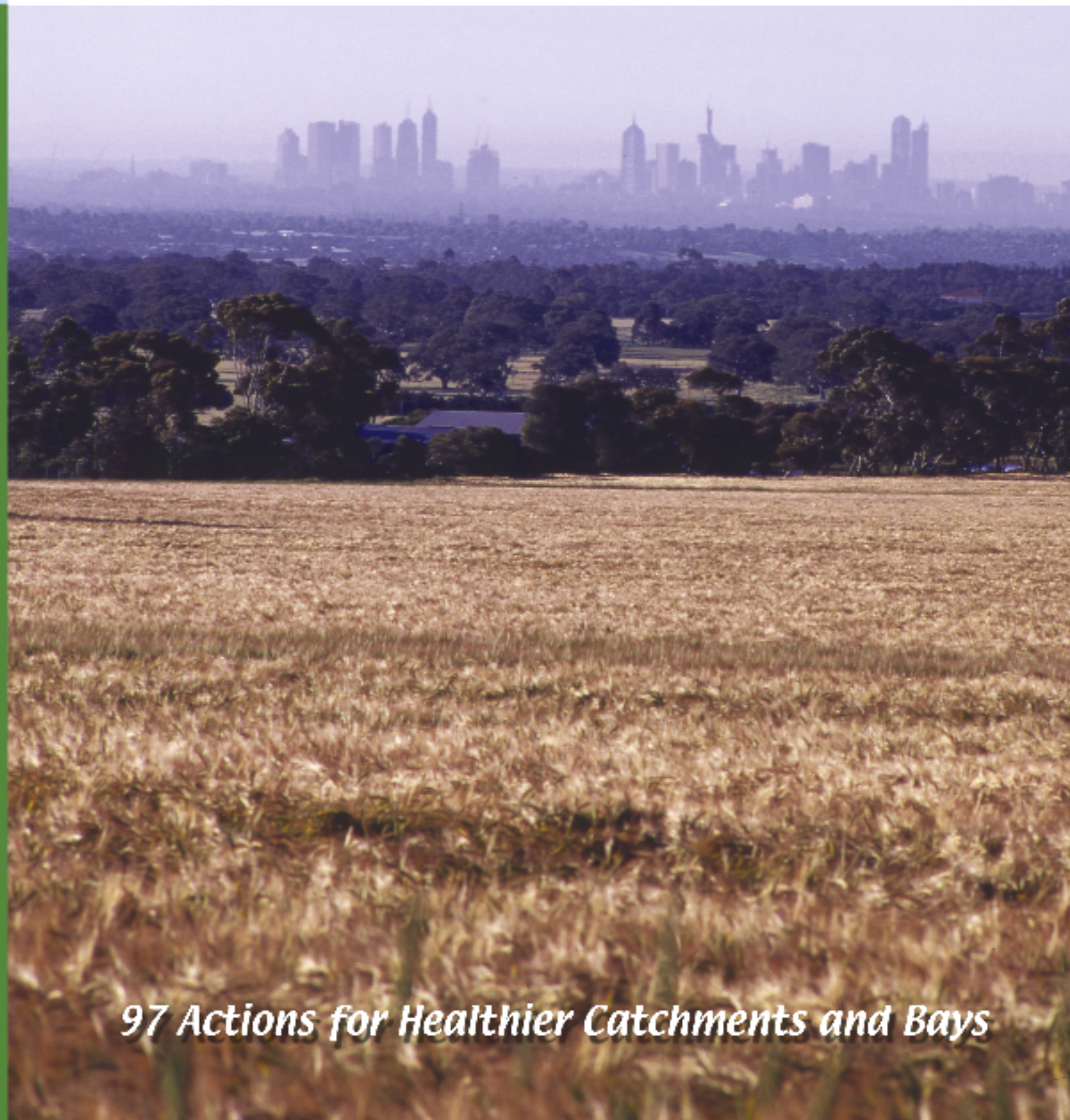




# Port Phillip and Western Port Regional Catchment Strategy 2004 - 2009



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*97 Actions for Healthier Catchments and Bays*

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Input and guidance has been provided by the members of the Regional Catchment Strategy Steering Committee on behalf of the organisations they represent, namely:

- |                    |  |                    |                                   |
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| • Alastair Kellock | Dept of Sustainability and Environment |                    |                                   |

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Port Phillip and Westernport



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## FOREWORD



The 2004-2009 Port Phillip and Western Port Regional Catchment Strategy is the culmination of two years work. It is a plan which will increasingly protect Port Phillip Bay, Western Port, the waterways and their catchments from the impacts of a growing population, from the changing use of land from rural to urban and from larger to smaller properties, many intensively managed.

The RCS Targets and Actions are built upon global sustainability principles embracing economic prosperity, social equity and environmental care. The 97 hard-edged actions respond to the immediate and longer-term risks to many of Victoria's most treasured and highly valued natural assets.

These include the bays and their beaches; the Yarra and Maribyrnong Rivers; the Yarra Ranges and the Macedon Ranges and their associated forests and parklands, which are the source of most of Melbourne's high quality drinking water; the highly threatened remnant grasslands and other rare vegetation communities and many species of wildlife whose continued existence depends on protecting and expanding their diminishing habitat.

The region is also famous for its productive rural landscapes that support flourishing, high value horticultural and agricultural industries.

This is the first time that a single plan has been prepared for our two valuable bays and all of the catchments that drain into them; a strategy whose priorities will guide the investment by Commonwealth and State Governments in natural resources management through the Natural Heritage Trust and other funding streams.

Identifying the relationships between our catchment assets and the activities that threaten them has been a substantial task.

Now government and non-government agencies, industry and community groups all have a role to play together with the CMA in implementing the Regional Catchment Strategy. Each of the 97 actions designates a lead agency and the partners responsible for their planning and implementation. Melbourne Water, the Department of Sustainability and Environment, the Department of Primary Industries, the EPA, each of the region's 38 Councils and several other agencies all have designated roles.

I commend the commitment and hard work of the staff and Board of Port Phillip and Westernport CMA in compiling this Regional Catchment Strategy, and also thank the many people from our partnering agencies, who have provided technical advice and assistance to the CMA. Their continued support will be important over the coming years as we work together to implement the RCS.

We now have a regional plan based on a good, although far from complete, understanding of what needs to be done in our catchment. With continued support from governments and the private sector we can now be confident the health of our natural assets will improve and the following generations will be the beneficiaries.

**Dr Mick Lumb**  
**Chairman**  
**Port Phillip and Westernport Catchment Management Authority**

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## Best Practice

Managing and implementing activities in ways that are designed to achieve agreed and beneficial environmental outcomes and performance targets.

## Biodiversity

The variety of life forms that exist in an area and the ecosystems of which they form part.

## Catchment

An area of land that drains naturally to its lowest point.

## Catchment assets

The term “catchment assets” is used in this RCS to describe broad categories of natural resources in this region, specifically the ‘water’, ‘land’, ‘biodiversity’ and ‘people and organisations’.

## Community

The people of the Port Phillip and Western Port region as individuals and collectively in a variety of organisations (including community groups, businesses, governments and their agencies, and non-government organisations).

## Ecological footprint

A concept that defines a theoretical area of land (hectares per person) needed to provide products for human consumption (including energy) as well as that required for waste disposal.

## Integrated catchment management

The management of all the components of catchment assets and their inter-relationships in a cooperative and coordinated manner.

## Region

The geographic area covered by this RCS, specifically being:

- the Werribee, Maribyrnong, Yarra, Dandenong and Western Port catchments
- Port Phillip Bay and Western Port
- the associated coast and near-shore marine areas.

## Risk assessment

Identification of what is causing catchment assets and their values to be at risk, and the quantitative and/or qualitative assessment of the likelihood and consequences of a deterioration of catchment assets.

## Sustainability

The ability of a catchment asset, and the values it provides, to be sustained for the long term.

## Triple bottom line

The concept of using a range of economic, environmental and social parameters together to measure outcomes or performance.

# 1. OVERVIEW The scope and contents of the RCS

## 1.1 The region

The Port Phillip and Western Port region is a spectacular, diverse, productive, vibrant, valuable and exciting place.

It includes Port Phillip Bay, Western Port and their ocean frontages, French and Phillip Islands and the rivers and streams of five catchments that flow to these bays, as shown in Figure 1. It contains metropolitan Melbourne, a thriving international city that is home to more than two-thirds of Victoria’s population. It is the hub of much of the State’s commercial, industrial and transport infrastructure, an important rural and agricultural region and a centre of social and cultural interaction.

The activities, livelihoods and lifestyles of the region’s 3.4 million urban and rural residents, and of the visitors who generate an important tourism industry, depend on the sustainable use of its land and water, the health of its fauna and flora and the habitats they live in. These are our “catchment assets”. While many of these assets are in good condition and well managed, the health of some others is at serious risk, as is their sustainability.

◆ Chapter 2 provides more information about the history and current condition of the catchment assets of this region.



Figure 1. Port Phillip and Westernport Region

## 1.2 The challenges and opportunities

Achieving sustainability and protecting our catchment assets is a major challenge for our society.

If the region is to be healthy, attractive and prosperous it must be characterised by increasing production, development and the associated economic benefits. To aid our progress towards this aim, we need to explore new technologies and apply them and increase awareness and adoption by our communities.

However, this production and development needs to be in sympathy with our environment. We must acknowledge that there are real limits and consequences to the way we use and manage our catchment assets. We have to understand that there are critical thresholds, or points at which the assets will be irreparably damaged, and we must ensure that we do not reach these thresholds.

Because the region is so densely populated and complex, in catchment management terms it presents some unique issues and opportunities. Among the greatest threats are the changes, pressures and impacts that come with population growth, urban and agricultural development. Port Phillip Bay will not cope with growing inputs of water-borne nutrients, particularly nitrogen. Western Port's health is severely affected by the inflow of increased sedimentation caused by unsustainable land use. The

*Achieving good catchment management requires everyone to consider the downstream impacts of their activities.*

Werribee and Maribyrnong Rivers are under pressure from high levels of water harvesting. Natural habitats on the coastal plains and the Mornington Peninsula face degradation and local extinction unless weed invasions are reversed and fragmentation of habitat arrested.

Achieving good catchment management requires everyone to consider the downstream impacts of their activities – figuratively and literally – and to find solutions where these cause problems. This is vital. We need to find less damaging ways of producing what we want and need, or the Port Phillip and Western Port region will face major economic, social and environmental costs.

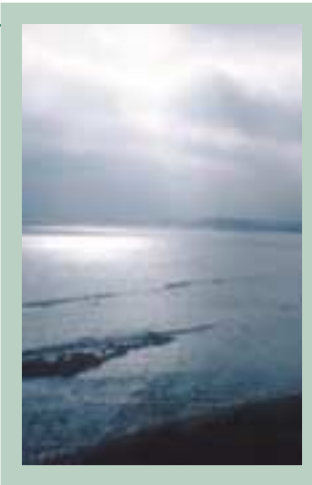
We all have a responsibility and an opportunity to be good stewards of our catchment assets. As we produce goods and services and modify landscapes to meet our economic and social needs, we must ensure that we respect environmental limits, avoid environmental damage and prevent environmental costs being transferred to others or into the public domain. For every activity, there are ways to minimise damage and make the most of environmental values. This is the path to sustainability.

- Chapter 2 establishes a vision that takes up the challenge of ensuring sustainability of catchment assets so that the region is healthy, attractive and prosperous.

Other key roles and responsibilities of the CMA include:

- providing high quality and timely advice to Government on matters relating to catchment management and land protection
- increasing community awareness and understanding of the importance of land and water resources in the region and their sustainable use, conservation and rehabilitation
- reporting regularly on the condition and management of land and water resources in the region.

More information on the CMA can be found at <http://www.ppwcm.vic.gov.au>



## 1.4 The Regional Catchment Strategy

### Outline

The Regional Catchment Strategy (RCS) describes our catchment assets and how they are interrelated. It indicates what needs to be done to manage and use the assets in a sustainable and integrated way, and outlines goals and priorities for the future.

It focuses on improving environmental and catchment management while recognising that, by helping resources to be managed more sustainably, it will contribute to society's present and future options for social and economic development. In this way, the RCS is much more than a geographic inventory of issues and proposed actions.

It has been developed around these key concepts:

- the people of Victoria have rich, complex and diverse relationships with the region's environment and catchment assets
- protecting key catchment assets and improving the way the region's natural systems are managed is fundamental to community wellbeing, now, in the future, and as community values change
- there is much to learn from past actions and experience in integrated catchment management in the region, and the RCS builds on this history
- through research and community involvement, we are getting better at understanding natural systems and how to work with them
- the social, economic and environmental outcomes of change are interrelated
- inspired and committed partnerships between community and governments are needed, because change will be achieved by people, their institutions and communities
- for success, the CMA and its partners will need to build purposeful partnerships between people and their organisations, including the professional, scientific and social disciplines, the wider community, and business interests involved in all aspects of catchment management.

The main focus of the RCS is management of land, water and biodiversity in the region, including the coastal and marine areas. To a lesser extent, it covers air and atmosphere, cultural heritage, planning and urban form, particularly where these relate to catchment management.

The RCS recognises that by drawing in large quantities of energy and materials and generating wastes, human activity in the region has significant impacts on this region and on others.

Accepting that the region's economic processes depend also on the catchment assets of other regions of Victoria, other parts of Australia, and other countries, the RCS particularly recognises the important interregional links and relationships between Melbourne and the rest of Victoria. Examples include the large quantities of goods and services that are traded into and out of the region, and the significant demands we make on the catchment assets of the Gippsland region, for instance, through the direct harvesting and transfer of water from the Thomson Dam and through reliance on large quantities of coal-fired electricity generated in the Latrobe Valley.

The RCS deals with catchments at a broad scale, demonstrating the connections between land, water and biodiversity with all the human and natural activities that occur here. It highlights these links, from the tops of mountain ranges and across forests, farms and suburbs, to the coasts, bays and inshore marine waters. It is designed to give us the total view of the region that is needed to best plan, manage and conserve the assets.

*The main focus of the RCS is management of land, water and biodiversity in the region, including the coastal and marine areas.*

The RCS also acts on our knowledge that the land, water and biodiversity of our catchments need to be managed together. It is a guide for the people and organisations of this region to work cooperatively and achieve integrated catchment management.



While the strategy has a stated life of five years, the RCS has been developed with a longer-term perspective in mind and will be revised regularly. Its implementation will be delivered through a range of issue-specific strategies and plans, such as the Regional River Health Strategy, as well as the annual Regional Catchment Investment Plan (RCIP).

- Chapter 3 provides more information on the regional, national and global context of the RCS, and the processes at work in the region, as a basis for setting regional priorities.

### Purposes

The RCS provides a framework for effort, a funding guide, and a means of integrating policy. It offers a regional perspective and a way of engaging stakeholders.

#### *A framework for focusing effort*

The RCS is a guide to help focus, integrate, coordinate and monitor government and community effort on the important catchment management issues throughout the region.

It aims to ensure that projects are planned in a logical sequence and to deliver the best value for money and human resources, for the benefit of the whole region.

#### *Investment plans for funding catchment programs*

The RCS has been accredited by the Victorian and Australian governments to guide their investment in catchment management in the region. By establishing clear goals and targets, it provides the Natural Heritage Trust (NHT) and other government funding programs with a consistent rationale and coordinated investment plan. This makes it a vital document for any organisation

seeking government support for programs in the region – including water authorities, councils, non-government organisations, private sector companies and volunteer community groups.

#### *Integrated and coordinated policy, planning and program delivery*

The RCS provides a common set of goals, priority actions and timetables so that everyone with an interest in the use of the region's land, water and biodiversity can work together.

It aims to fulfil the purposes of a number of related Acts, including the Catchment and Land Protection Act 1994, Environment Protection Act 1970, Water Act 1989, Planning and Environment Act 1987 and Coastal Management Act 1995. It provides objectives and a region-wide context for scientific assessment and planning.

#### *A regional perspective*

By viewing problems and solutions from a whole-of-catchment perspective, the RCS shows how local and regional projects can complement each other and create the maximum benefit.

#### *Engagement of stakeholders*

The guidance provided by the RCS is for everyone; individual landholders, governments and their agencies at all levels, non-government organisations, agriculture, industry, businesses and cultural groups, as well as the region's 38 local councils and around 500 volunteer community groups.

All these sectors of the regional community have a stake in how we manage catchment assets. Many have helped with the development of this RCS. Their input and commitment has been vital in shaping its objectives and priorities, and continuation of the relationships established in this way is now vital for its successful implementation.

- Chapter 3 provides more information on the purposes and scope of the RCS and the key stakeholders and partnerships that will be important in its implementation.

### Ensuring sustainability at a regional level

The RCS presents a systematic and logical way of translating nationally and internationally accepted principles of sustainability into regional goals, targets and actions. It does so in four stages:

1. Defining principles of sustainability and identifying the region's catchment assets.
2. Drawing up an asset-risk analysis that looks at the values of the assets and the threats to those values, in order to determine the most important risks that need to be managed.
3. Developing sustainability objectives that address the risks and meet the overall principles of sustainability.
4. Defining targets and actions to achieve the objectives.

- Chapter 4 further explains the flow of logic adopted in the RCS to guide its analysis and define priority actions. Chapter 4 also explains the asset-risk analysis method that has been used.

### Goals, objectives, targets and actions

These steps are undertaken for the catchment assets of:

- Water resources (Chapter 5),
- Land (Chapter 6) and
- Biodiversity (Chapter 7).

The same approach is also used to describe:

- the People and Organisations of the region (Chapter 8) which are the key influence on catchment assets.

The goals, objectives, targets and actions are summarised in table form at the end of each chapter.

### Monitoring, evaluation and reporting

It is vital that we understand the effectiveness of actions as well as the changes in catchment condition. This enables us to adapt our actions with improved knowledge and also to be accountable for investment in the region.

- Chapter 9 outlines the key steps to be taken in developing a robust monitoring, evaluation and reporting framework

### Implementation

The RCS sets 97 actions to be implemented. Some are existing actions that need to continue, while others are new initiatives. The actions must be assessed to determine their relative priority. This assessment is based on achievability, cost and the level of environmental, economic and social benefits that will be realised by each action.

- Chapter 10 outlines a methodology that will be used to assess the priority of actions and implementation arrangements.



### Linkages across the RCS and regional contributions to national targets

The RCS covers numerous topics and issues and includes actions that are relevant to a large number of stakeholder groups and organisations.

The RCS also sets targets for this region that contribute to the national framework for natural resource management.

- Chapter 11 shows how the RCS targets fit within and contribute to the national framework and broadens this approach to summarise objectives, targets and actions that are relevant to various other key topics and organisations.

### Consultation and development

This RCS builds on the first RCS developed in 1997 and underlines the fact that we are continuing to learn how the region's ecosystems work and how to work with them.

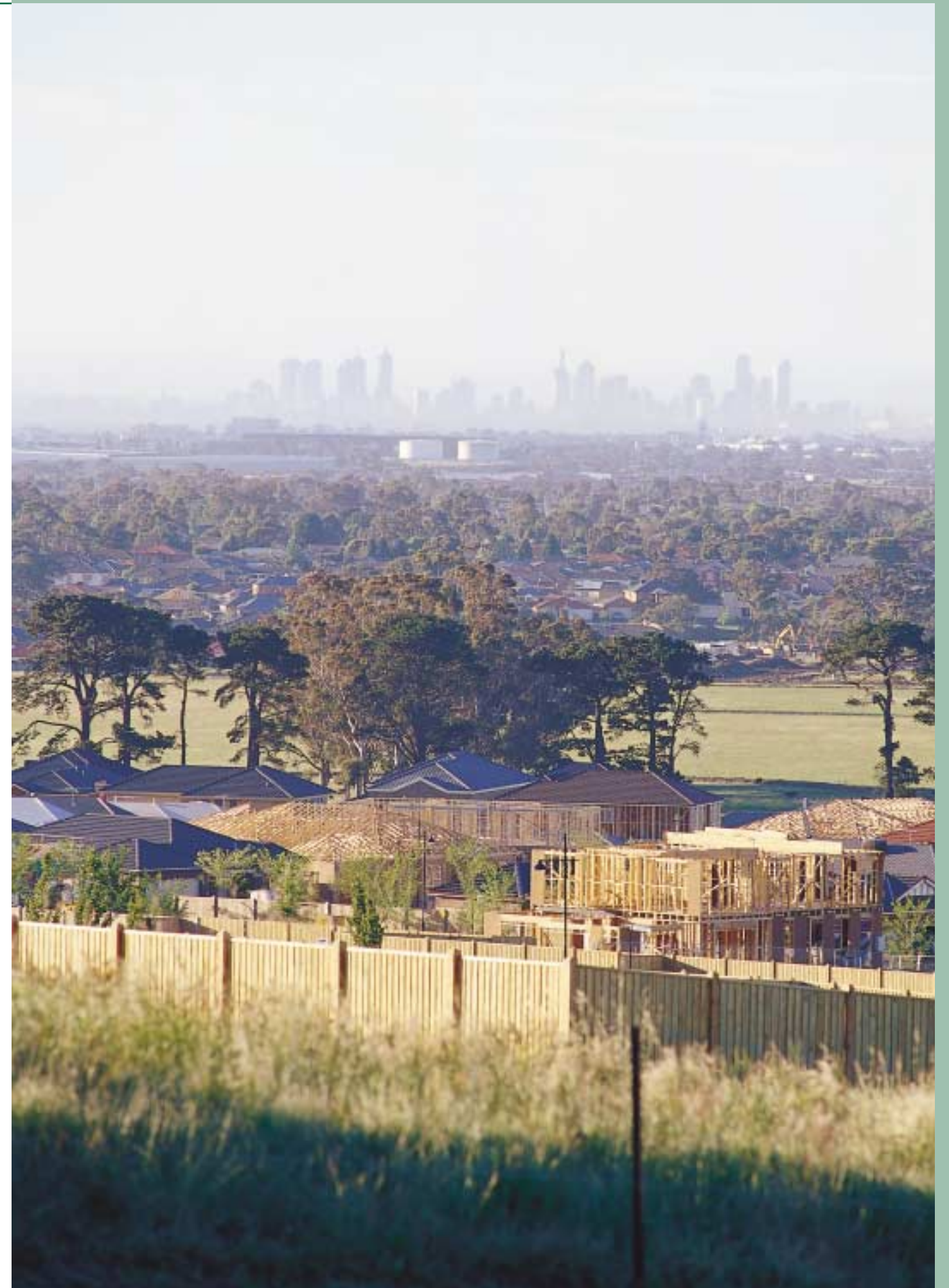
The consultation process has been extensive. A multi-organisation RCS Steering Committee was set up, intimately involving key people and organisations in all aspects of the consulting, planning and writing from the initial stages of the RCS through to the final production. Three stages of consultation were undertaken, including the publication of two discussion papers prior to a draft RCS. This built a solid understanding by stakeholders and communities of the scope,

issues, targets and actions of the RCS. The discussion papers were in an easy-to-understand style, designed so people could provide comments easily. Around 1,500 printed copies of each document were distributed and all feedback was analysed and considered in the development of the next stage.

The draft RCS was itself the subject of an extensive community consultation process. Four local government workshops, nine community forums, and numerous individual meetings and discussions were held with government organisations, industry sectors and community interest groups, including the Indigenous community. In addition to the feedback gathered in these meetings and discussions, over 70 written submissions were received regarding the draft. The draft was improved substantially as a result of the advice and comments received. As an example, the information, targets and actions regarding the region's marine assets have been amended extensively in the Estuaries, Bays and Seas section and in the Biodiversity chapter.

The RCS emphasises the need for ongoing attention to processes of consultation, education, research, monitoring and evaluation.

- Chapter 12 explains the renewal of the RCS, including the community consultation process and examples of the way the consultation influenced the structure and content of this RCS.





## 2. PERSPECTIVE on the region

### 2.1 A brief history

The Port Phillip and Western Port region holds evidence of 500 million years of the Earth's history in its rocks and fossils<sup>1</sup>. Its landscape was formed by ancient sedimentation in deep ocean and shallow marine environments, by massive continental shifting and spectacular volcanic activity.

Some 100 million years ago the area was part of a giant continent that included Antarctica. Around 30,000 years ago enormous herbivorous mammals called diprotodons browsed for their favourite grasses, fruit and leaves, and 20,000 years ago a vast exposed plain stretched all the way south to the area now known as Tasmania.

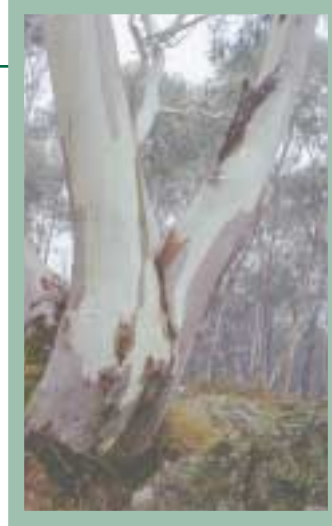
Between 6,000 and 14,000 years ago the climate warmed markedly, sea levels rose and the landscape took on the approximate form that we see now, with mountain ranges, a vast basalt plain in the west of the region, large freshwater swamps and the two major bays.

At the time when white settlers first came to Australia, Port Phillip Bay was much as it is now, with diverse marine life in its deep protected waters. Western Port was generally shallower but with some deep channels, lush seagrass meadows and large intertidal zones daily exposing mudflats and mangroves. Together these water bodies supported a vibrant array of marine and bird life.

The region then was home to indigenous people in a number of tribes, most being part of the Kulin Nation of peoples, with each group made up of several clans<sup>2</sup>. The total Aboriginal population of the region may have numbered hundreds rather than thousands. Their ancestors had been in this area for around 40,000 years, through the last Ice Age and when the last volcanoes erupted.

The tribes managed the region's natural assets for productive purposes. Extensive use of fire on the volcanic plains kept the plains largely grassy and productive for hunting. However, Aboriginal culture and management practices were based on an understanding of the regional environment and sustainable use of the natural resources. Groups made up of one or two families would collect food and other materials locally, periodically moving to other areas and allowing former locations to regenerate.

The area was an important meeting and trading place. Corroborees involving several clans were performed often in the region, and for many reasons. Trading between clans and nations occurred, evidenced by axe stones that were shaped at a site many weeks travel away.



Their country included important rivers and streams and the associated catchments. Key waterways included those now known as the Werribee, Maribyrnong, Yarra, Lang Lang and Bass rivers, all with their origins in the uplifted hills in the northern or eastern parts of the region. Each river travelled through a mix of forest, woodland, scrub, grassland and heath on its way to wetlands, estuaries and the bays. The riparian zones were typically heavily vegetated, providing sheltered habitat for the reclusive platypus and a range of native freshwater fish species.

The prolific and often dense native vegetation of the catchments was home to fauna species including koalas, wombats, kangaroos and wallabies, eastern quolls, emus, snakes and extensive birdlife such as parrots and eagles. Large freshwater wetlands were common near the coast and were a hub for birdlife

feeding, nesting and resting on the way to destinations elsewhere around the globe.

The region held significant untapped deposits of sand, rock and minerals that would later aid building and construction. Underground layers of ancient sands and gravel acted as aquifers and held substantial quantities of high quality groundwater. The climate and soils, though variable across the landscape, offered the opportunity for the establishment of a variety of introduced and productive food crops.

Overall, the region had exceptional natural beauty and diversity shaped by geological processes, climate and the ecosystems unique to this part of the world.



<sup>1</sup> *Introducing Victorian Geology*  
<sup>2</sup> *The lost land of the Kulin Nation*

## 2.2 The region today

Little has changed geologically in the 200 years or so since the region was first settled by Europeans. Looking to the horizon, the landscape is impressive in every direction.

But the region is much more populous, with around 3.4 million residents<sup>3</sup>. The population saw rapid growth from the 1830s onward, with significant migration from overseas and interstate in the second half of the 20th century. The Aboriginal culture, initially so dominant, is far less evident even though the region is home to almost half of Victoria's Indigenous population<sup>4</sup>.

The banks of the Yarra River have remained an important meeting place and Melbourne is a major metropolis, the population centre of the region and the State, a hub of social interaction and activity, and a centre of trade, tourism, business and industry, learning and technology with around 1.4 million dwellings and more than 180,000 business locations<sup>5</sup>.

*The activities and lifestyles of residents and visitors rely on the diversity and health of the stunning catchment assets*

The activities and lifestyles of residents and visitors rely, however, on the diversity and continued health of the stunning catchment assets that provide its environmental, economic and social values.

Key assets in the region range from rural landscapes to parks and reserves, indigenous flora and fauna and the catchment features that include rivers, wetlands and the bays, and French and Phillip Islands.

The rural landscapes around Melbourne support agricultural industries of high value. Of the 1.3 million hectares in the region, around 45 per cent is rural farmland<sup>6</sup> accommodating some 4,500 enterprises<sup>7</sup>. The annual gross value of agricultural production exceeds \$1 billion, from industries such as horticulture, dairying, poultry farming, beef farming and viticulture. This figure could be significantly higher if the income from small

properties and value-adding industries was included<sup>8</sup>.

The region has an array of parks and reserves that support rare and diverse flora and fauna species as well as providing highly valued recreation and tourism areas. It is at the intersection of seven bioregions, the bay and ocean environments, and includes eight National Parks, six State Parks, eight Marine Protected Areas and a wide range of regional, metropolitan and local parks and conservation reserves.

Almost one third of the region retains remnants of its locally indigenous vegetation, including important areas of grasslands seldom found elsewhere<sup>9</sup>. Of this vegetation, 41 per cent is protected in parks or reserves and managed for conservation, a further 31 per cent is on other public land, and the remainder – on private land – is also highly significant. A number of vegetation classes are severely depleted in extent and quality, in particular the grasslands.

The extensive range of vegetation types and natural ecosystems in both the terrestrial and marine environments houses more than 1860 species of native flora and more than 600 species of native vertebrate fauna, making the region one of the most biologically diverse in the State<sup>10</sup>. Of the species here, 296 flora species and 128 fauna species are considered threatened.

The region's water supply catchments, water storages and waterway systems provide certainty of potable supply for the population as well as a range of other economic, social and environmental benefits. Some 8,000 kilometres of waterways attract more than 50 million recreational visits annually<sup>11</sup>. There are also more than 900 wetlands<sup>12</sup> including three internationally recognised Ramsar sites.



The jewels in the crown - Port Phillip Bay and Western Port and its islands - are found where the catchments meet the sea. Each has unique and wondrous ecological, economic and community values. The bays support commercial fishing, a growing aquaculture industry, three major ports and provide the most popular recreational fishing areas in Victoria. In these bays and the nearshore areas of Bass Strait are eight recently established Marine Protected Areas that safeguard marine habitats and species, natural features, cultural heritage and aesthetic values.

Not surprisingly, tourists make some 70 million visits a year to the bays and the attractive and accessible 600 kilometres of bay and Bass Strait coastline and beaches that lie within the region.

In the region the environment, as measured by indicators such as air and water quality, is generally good by world standards and living conditions are of a very high standard. These factors are fundamental to Melbourne's reputation as one of the world's most liveable cities<sup>13</sup>.

However, there are numerous threats to our catchment assets and some important declining trends in catchment health. Increasing population, new urban development and our modern lifestyles are affecting catchment hydrology, water use and soil health at an unprecedented rate. Salinity is emerging as a major problem in urban and rural areas. Native vegetation is still being cleared at a greater rate than it can be re-established through revegetation programs. Nitrogen inputs to Port Phillip Bay are high and the health of this bay is critically poised<sup>14</sup>. Sediment inputs to Western Port are contributing to losses of seagrass and slow recovery rates.

We do not seek to return the region to how it was in the past. But the challenges confronting us today include understanding catchment processes, managing the changes in our catchment condition, modifying our collective patterns of consumption and resource use, and developing initiatives to protect and enhance key assets.

*The challenges confronting us today include understanding catchment processes, managing the changes in our catchment condition, modifying our collective patterns of consumption and resource use, and developing initiatives to protect and enhance key assets*

This task is complex due to the number of people and organisations having an impact on the environment and being involved in its management. As well as the substantial resident population there are numerous Government agencies, local councils, non-government organisations, agricultural and industry groups, Indigenous organisations, and hundreds of volunteer community groups including Landcare, CoastAction/Coastcare, Bushcare, Rivercare and various 'friends' groups. The awareness, understanding, attitudes and actions of these people and organisations will have a strong influence on the future health of our catchment assets.

We must understand the existing interrelated and cumulative pressures on the catchment assets and those that are looming for the future — pressures such as increasing population, high per capita consumption and waste, changing land-use, urban development, water consumption, energy use, inappropriate land management practices, habitat and species loss, pest plants and animals, climate change, salinity and water pollution. Then we must find effective and innovative ways to manage them.



<sup>3</sup> ABS Census of population and housing.

<sup>4</sup> Strategy for Aboriginal managed lands in Victoria.

<sup>5</sup> ABS Regional Statistics Victoria 2002.

<sup>6</sup> Land use map - Port Phillip and Western Port Region. (GIS Layer).

<sup>7</sup> ABS 1999/2000 Agricultural Commodity Survey - Value of Agricultural Production

<sup>8</sup> Challenges and opportunities for agribusiness on the urban fringe - Yarra Valley Region

<sup>9</sup> Vegetation (EVC) Mapping of the Port Phillip and Westernport Region.

<sup>10</sup> Flora Information System and Atlas of Victorian Wildlife.

<sup>11</sup> StreamWatch Annual Report 1994.

<sup>12</sup> Current wetlands environment and extent (GIS layer).

<sup>13</sup> Cost of Living Survey.

<sup>14</sup> Port Phillip Bay Environmental Study.

## 2.3 Our vision for the future

*The Port Phillip and Western Port region will have people working to achieve productive land, habitat for native plants and animals and clean water in the catchments, rivers and bays, making it a healthy, attractive and prosperous place to live, work and visit*

In realising this vision we expect that during the next 30 years major work will be undertaken across the region, so that by 2030, significant changes will be clearly visible in the landscape, both urban and rural.

### Urban areas

New urban development will be carried out according to performance standards that embrace sustainability and make houses and buildings economical users and recyclers of natural resources, such as water-sensitive urban design, energy efficiency and waste management technologies.

Established suburbs will have been retrofitted with technologies to reduce stormwater flows, pollutant loads, energy use and water consumption, such as low-flow taps, rainwater tanks to supplement the piped water supply, and garden plants that require minimal watering. These will have reduced stormwater flows, pollutant loads, energy use and water consumption.

Vegetation will have been restored along urban waterways and integrated with recreational infrastructure such as walking and cycling tracks, making city dwellers more aware of environmental issues and what they can do to make the region sustainable.

At the same time as up to one million new residents are accommodated, urban sprawl will have been controlled by implementing an urban growth boundary around Melbourne and regional townships. Complementing this, planning protection and support for 'green wedges' will have helped the region to profit in economic and social terms from its catchment assets while promoting sustainability within the green wedges and supporting a diversity of native ecosystems and species.

### Rural areas

Productive agriculture, with small and large landholders across a range of industries, will underpin vibrant rural communities and investment in improving the condition of rural land in the region. Most enterprises will use environmental management systems to guide land management and food production and give them advantages in export markets. Native vegetation on farms will have increased the natural predators of insect pests, no new weed species will have been allowed to establish, and research into weed control will have helped reduce existing weeds. Land-use that matches land capability will be achieving multiple benefits for the local landscape, including salinity control and waterway protection. The region's many small farms and lifestyle properties will be well managed, providing a high level of social and environmental value to their owners and the local community.

Spectacular valleys and escarpments in the Werribee and Maribyrnong catchments will have been revegetated with locally indigenous species to enhance biodiversity, landscape and cultural values and create new recreation facilities. Vegetation corridors will link the Brisbane Ranges, Werribee Gorge and Lerderderg parks and local agricultural enterprises will be largely protected from weeds, salinity and decline in water quality. Productive agricultural land will support innovation in rural industries such as the link between agriculture and tourism.

In the Yarra and Dandenong catchments, along Port Phillip Bay and on the Mornington Peninsula, bushland remnants and the coastline will have been protected and improved, streambanks and foreshores revegetated, belts of forest created around vineyards and other farms, major wetlands enhanced and salinity managed.

In the Western Port catchment, work will have been undertaken on private and public land to reduce sediments in waterways and to rehabilitate the coastline. Phillip Island and the steep country in the Bass Hills will have been gradually reafforested so that farmland paddocks are lined with belts of local eucalypts and acacias and with indigenous understorey plants, easing salinity problems and providing an income stream from forest products for landholders. The highly significant vegetation and wetlands on French Island will be relatively weed-free and offering a sustainable ecosystem for the many rare and endangered flora and fauna species which have become extinct in other parts of the region. Widespread coastal and marine projects will have been undertaken to help regenerate the seagrass beds in Western Port and restore healthy fish populations.

### Across the region

Targets will have been achieved for river health, water quality, water recycling and the reduction of nitrogen, phosphorous, sediment and toxicant inputs to waterways, wetlands and the bays and oceans. Along the coast, separation will be maintained between valuable and popular natural areas and townships. There will be a sound understanding of the implications of climate change, which is factored into our catchment management programs. An extensive and representative array of parks and other public land will be managed for ecological sustainability while offering multiple recreational opportunities. Also, the quality and quantity of native vegetation across the region will have improved, with connections made to help reestablish a web of vegetation corridors and viable populations of rare and threatened species.

The marine environments in the bays and offshore will be ecologically rich. Sustainable aquaculture enterprises and recreational and commercial fisheries will be enjoyed alongside the network of marine protected areas. Outstanding natural values and consistently high water quality will ensure that Port Phillip Bay, Western Port and the coastline remain the premier recreational assets for Victoria with millions of people enjoying swimming, boating and fishing each year.

Residents will enjoy a quality of life that is high in global terms. Melbourne will remain a hub of trade, technology, culture and social interaction with strong links to its neighbouring rural centres that share the region's catchments. Improved public health will be a tribute to the clean water, low pollution levels and the availability of open space for exercise and enjoyment.

The management of catchment assets will be undertaken cooperatively across agencies and local government, and coordinated with economic and social planning and service delivery to provide outstanding efficiencies and results. There will be better community understanding of the issues, and more willingness to change practices. Land stewardship will be culturally ingrained so that landowners accept the responsibility to hand on their land to future generations in better condition than it was received.

Our vision is for a vibrant community that is informed, aware, consulted, active in undertaking on-ground projects and pro-active in seeking new technology and practices to achieve sustainability.





**CONTEXT** for the RCS

## 3. CONTEXT for the RCS

### 3.1 The scope of the challenges

This chapter places the RCS and the issues that it addresses in a global and national context. It looks at global and regional environmental challenges and at the creative responses that are being adopted.

#### Global challenges

The global challenges of managing the environment and sustainable development are well recognised and documented. For example, the recent international review of global change<sup>15</sup> states that:

*“The world faces significant environmental problems: shortages of clean and accessible freshwater, degradation of terrestrial and aquatic ecosystems, increases in soil erosion, loss of biodiversity, changes in the chemistry of the atmosphere, declines in fisheries, and the possibility of significant changes in climate. These changes are occurring over and above the stresses imposed by the natural variability of a dynamic planet ...”*

*“The changes taking place are, in fact, changes in the human-nature relationship. They are recent, they are profound, and many are accelerating. They are cascading through the Earth’s environment in ways that are difficult to understand and often impossible to predict. ...these human-driven changes to the global environment will require societies to develop a multitude of creative response and adaptation strategies.”*

*Within the Port Phillip and Western Port region, many sound and farsighted decisions have previously been made*

Throughout the world, recognition of the magnitude of these changes is mobilising many and diverse responses from all sectors: public and private, non-government and community. Responses include formal international agreements between governments, numerous government policies and programs, the acceleration of innovations in production and recycling processes, and the adoption of better business practices. As well, millions of individuals are making personal commitments to change their lifestyles and consumption patterns.

#### Regional challenges

In developing the RCS we have taken into account not only global but national, regional and local perspectives to determine the scale and nature of the challenges that confront us.

The RCS acknowledges that many sound and farsighted initiatives and decisions have previously been made within the Port Phillip and Western Port region. It builds on these foundations, drawing on lessons learned from the wide range of responses developed in the later part of the 20th century, and on the emerging understanding of ecological systems and the pressures and conditions on catchment assets in the region.

In particular, it recognises the need for regional planning and reform and the special issues that arise because the region includes a major industrial city and its hinterland.



<sup>15</sup> Global change and the Earth system: a planet under pressure

While Melbourne's urban area only occupies 17 per cent of the Port Phillip and Western Port region, its patterns of natural resource use significantly influence the whole region. A large metropolis like Melbourne pulls in, consumes and transforms material and energy from near and far, posing particular catchment management challenges in terms of population numbers and densities, affluence, production systems and consumption patterns and of the sheer quantity and nature of the wastes generated. Changing the consumption patterns and the flow of wastes into receiving environments will have wide-ranging effects across society. It is this aspect that sets our region apart from the other regions in Victoria.

*The RCS emphasises the need for partnerships and community education*

The RCS emphasises the need for partnerships and community education because the activities within this region that impact on catchment management and ecosystems are the cumulative outcomes of the choices and actions of individuals going about their businesses, their daily lives and through the organisations and communities. However, the RCS is only one of many mechanisms for vigorously and meaningfully addressing the global challenges of sustainability in the region.

This Regional Catchment Strategy aims to deliver integrated catchment management with a strong focus on the protection and integrated management of water, land and biodiversity within this region. However, there are also clear connections with and dependencies on areas outside this regional boundary, particularly through the air and atmosphere, oceans and across the catchment boundaries.

### Connections and dependencies

Despite impressive technological innovations that have transformed life in affluent countries, human life still depends on the earth's natural resources and capacity to sustain the delivery of the ecosystem-based goods and services on which we depend – anything from food and clean water to pollution and flood control, and disease regulation. Through daily actions as simple yet fundamental as breathing and eating each person interrelates with the regional and the global environment. We are connected and dependent. Throughout human history, ecosystem goods and services have provided the fabric of human culture and aesthetics, while humans have shaped nature and have arguably become

the world's most dominant evolutionary force<sup>16</sup>. Modern technology, consumption patterns and increasing populations are delivering unprecedented rates of change to global systems so that in many parts of the world, the relationship between biophysical and human systems is becoming profoundly unbalanced as populations will face increasing environmental, social and economic difficulties as the 21st century progresses.

During the 20th century the world population tripled and water use increased sixfold. By 2050, at least one in four people is likely to live in countries affected by chronic or recurrent shortages of fresh water<sup>17</sup>. This change will have come at great environmental cost: some rivers will no longer reach the sea, half the world's wetlands will have disappeared and 20 per cent of freshwater fish will be endangered<sup>18</sup>.

Around the world, the challenge of protecting ecosystem goods and services is made more complicated by the fact that issues of population, poverty, pollution and resource demand are all interlinked and cannot be solved separately. The social, economic and environmental outcomes of change are related.

A key issue from the perspective of catchment management is the need to adapt and respond to changing circumstances and demands, but in doing so we must stay within critical thresholds of the natural systems involved. Although these thresholds may be hard to determine, many conform to standard patterns based on well-understood ecological processes. Throughout the world, the eutrophication of lakes, estuaries, shallow bays and near-coastal waters is a recognised problem. In the Port Phillip and Western Port region we know that we may be approaching some critical thresholds that could propel the large natural systems we depend on into new, less desirable states.

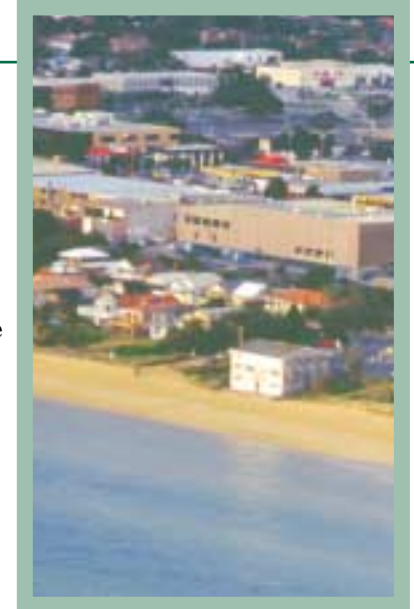
For example, the 1996 CSIRO Port Phillip Bay Study identified nitrogen as the critical determinant of the health of the bay. If little is done to effectively stabilise or reduce nitrogen loads in this bay, then a critical threshold may well be approached. Exceeding this threshold could trigger changes such as frequent algal blooms and the dominance of introduced marine pests. This would fundamentally alter the bay's ecological processes, reducing its attractiveness and usefulness to humans for swimming, boating, fishing and its capacity to assimilate waste. This would threaten the health the productivity of the natural system. And because it would be extremely difficult to reverse it could lead to a major social and political crisis for Victoria.

This example demonstrates the connections and dependencies between human wellbeing and the ongoing capacity of large-scale ecological processes to continue to deliver ecosystem services like waste assimilation and nutrient recycling. While these services remain uncosted in the economic sense, they are clearly critical to economic and social wellbeing. In many cases, this capacity is threatened by cumulative loads and unforeseen interactions.

While natural systems will continue to change, it is important that we manage them to retain their resilience and functional health. It is important to invest in good quality science that can support proactive planning and policy development, and inform regional catchment management. This has been critical

in the case of Port Phillip Bay, where investments in research and development have provided a working understanding of the geochemical and ecological processes that drive its nutrient processing and health. The results of the Port Phillip Bay Study clearly highlighted the need to focus on lowering the total nitrogen load entering the bay each year, triggering the development of the Port Phillip Bay Environmental Management Plan and other initiatives to protect the health of the system and to ensure that it can still assimilate nitrogen.

*While natural systems will continue to change, it is important that we manage them to retain their resilience and functional health.*



<sup>16</sup> Homo economicus as a keystone species

<sup>17</sup> Sustaining Water, Easing Scarcity: A Second Update.

<sup>18</sup> The UN World Water Development Report for People, Water for Life

## 3.2 Strategic work that sets the scene

Numerous Acts, policies, strategic documents and plans are relevant to the catchment management issues dealt with in the RCS. Those of particular relevance to us are summarised below. Their focus varies from global right through to local emphasis.

### Global, national and state strategies and plans

The concept of sustainability has gathered momentum since publication in 1980 of the World Conservation Strategy of the International Union for Conservation of Nature and Natural Resources (IUCN). The IUCN promoted sustainability as a strategic approach to the integration of conservation and development, consistent with the objectives of:

- ecosystem maintenance
- the preservation of genetic diversity
- sustainable utilisation of resources.

A suite of interrelated principles, such as conservation of biodiversity and the precautionary principle, is now accepted as the basis of sustainability. Sustainability principles have been endorsed and adopted by governments around the world, with recognition of the fundamental links between social and economic wellbeing and a healthy environment. These were explained for the first time in 'Our Common Future'.

Integration of economic, natural resources, and environmental policy is critical to making progress towards sustainability goals. This link was explored through Agenda 21 which is a global action plan for sustainable development endorsed by more than 150 nations, including Australia, at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. Its 40 chapters provide the most comprehensive international strategy for combating the problems of poverty, development and environmental degradation.

Agenda 21 outlines actions that governments, international organisations, industries and the community can take to achieve sustainability. These actions recognise the impacts of

*In our region, relative affluence and access to technology have deferred many problems of environment degradation.*

human behaviours on the environment and on the sustainability of productive systems. Like most international agreements, it is general in nature, so the real test comes in transferring its broad policies to effective regional action. That is the task of this RCS. Already more than 100 local governments in Australia, including at least 20 in Victoria, have committed to Local Agenda 21, or ecologically sustainable development, through municipal plans and strategies that involve the community.

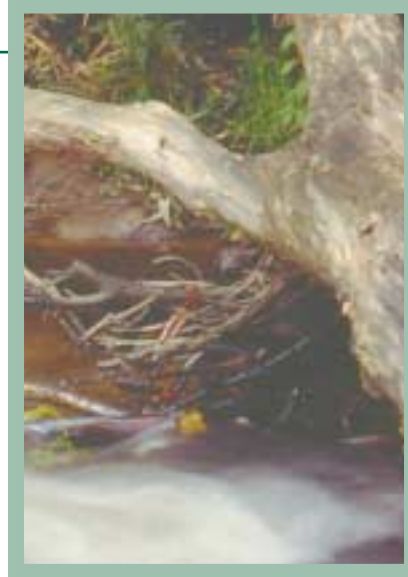
The National Strategy for Ecologically Sustainable Development (ESD) was endorsed by heads of Government in 1992. It outlined government commitments at state and federal level to achieving sustainable development, and followed the Commonwealth Government's ratification of Agenda 21.

At state level, complementary sustainability strategies exist to provide the context for the RCS, including Growing Victoria Together that sets out the Victorian Government's vision for the future. This requires consideration of triple bottom line (social, economic and environmental outcomes) in government investment.

### Plans that involve our region

The challenge of sustainability is acute in the Port Phillip and Western Port region, given the relationship of its large urban agglomeration to the catchments, and given that this is the region where most Victorians live and work.

In Australia, and in our region, relative affluence and access to technology have deferred many problems of environmental degradation. But the need to find solutions remains urgent. Notwithstanding our tremendous advances in technology and material wellbeing, we are now no less dependent on abundant and resilient ecosystems than we were in past decades and centuries. Despite the impressive engineered infrastructure that services cities, the quality of our lives is still linked to basic and indispensable ecosystem services, including those that deliver water and air and those that disperse and assimilate pollution.



Positive signs include heightened environmental awareness, increasing involvement in practices like recycling, and the growth of community groups in areas like urban bushcare and landcare. The RCS aims to support community involvement and to help coordinate institutional responses.

The RCS discusses and addresses the core catchment management issues associated with the region's land, water, biodiversity, people and organisations. Less directly, it also relates to issues whose management can impact significantly on catchment assets, such as urban form, greenhouse and climate change, solid waste, transport and energy use. It is anticipated that the links with these issues will be advanced over coming years and strengthened in future RCSs.

Many documents and strategies relate to catchment management in our region and have been drawn upon in the development of the RCS. These include:

### International agreements

- Japan-Australia Migratory Birds Agreement (JAMBA) and China-Australia Migratory Birds Agreement (CAMBA), which are international agreements with China and Japan on migratory birds and the protection of their habitat. Areas designated under the agreements require special attention and are described in this RCS.
- The Ramsar Convention on Wetlands, which specifies criteria for assessing wetlands of international importance. The Port Phillip and Western Port region has three sites recognised as Ramsar wetlands.

### National policies and plans

- National Strategy for the Conservation of Australia's Biological Diversity, which aims to bridge the gap between current activities and the effective identification, conservation and management of Australia's biological diversity.
- Australia's Ocean Policy, which provides a strategic planning and management framework to deal with the complex issues confronting the long-term future of our

oceans, and guidance on addressing the interaction between land and seas.

- The National Aquaculture Policy Statement, which supports the development of ecologically sustainable aquaculture as an industry of the future. Port Phillip Bay and Western Port support a major fishing industry and a growing aquaculture sector.
- South East Region Marine Plan, which was developed under the Australia's Ocean Policy, seeks to ensure the protection and sustainable development of Australia's vast and rich ocean territory around Victoria, Tasmania, eastern South Australia and southern New South Wales.

### Legislation

- A range of Acts apply to the management of water resources in the region including the Water Act 1989, the Catchment and Land Protection Act 1994 and the Coastal Management Act 1995. Water management in Victoria is underpinned by an allocation framework that brings together existing water rights and environmental water requirements to establish agreed water allocations.
- Legislation applying to the management of land in the region includes the Planning and Environment Act 1987 which is the basis for the direction and control of land use and development in Victoria. It is administered through the State Planning Policy Framework and local government planning schemes. There are numerous other Acts and policies which help regulate land use and development in the region including the Environment Protection Act 1970, the Coastal Management Act 1995 and the Forests Act 1958.
- In relation to the protection and management of biodiversity, key Acts include the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and the Victorian Flora and Fauna Guarantee Act 1988. These are the main statutory frameworks for protecting native flora and fauna and ecological communities. There are several other relevant Acts including the Wildlife Act 1975, the National Parks Act 1975 and the Crown Land (Reserves) Act 1978.



This RCS plays an important role in implementing the intent and provisions for integrated catchment management contained in Federal and State legislation. It provides public agencies and community organisations with common operational goals and incentives to coordinate their activities. Further reference to the relevant Acts, policies and plans relating to the protection and management of water resources, land and biodiversity are contained in sections 5.2, 6.2 and 7.2 of this RCS respectively.

### State policies and strategies

- Securing Our Water Future Together, the Victorian Government Water White Paper that sets out an action plan over the next 50 years to achieve sustainable management of water. This document, released in June 2004, establishes numerous new policy directions and benchmarks for water conservation and management in Victoria, including the following of particular importance for this region:
  - \* Maintaining the Port Phillip and Western Port Catchment Management Authority as a community-based organisation independent of other Government agencies and responsible for strategic planning and priority setting in relation to catchment management for the region, preparation of the Regional Catchment Strategy and coordination of its implementation, and reporting on catchment condition
  - \* Establishing Melbourne Water as the “caretaker of river health” for the whole of Port Phillip and Western Port region, thereby resolving some long-standing gaps in waterway management arrangements
  - \* Establishing diversion caps on all waterways in the region
  - \* Establishing an environmental water reserve for waterways, to be managed by Melbourne Water.
- Sustaining Our Living Wealth, Victoria’s Biodiversity Strategy, which maps out programs for integrating biodiversity conservation into actions in order to ensure that Victoria’s biodiversity is managed in an ecologically sound and sustainable manner. This strategy informs the consideration of biodiversity assets in the RCS and requires the development of Biodiversity Action Plans.
- Waters of Victoria – a State environment protection policy that describes desired outcomes for waters in Victoria. There are also specific schedules for Western Port and its catchment, the Yarra River and Port Phillip Bay.
- Healthy Rivers, Healthy Communities and Regional Growth, The Victorian River Health Strategy, which

provides a framework for communities to work in partnership with Government on long-term management and restoration of Victoria’s rivers, and requires preparation of a river health strategy for each catchment management region. The preparation of the Port Phillip and Western Port River Health Strategy is being coordinated in partnership by Melbourne Water and the Catchment Management Authority with a strong emphasis on community consultation.

- The Victorian Coastal Strategy, which seeks to ensure the protection of significant coastal environmental features and provides clear direction for the future use of the coast, including the marine environment. Priorities and actions for the Port Phillip and Western Port region are found in ‘Coastal Priorities for the Central Region: A Framework for Implementing the Victorian Coastal Strategy’.
- CoastAction/Coastcare Strategy, which encourages and facilitates active participation in marine and coastal management. It is a key program implementing the Victorian Coastal Strategy and the coastal and marine objectives of the RCS.
- The Victorian Greenhouse Strategy – this commits Victoria to playing its part in national and international efforts to address the threat of climate change. The RCS does not set out to comprehensively address greenhouse and climate issues. It recognises the threat of climate change to the sustainability of our natural resources and proposes a range of revegetation actions that will provide benefits to not only our land, water and biodiversity assets but will also assist with carbon sequestration. It also proposes careful monitoring of the impacts of climate change on natural systems, biodiversity and processes in the region so that appropriate responses can be developed.
- Victoria’s Native Vegetation Management Framework, which outlines Victoria’s approach to managing our native vegetation. The framework also requires CMAs to prepare detailed regional plans. The Port Phillip and Western Port Regional Native Vegetation Plan meets this requirement.
- Private Forestry Victoria: Growing the future in forestry - growing private forests, which promotes the development of a dynamic forest and forest products industry that generates economic, social and environmental benefits for all Victorians. We have adapted this broad strategy by developing a regional private forestry plan.
- The Victorian Pest Management Framework, which outlines the broad approach to pest plant and animal management in Victoria. It requires CMAs to prepare Regional Weed Action Plans and Regional Rabbit Action Plans. A number of state-wide weed action plans such as the Victorian Serrated Tussock Management Plan and the

Victorian Ragwort Plan also coordinate regional actions to address important weeds. These plans have informed the approach to pest plant and animal management outlined in the RCS.

- The Victorian Marine Pollution Contingency Plan (VICPLAN) which provides a framework to plan for and respond to major incidents of pollution of the sea by oil and other noxious substances.

### Regional strategies and plans

- Melbourne 2030: Planning for sustainable growth – the urban planning strategy for metropolitan Melbourne. This identifies growth areas on the urban fringe where some of Melbourne’s anticipated extra one million people over the next 30 years will find housing, and it supports urban consolidation with new infill and medium density housing in existing areas and activity centres. This population pressure sets the context for natural resource management. Melbourne 2030 lays out a rational approach to land-use allocation based on a comprehensive assessment of the issues. It establishes an urban growth boundary and formalises the existence of the green wedges around Melbourne. It has various implications for the RCS. These include increased intensity of urban runoff due to reduced areas of porosity (more hard surfaces), ‘spillover’ urban growth with likely increased population pressures along the coast, in rural towns and adjoining rural residential developments, and management of the green wedge zones.
- 21st Century Melbourne: a WaterSmart City – the water resource management strategy for Melbourne, which recognises that water conservation is an important component of Melbourne’s sustainable future. It will help the RCS achieve its aims through increasing consumer awareness about the importance of our water resource.
- Port Phillip Bay Environmental Management Plan, which facilitates the coordination of planning and resource management activities to target key desired environmental outcomes for the Bay.
- Linking People and Spaces, which is Parks Victoria’s strategy for managing Melbourne’s open space. It provides the foundation for consideration of land assets in the RCS.
- Port Phillip and Westernport Native Vegetation Plan, which will assess and prioritise the remnant native vegetation in this region and identify priority actions for its protection and enhancement. The plan will lead the implementation of Victoria’s Native Vegetation Management Framework in this region.
- Port Phillip and Westernport Regional Weed Action Plan,

which clarifies the responsibilities for public and private land managers in this region regarding weed management, lists priority weeds and sets targets for their management

- Port Phillip and Westernport Regional Rabbit Action Plan, which clarifies the responsibilities for public and private land managers in this region regarding the control of rabbits and sets priorities for investment in rabbit control activities.
- Port Phillip and Westernport Regional River Health Strategy which will assess the values and risks of rivers and streams across the whole region and set priorities for the cooperative management and restoration of rivers by Government and communities. The plan will lead the implementation of the Victorian River Health Strategy in this region.
- Strategy for the Support and Coordination of Landcare and Community Groups in the Port Phillip and Westernport Region, which identifies issues impacting on volunteer community groups in relation to natural resource management. It aims to strengthen partnerships and assist groups to secure funding, to achieve their goals to improve the health of catchments.



### 3.3 Stakeholders in the management of catchment assets

Numerous agencies, organisations and groups have direct and indirect interests in the management of land and water resources in the Port Phillip and Western Port region. In terms of expertise and resources this presents tremendous problem-solving opportunities. In terms of decision-making it highlights complex relationships and competing interests.

Thus, helping the region's land and water managers work together is important work for the Catchment Management Authority. A fundamental aim for the RCS is to guide purposeful and effective action. There follows a list of some of the region's major land and water stakeholders, with a description of the roles it is anticipated they will take in helping implement the RCS.

#### Australian Government agencies

- *Department of Agriculture, Fisheries and Forestry*

The Australian Government Department of Agriculture, Fisheries and Forestry [DAFF] prepares and provides incentives and assistance for the implementation of national agricultural, food, fisheries and forest industry policies. It will be able to help implement the RCS through:

- its expertise in setting national standards and helping fund sustainable use of natural resources across whole farm production and marketing systems
- its role as joint manager and investor for the Natural Heritage Trust.

- *Department of Environment and Heritage*

The Department of Environment and Heritage [DEH] will play a critical role in supporting implementation of the RCS through:

- developing and implementing policy for the protection of environments and environmental assets of national significance
- its role as joint manager and investor [with DAFF] for Australian Government investment through the Natural Heritage Trust
- its role in providing investment funds directly to community groups through Envirofund
- its development and administration of the Environment Protection & Biodiversity Conservation Act 1999.

#### State Government agencies and authorities

- *Port Phillip and Western Port Catchment Management Authority (CMA)*

The CMA is a community-based Board appointed by the Minister for Environment under the provisions of the Catchment and Land Protection Act 1994. Under the Act, the CMA is responsible for the development and implementation of the RCS. Other core functions of the CMA include:

- promoting cooperation in the management of land and water resources
- advising on regional priorities
- advising on matters relating to catchment and land protection
- advising on the condition of land and water resources, and
- promoting community awareness and understanding of the importance of land and water resources, their sustainable use, conservation and rehabilitation.

The recent release of the Water White Paper Securing Our Water Future Together, has maintained these roles for the CMA and re-affirmed the CMAs role as an organisation independent of other Government agencies and responsible for strategic planning and priority setting in relation to catchment management for the region. The CMA is also obligated to engage key stakeholder organisations and community sectors

*Fundamental to better management and planning is the recognition that the environment, including our cultural and natural heritage, is everyone's business.*



in regional planning regarding catchment management. The CMA utilises various mechanisms for engaging community sectors across the region and seeks to continually assess its mechanisms and identify new ways that improve communication and coordination

- *Central Coastal Board (CCB)*

The Central Coastal Board was established in 1996 under the provisions of the Coastal Management Act 1995. The CCB provides strategic coastal planning advice to the State Minister for Environment with the aim of implementing the Victorian Coastal Strategy in the Central Region. The CCB and CMA expect to work in close cooperation to plan and invest in RCS actions.

- *Department of Sustainability and Environment (DSE)*

DSE's mission is to help prepare and lead the implementation of State Government policy for the sustainable use of natural resources in ways that create environmental, social and economic benefits. DSE provides state-wide policy, administrative support and resources for the management of many of the natural resources and built assets for which the CMA is expected to coordinate action at a regional level. These include catchment management, land stewardship, biodiversity and heritage conservation, and planning for sustainable cities and towns.

- *Department of Primary Industries (DPI)*

DPI aims to support the sustainable development of primary industries for the benefit of Victoria. It is committed to driving the adoption of resource-efficient technologies and improving the environmental technologies capability of primary industries. DPI plays a crucial role in policy development, identification of emerging issues, educating communities and helping them manage change associated with industry development, natural hazards (drought, disease, flood, fire), resource management and environmental issues.

- *Melbourne Water (MW)*

Owned by the Victorian Government, Melbourne Water manages Melbourne's water supply catchments, removes and treats most of Melbourne's sewage and manages waterways, floodplains, environmental water reserve and major drainage systems for the region. The Water White Paper *Securing Our Water Future Together*, has recently established Melbourne Water as the waterway, drainage and floodplain management authority for the whole of the Port Phillip and Western Port region, and also as the manager of the environmental water reserve for this region.

- *Southern Rural Water (SRW)*

SRW is responsible for rural water supply across southern Victoria, from the Great Divide to the coast. In the Port Phillip and Western Port region this includes the management of some large dams and two irrigation districts, as well as the licensing of surface and groundwater extractions and the establishment of water supply protection areas and groundwater management plans

- *Retail water authorities*

The three urban water authorities (South East Water, Yarra Valley Water and City West Water) have operated the water distribution and sewerage systems for the Melbourne metropolitan area since a restructuring of Melbourne's water industry in 1994. Most of the water for retail sale is supplied by Melbourne Water, although some recycled water is supplied directly to customers by the urban retail water authorities.

The rural urban water authorities (Western Port Water, South Gippsland Water, Western Water, Central Highlands Water) are also responsible for water distribution and sewerage systems, but are different as they serve customer bases from around 8,000 to 99,000 properties. Geographic areas are generally larger than the metropolitan retail territory and water supplies for non-metropolitan urban authorities come from a mixture of sources - bulk supply from rural authorities, significant storage areas of their own, and/or groundwater.

- *Parks Victoria (PV)*

Parks Victoria manages a significant estate of terrestrial and marine parks and reserves and is the recreational manager of Western Port and Port Phillip Bay and major waterways. Parks Victoria also plays an integral role in the planning of equitable open space access in the region.

- *Environment Protection Authority (EPA)*

The Environment Protection Authority has a responsibility to enable the protection of the uses and values of Victoria's environment by employing a range of measures consistent with its responsibilities under the Environment Protection Act 1970. The EPA develops and administers a range of statutory tools, such as state environment protection policies, to control pollution on land, in water and air, and industrial noise.

- *Trust For Nature (TFN)*

A statutory body established under the Victorian Conservation Trust Act 1972 to conserve native vegetation and wildlife in Victoria. It purchases private land to preserve areas of ecological significance, natural, historic or scientific interest. It also enables private landholders to protect high quality remnant vegetation on their land by placing a conservation covenant on a specific property or piece of land.

- *Marine Safety Victoria*

Marine Safety Victoria is the State's marine safety agency and is responsible for administration of the Marine Act 1988 and the Marine Regulations 1999. It develops and manages the Victorian marine pollution contingency plan.

- *Neighbouring Catchment Management Authorities*

The Port Phillip and Western Port region shares its boundary with four of Victoria's other Catchment Management Authorities: West Gippsland, Goulburn Broken, North Central and Corangamite. These neighbouring authorities will be important partners in catchment management programs that deal with cross-regional and statewide projects.



- *Local councils*

The local government bodies in the Port Phillip and Western Port region (Figure 2) are major investors, planners and project managers in natural resource management, individually and collectively. Local government planning schemes, environmental policies and strategies play a key role in ensuring protection and enhancement of natural resources. Councils are also contributors to natural resource management through local laws and regulatory activities, community engagement and education, on-ground works employing Council and community resources, and monitoring and reporting of environmental change at a local level.

- *Municipal Association of Victoria (MAV)*

The MAV is an association of Victorian local government authorities that enables them to communicate and act cooperatively on relevant matters. It operates and supports various sub-groupings of councils, and forums on specific topics.





## Community groups

- *Landcare groups and networks*

The region has around 70 Landcare groups, some of which are known collectively as 'networks.' These groups mainly work in rural areas on private land. Members are generally volunteers focusing on sustainable land use and protecting and enhancing the natural environment.

- *Waterway Committees*

Waterway Committees such as the three Committees that make up the Northern Waterways Group – Darebin Creek Management Committee, Moonee Ponds Coordinating Committee and Merri Creek Management Committee bring together different levels of government and community members to deal cooperatively on catchment issues and achieve an overall improvement in the condition of waterways.

- *Other groups*

More than 400 community environment groups – more than in any other region of Victoria – are active in the region, generally working on public land and commonly with the backing of the public land manager/owner (usually local councils or Parks Victoria). They include 'Friends' groups, CoastAction/Coastcare and Waterwatch groups, foreshore committees of management and the like.

## Environmental organisations

- *Environment Victoria (EV)*

Victoria's peak non-government environment organisation, dedicated to helping local and regional environment groups working on issues of local or regional importance.

- *Greening Australia Victoria (GAV)*

A not-for-profit community-based organisation which forms a federation of similar organisations throughout Australia. Greening Australia Victoria works in partnership with landholders, the community, government and business to tackle environmental challenges and opportunities in a practical, apolitical, scientific way.

- *Conservation Volunteers Australia (CVA)*

A group that involves the community in conservation projects in urban, regional and remote Australia. Projects include tree planting, seed collection, endangered species protection, weed control, flora and fauna surveys, walking trail construction, fencing and environmental monitoring. It organises volunteers to complete conservation projects across Australia each year, resulting in positive environmental outcomes, increased community participation, conservation skills and awareness.

- *Victorian National Parks Association (VNPA)*

An independent, non-profit organisation formed to protect Victoria's biodiversity through a representative national parks and reserves system. As well as its strategic campaigns for nature conservation and biodiversity it runs Victoria's largest bushwalking and outdoor activities program.

- *Australian Conservation Foundation (ACF)*

A non-profit, membership-based environment group that takes a solution-oriented approach to environmental issues such as natural heritage protection and sustainable cities, and seeks to form partnerships with community groups, governments and business to achieve ecologically sustainable results. It lobbies governments and works to raise the level of awareness of environmental issues within Australia.

- *Mornington Peninsula and Western Port Biosphere Reserve Foundation*

A membership-based organisation established to implement the Mornington Peninsula and Western Port Biosphere Reserve, which was accepted into UNESCO's worldwide network of Biosphere Reserves in 2002. This is Australia's 13th Biosphere Reserve and the first established for some 20 years. The objectives of the Biosphere Reserve Foundation are to protect biodiversity, to provide for scientific research and monitoring and to foster improved sustainability approaches to a range of industrial, commercial, educational, cultural and social challenges.

- *International Council for Local Environmental Initiatives (ICLEI)*

ICLEI is a membership association of cities, towns, counties, metropolitan governments and local government associations. Its mission is to build and serve a worldwide movement of local governments to achieve tangible improvements in global sustainability. Major ICLEI programs in this region include the Cities for Climate Protection and the Water Campaign.



## Rural and urban businesses and industries

- *Primary producers*

In the region primary producers make a significant contribution to regional, state and national economies as well as managing some 45 per cent of the region's land. The condition of the catchment assets of this region is therefore significantly influenced by how primary producers and other landowners manage their land.

- *Victorian Farmers Federation (VFF)*

This body serves and advances the commercial, environmental and social interests of Victorian farmers. It seeks to do this by creating a favourable economic environment for agriculture, encouraging sustainable farming practices, increasing public understanding of the importance of agriculture and improving access to human and community services for farmers.

- *Agricultural industry associations*

A number of these groups represent agriculturalists with similar requirements and pressures, such as strawberry growers, vigneron, beef producers and vegetable growers. Some commodity groups are part of the VFF while others act independently. These groups have a variety of roles, but generally encompass market development, policy and lobbying, improving productivity, environmentally sustainable production and networking.

- *Agribusiness forums*

These have emerged in recent years as a means of facilitating cooperation in the agribusiness sector and of engaging other important organisations (like local government) in a particular area (such as the Yarra Valley). Issues covered include regional branding, links with other sectors, integrated farm management, support for farmers and education, training and employment.

- *Forestry companies*

The harvesting of timber resources is carried out on public land (State parks) and private land. In both situations, there can be significant benefits for and/or impacts on catchment assets depending on the siting and management of forestry coupes and plantations.

- *Mining and extractive industries*

The region contains mineral resources that are extracted, usually from quarries. Companies such as Barro, Boral Resources, CSR, Nubrik and Pioneer all have operations here.

- *Land developers*

The urbanised nature of the region means there are constant incremental changes from rural to residential, commercial or industrial land uses. Development companies range from government bodies such as the former Urban and Regional Land Corporation (now merged with the Docklands Authority and known as VicUrban) to many private developers. Indications about guidelines for land use can be found in Melbourne 2030.

- *Fishing industry organisations*

The region sustains a significant recreational fishery, a growing aquaculture industry and a commercial fishing industry targeting a variety of species in the region's inland waterways, estuaries, Port Phillip Bay, Western Port and near-shore ocean. These industries are represented by the Fisheries Co-Management Council, Seafood Industry Victoria, the Victorian recreational fishing peak body VRFish and the Victorian Aquaculture Council.

- *Businesses and corporations*

Around 180,000 business establishments, represented by a number of peak bodies, employ more than two million people in the region.

## Indigenous organisations

- *Traditional owners (tribes of the Kulin Nation)*

The term 'traditional owners' is used to describe people or groups with a traditional (or ancestral) connection to a particular area. This connection may transfer to interests in the protection and management of Aboriginal cultural heritage values within their area of interest. It is currently accepted that the Port Phillip and Western Port region was traditionally occupied by speakers of the Wurundjeri, Boonerwung, Wathaurong and Taungerong languages. These groups formed part of a larger confederacy or language grouping known as the Kulin Nation.

- *Cooperatives/local communities*

Four cooperatives/local communities are listed under the Aboriginal and Torres Strait Islander Heritage Protection Act 1984 as having decision-making responsibilities for Indigenous cultural heritage for defined areas in the region. They are the Wurundjeri Tribe Land Compensation and Cultural Heritage Council Inc., Coranderrk Koori Cooperative Ltd, Wathaurong Aboriginal Cooperative Ltd and West Gippsland Aboriginal Cooperative Ltd. While the Coranderrk Koori Cooperative Ltd has been allocated an area under the Act, no such organisation currently exists, and the Minister personally signs all agreements. Conversely, the Taungerong Clans Aboriginal Corporation and the Victorian Boonerwung Elders Land Council Aboriginal Corporation are now in the Schedule, but do not have a defined area of responsibility.

- *Regional cultural heritage programs*

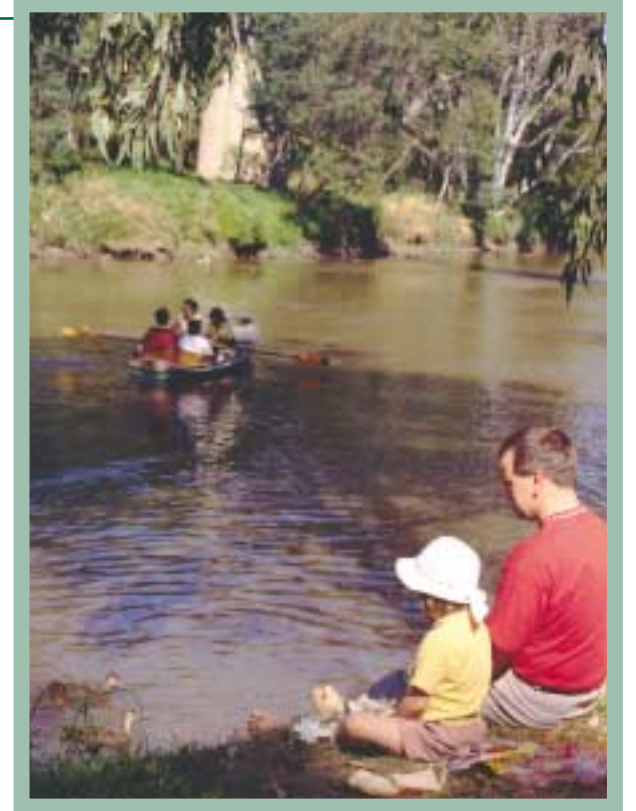
Regional Cultural Heritage Program (RCHP) offices undertake the regional coordination of day-to-day activities in cultural heritage management across Victoria. The Port Phillip and Western Port areas are within the area managed by the Central Victorian Cultural Heritage Project (formerly Kulin Nations) with some overlap into the Gippsland and South West and Wimmera RCHP areas.

## Education and research organisations

- *Primary, secondary and tertiary education*

Primary and secondary organisations are the major source of education for the population, and reach or have reached most of the region's inhabitants. This process provides a major opportunity to educate current and future students, and through them their parents, about the importance of environmental issues and sustainable behaviour.

Tertiary education provides more advanced knowledge on natural resource management issues as well as providing a research framework for students and staff. This comes in the form of research-based qualifications, encouragement



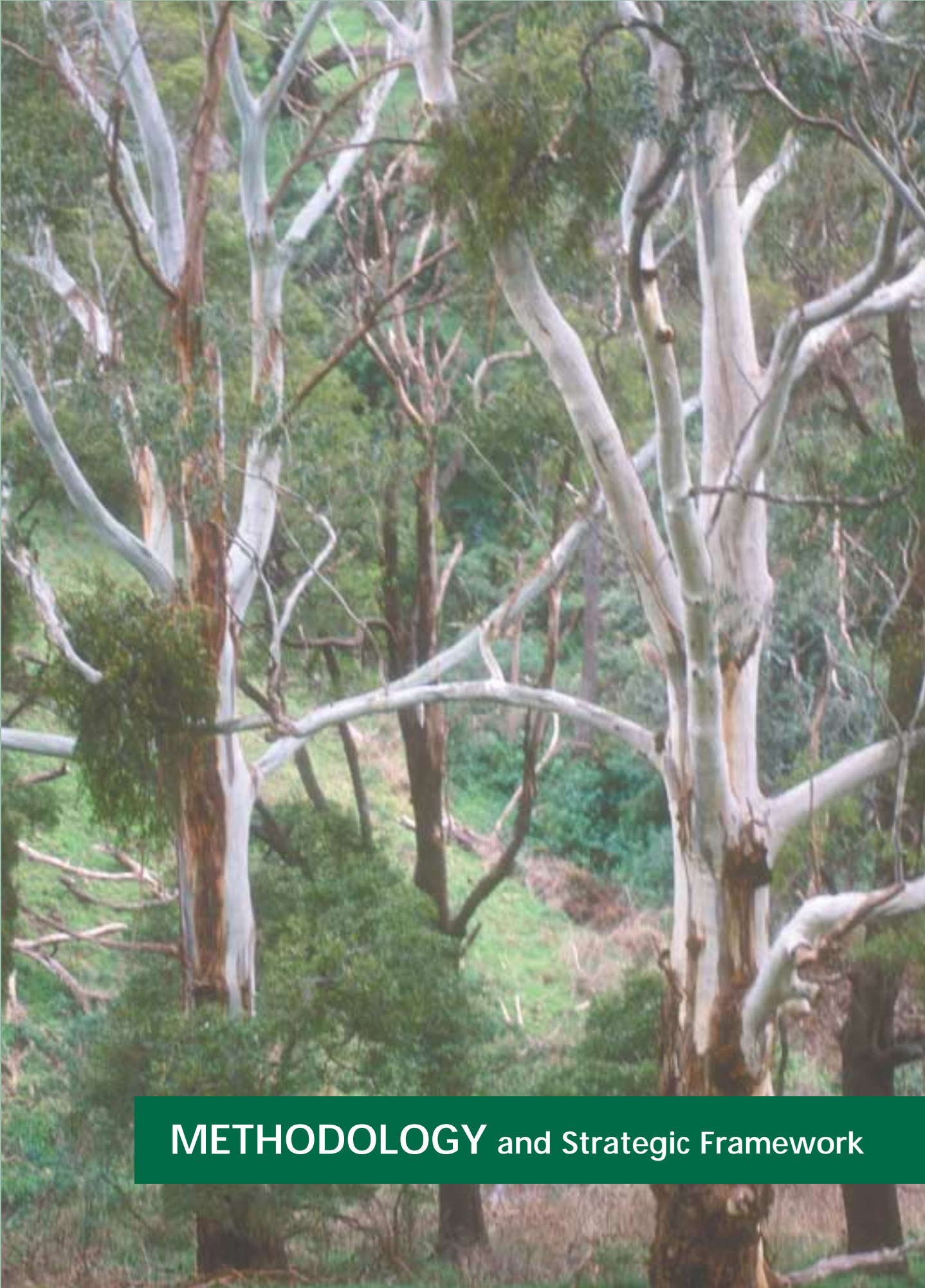
for publishing research material and the establishment of research centres.

- *Research centres*

Research is carried out in the region under a number of organisational arrangements. The CSIRO is established purely for research purposes. The Cooperative Research Centre Program is a Commonwealth Government funding initiative to boost the competitiveness of industry and capture the benefits of research for Australians. The CRC Program brings together researchers from universities, research organisations, government agencies and industry for strategic collaborative research.

## The broader community

The households and residents of the region benefit from the region's catchment assets as well as putting pressure on those resources. Therefore, natural resource management literally begins at home, with households being able to manage their consumption in terms of volume, using environmentally friendly products, minimising waste, disposing of it correctly and increasing reuse, and providing habitat for native flora and fauna.



**METHODOLOGY** and Strategic Framework

## 4. METHODOLOGY and Strategic Framework

### 4.1 Goals and sustainability principles

The RCS will guide investment by the Australian and Victorian governments in catchment management in the Port Phillip and Western Port region. These governments have established a process of accreditation to ensure that the RCS is scientifically sound, and that it has been developed under a nationally agreed framework with an appropriate level of community consultation. The framework requires consideration of the values provided by the catchment assets of a region.

As a starting point in this region, a long-term goal has been set for each of the major catchment assets in the region – that is, for the region's land, water, biodiversity and people. Each goal has been developed in line with principles of sustainability, and they are inter-related and inter-dependent in many ways.

As outlined earlier, the sustainability principles have grown out of international and national summits, conferences and strategies. Sustainability principles were initially focused on the limits of growth and irreversible impacts on life support systems. But in recent years they have incorporated the notion of social and economic wellbeing, and the ability of people and communities to influence the quality of life.

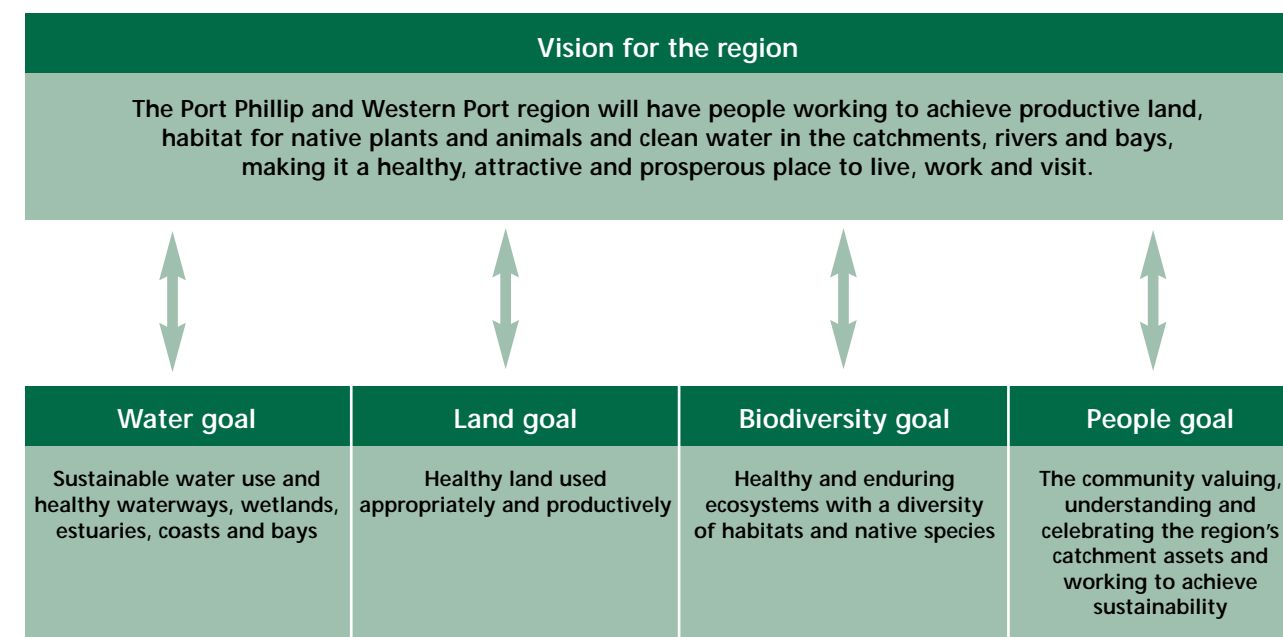


Figure 3: Vision and Goals for the Regional Catchment Strategy

The RCS employs seven principles (P1 – P7) that reflect current global ideas about sustainability.

**P1 Adopt the precautionary principle**

The RCS seeks to make decisions based on good science. Where the risk to the environment is significant, a lack of scientific certainty is not used as an excuse for postponing measures to protect the environment. Similarly, the RCS does not recommend actions that are of high risk to the values of this region, particularly if there is an incomplete understanding of the implications.

**P2 Ensure intra- and inter-generational equity**

The RCS seeks opportunities for all sectors of the community to benefit equitably from the region’s natural resources. It also seeks to achieve responsible stewardship of natural resources so that natural capital is passed on to future generations in as good or better condition than now.

**P3 Conserve natural resources**

The RCS seeks conservative use of the region’s non-renewable resources, encouraging efficient use and the search for alternatives. It also seeks to ensure that consumption of renewable resources does not exceed their rate of regeneration or replacement.

**P4 Maintain ecological diversity**

The natural environment provides goods and services that are fundamental to life and economic activity, as well as intrinsic values that do not directly support human activity. The RCS seeks to maintain and enhance the diversity and resilience of the region’s native plants, animals, micro-organisms and ecosystems.



**P5 Enhance regional prosperity**

The RCS seeks to enhance the regional economy, particularly through actions and new technologies that will benefit catchment assets and/or deliver benefits through the sustainable use of catchment assets.

**P6 Protect societal and cultural values**

The region contains a large population with a diversity of cultures and values. The RCS seeks to protect and enhance catchment assets that are important to the society and cultures of the region.

**P7 Strengthen understanding, participation and partnerships.**

The RCS recognises the important role of the region’s community in achieving the regional vision and goals. It reflects the need to develop a common understanding and effective working relationships between governments, industry and community sectors. As we improve the quality of the region’s catchment assets we seek to emphasise better coordination, cooperation, integration and involvement of individuals and the community.

**4.2 Objectives, targets and actions**

To determine the objectives, targets and actions that are necessary to achieve the goals for each catchment asset, a detailed assessment of values and risks is required. Figure 4 illustrates this thinking, showing that the broad vision and goals lead into specific objectives, targets and actions, based on a risk assessment.

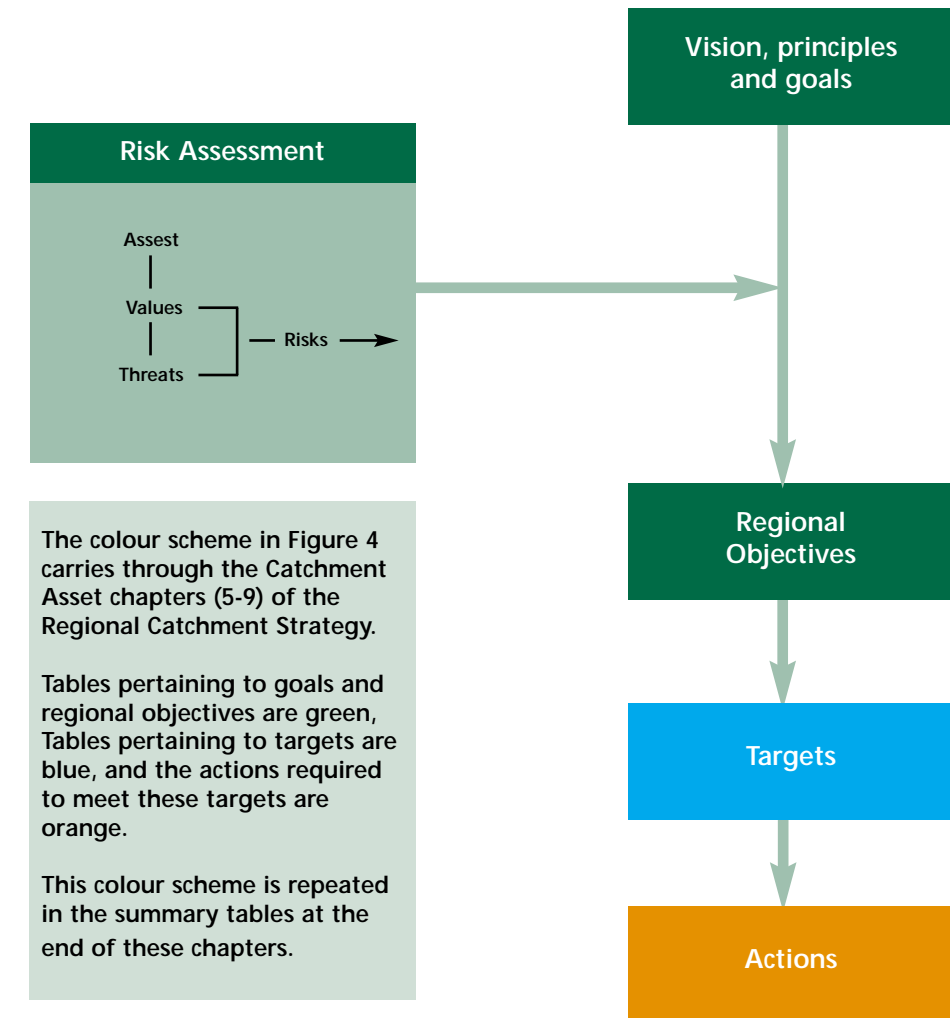


Figure 4: The flow of logic for the Regional Catchment Strategy

Regional objectives, which can be regarded as long-term ‘aspirational targets’, have been designed to respond to the key risks and at the same time, to reflect the sustainability principles.

For example, one of several regional objectives to achieve the goal of ‘healthy land used appropriately and productively’ relates to the use of land for urban development. The objective is to ‘ensure sensitively located and functional urban areas with minimal impacts on the region’s biodiversity and water resources’. This objective covers the location, design and functioning of urban systems. Urban development must have regard for the region’s significant biodiversity values and for risks to infrastructure from salinity, unstable land, flood and fire. By choosing wisely now, potential future costs are avoided (inter-generational equity, precautionary and ecological diversity principles). The design and operation of urban areas should minimise off- site environmental impacts, conserve natural resources and maximise opportunities for partnerships.

While the regional objectives represent desirable outcomes in the longer term, progress towards their achievement can be more readily assessed if specific targets are defined that describe how we wish to change the state or condition of our natural assets in a measurable way and over defined periods of time.

Each objective is therefore underpinned by one or more targets that can be regarded as 'resource condition targets'. When achieved, these targets will significantly improve the quality of the region's land, water and biodiversity and increase the capacity of those who live and work in the region to drive these changes.

In turn, specific actions are required to meet the targets. They can be regarded as 'management action targets' as they cover aspects of the management of catchment assets. They include the need for knowledge-building through research and data assembly, strategic planning, on-ground programs of work, monitoring and reporting processes. The rationale for the various actions is briefly described and timelines are set to measure the progress in achieving actions. Some of the actions are already under way and should continue. Others build on existing programs or are new initiatives that respond to the analyses undertaken for the RCS.

Sections 5, 6, 7 and 8 of this document explore this sequence of operations for the four goals – water, land, biodiversity and people. Chapter 9 on monitoring, evaluation and reporting also uses the framework of objectives, targets and actions. Each section concludes with a table that summarises the proposed objectives, targets and actions and the groups that will be involved, and indicates which of the targets and actions are pre-existing (ie. are already in place through existing policies, strategies or plans) and which are new.

### Nomenclature for objectives, targets and actions

Each of the objectives, targets and actions through the RCS is coded to assist referencing, as described in the following table:

Chapters of the RCS		Objectives (O)	Targets (T)	Actions (A)
Chapter 5 -	Water (W)	WO1-5	WT1-24	WA1-53
Chapter 6 -	Land (L)	LO1-5	LT1-10	LA1-13
Chapter 7 -	Biodiversity (B)	BO1-5	BT1-10	BA1-15
Chapter 8 -	People and organisations (P)	PO1-3	PT1-7	PA1-10
Chapter 9 -	Monitoring, evaluation and reporting (M)	MO1-3	MT1-4	MA1-6
Total		21 objectives	55 targets	97 actions

### The lead role for actions

For each action, an organisation is listed as having the lead role in seeing that the action is implemented. This may involve directly planning and undertaking the action, or it might involve facilitating and coordinating others to undertake the action in a partnership.

### Level of investment for actions

An estimate is also provided for each action regarding the order of magnitude of resourcing that will be required to implement it, either low (tens of thousands of dollars), medium (hundreds of thousands of dollars) or high (millions of dollars).

The capacity of organisations to meet targets and take the lead role in implementing actions will be dependent on the availability of resources. However, it is also envisaged that this RCS will be used by agencies and organisations as a sound basis for seeking and securing funding to undertake the actions.

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## 4.3 Assessing values and risks

The assessment of values and risks involves identifying what threats are causing our regional assets and their values to be at risk, and assesses the level of risk.

The methodology used in this RCS for risk assessment is in its early stages of development. The rules for assigning market and non-market values to assets and for calculating risk are under discussion. However, the RCS has included a preliminary analysis for the catchment assets of water, land and biodiversity.

For each of these assets, certain values have been selected and the risk to these values described and quantified. In Chapters 5-7, we demonstrate the capacity of the methodology to quantify both values and risks and present a regional picture showing that particular assets, and the values attached to them, have a spatial distribution across the region as do the risks to those values.

Assets can have many environmental, social and economic values, which are frequently at risk from various threats. The values may vary across the region, as may the extent and severity of the threats.

The risk posed can be evaluated by assessing

- the values,
- the extent and severity of the threat
- the sensitivity, or degree to which the threat may impact on the value.

Thus: **Risk = Value x Severity x Sensitivity**

In many instances a semi-quantitative rating system has been devised with values rated in the range of 1 to 5 and severity/sensitivity each rated in the range 0 to 1.

The methodology will eventually take a triple bottom line approach when determining the values of land, water and biodiversity. However, it is more difficult to price environmental and social values, although this has been done in some instances using 'contingent' or 'willingness to pay' approaches.

Over time, the data sets needed to prepare a more complete analysis will be developed. It is well understood that the current methodologies can be a useful guide for resource allocation but that more discussion with investors and asset managers is needed to establish the place of asset-risk analysis in determining regional investment priorities.

Despite the preliminary nature of the methodology, for some values and threats the magnitude of risks to natural assets is evident in the maps depicting the magnitude of risk. The spatial images provide a regional view of where the greatest risks to assets are located. This information provides a basis for focussing on defined areas when implementing particular programs.

It should be noted however, that not all identified threats have been dealt with using this methodology, and hence many of the actions are aimed at threats for which a risk assessment has yet to be undertaken.

In the case of waterways, a slightly different risk assessment approach has been used. The RCS has adopted the extensive work undertaken by Melbourne Water using the STREAMS model. Based on six years of consultation and refinement of data, STREAMS identifies social, economic and environmental values of all the major waterways in the region, using as a spatial base some 175 sub-catchments. Ongoing development of STREAMS will proceed with a view to merging it with the state RiVERS model. It should also be noted that, because STREAMS is at a relatively advanced stage of development, it is different in some ways from the preliminary assessment used in other parts of this RCS.





**WATER**

## 5. WATER

### 5.1 Overview

The substantial water resources of the Port Phillip and Western Port region are the lifeblood of the regional economy, and of its society and ecosystems.

There are some 8,000 kilometres of rivers and streams<sup>19</sup>, more than 900 wetlands<sup>20</sup> and more than a dozen estuaries within the region's Werribee, Maribyrnong, Yarra, Dandenong and Western Port catchments. The region also contains numerous large reservoirs that collect and store high-quality water for household, industrial and agricultural use in metropolitan Melbourne and surrounding areas. These surface water supplies are supplemented by significant amounts of groundwater held in the region's aquifers.

The waterways of the five catchments flow to 600 kilometres of spectacular regional coastline and then into the renowned marine systems of Port Phillip Bay, Western Port and Bass Strait. These coastal and marine systems, which include internationally recognised wetlands as well as eight marine protected areas, support myriad recreational activities, underpin commercial initiatives such as ports and commercial fishing, and provide invaluable ecosystem services.

Complex relationships and interactions exist between the region's water resources. Some are obvious, such as the flow of rivers into the bays, or our collection and storage of fresh water in reservoirs for domestic use. Others are less obvious but just as important, such as the contribution of groundwater to base flow levels in streams, and the role of wetlands and estuaries in filtering sediments and nutrients to improve water quality.

*Complex relationships and interactions exist between the region's water resources*

Important relationships also exist between the activities on land and the health of the region's water resources.



<sup>19</sup> Draft Port Phillip and Westernport Regional River Health Strategy  
<sup>20</sup> Current wetlands environment and extent (GIS layer)

## 5.2 Policy context for the management of water resources

A range of legislation and supporting policies apply to the management of water resources and support integrated catchment management in the Port Phillip and Western Port region.

State legislation, including the Water Act 1989, the Catchment and Land Protection Act 1994 and the Coastal Management Act 1995, provides for the formation of a number of boards and statutory authorities to plan for, manage and protect water, waterways, floodplains, coasts and marine resources.

Under the Acts, the Victorian water allocation framework establishes several mechanisms that bring together existing water rights and environmental water requirements to establish agreed water allocations. These include Bulk Entitlements for regulated river systems, Stream Flow Management Plans for unregulated river systems and Groundwater Management Plans for groundwater supply protection areas. The recently released Victorian Government Water White Paper Securing Our Water Future Together will generate legislative amendments enabling better integration of activities to achieve improved river health and more sustainable use of surface and ground waters.

The Melbourne Metropolitan Board of Works Act 1958 and the Melbourne Water Corporation Act 1992 are also important

elements of the legislative framework, creating the institutional arrangements for waterway and drainage management in much of the region.

The Environment Protection Act 1970 and its subordinate legislation, State environmental protection policies, regulates potential pollution risks to protect the beneficial uses of surface waters and groundwater.

The Catchment and Land Protection Act 1994 also enables declaration of Special Areas (formerly called Proclaimed Water Supply Catchments) for catchments that supply potable water. Special Area Plans can be developed for these areas and be linked to local planning schemes to regulate some land uses.

Other legislation relevant to the management of water resources includes:

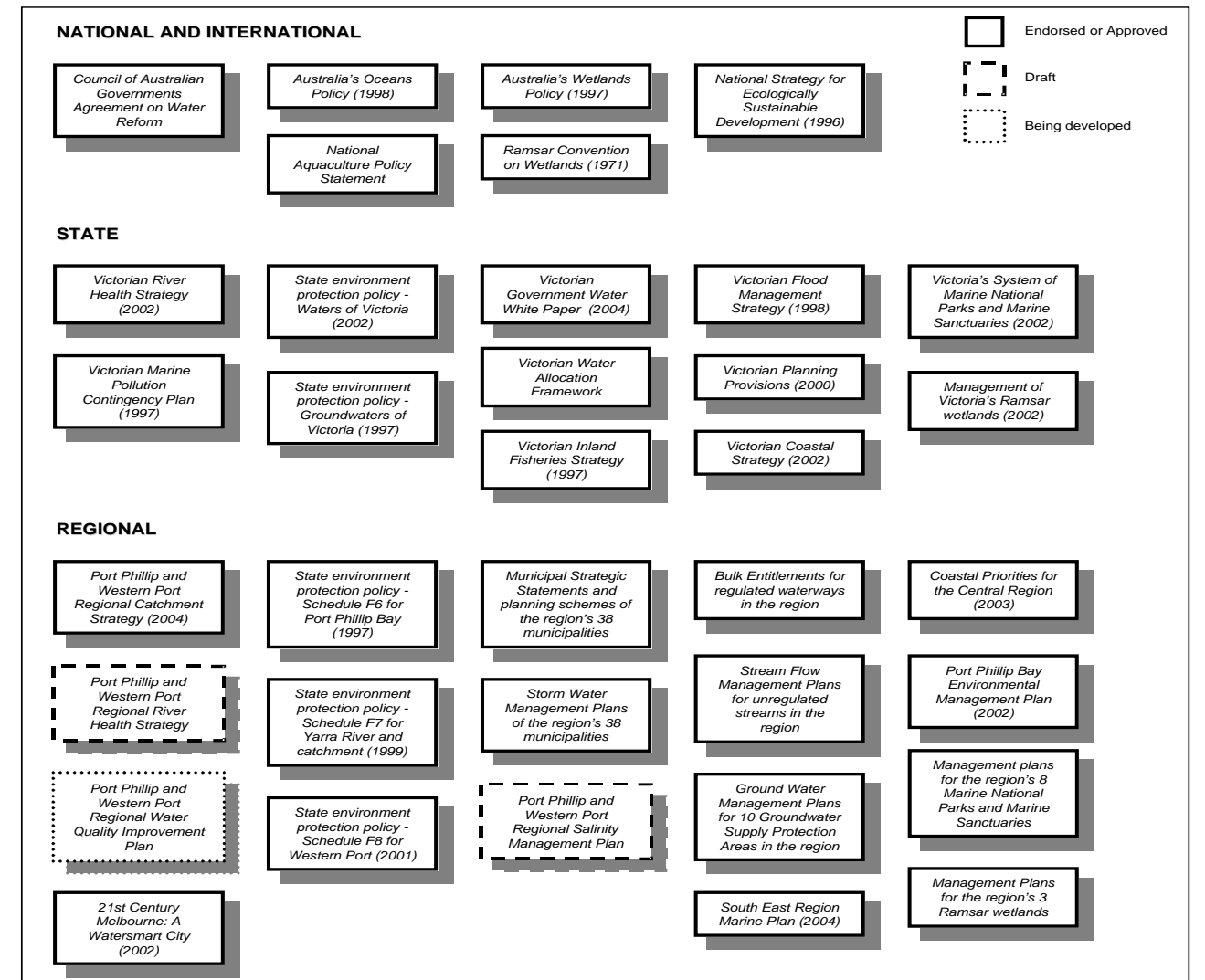
- The Heritage Rivers Act 1992 - which protects rivers and catchments with environmental, amenity, cultural and historical significance
- The Marine Act 1988 - which prohibits the disposal of dangerous or polluting substances (including ballast water that may contain marine pests) into State controlled waters.

This RCS plays an important role in implementing the intent and provisions for integrated catchment management contained in Federal and State legislation. It provides public agencies and community organisations with common operational goals and incentives to coordinate their activities.

Figure 5 depicts some of the national, State and regional policies, strategies and plans relevant to water resource use and management in the region.



Figure 5: Some of the important policies, strategies and plans relating to the management of water resources.



### 5.3 Regional goal for water resources

In recognition of the need to keep all components of the water resources healthy and sustainable, including their relationships and interactions, this broad, long-term goal for the region's water resources is established:

**Sustainable water use and healthy waterways, wetland estuaries, coasts, bays and seas**

This goal embraces the global principles of sustainability and encompasses:

- managing the pressures on the water environment that are inevitable with a large and growing population in the region and an estimated 100 million visits to its waterways annually
- passing waterways onto future generations in a better condition than they have been received
- the management of threatening processes including unsustainable land-use, urban expansion, loss of riparian vegetation, loss of habitat and pest invasion
- protection of Indigenous and other cultural heritage values and provision of water-based assets in a condition fit for recreation and other social and cultural activities
- sustainable water use for residential, commercial, industrial, agricultural, aquacultural and environmental purposes
- management of fresh and marine water systems to protect their fauna and flora and the integrity of ecosystems.



### 5.4 Objectives

To achieve the goal, the following five Water Objectives (WO1 – WO5) are defined to guide the management of water resources in the region. These objectives are based on and contribute to the principles of sustainability that are outlined in Section 4.1.

Objective	Sustainability Principles
WO1 Ensure efficient management of water resources with minimal new impacts	P2, P3, P4, P5,

Objective WO1 embraces various principles of sustainability because of the inherent dependency on water of our ecosystems and society.

The objective recognises the need to conserve water by using and re-using it as efficiently as possible to minimise the threats posed by diverting surface water and groundwater for necessary and beneficial agricultural, industrial and residential uses. As the level of diversions increases, so too does the risk of damaging ecosystems, decreasing ecological diversity and reducing security of supply for users.

The objective also acknowledges the need to improve our understanding of natural and modified surface water and groundwater processes and their interactions.

Objective	Sustainability Principles
WO2 Protect and improve the environmental health and social and economic values of waterways and wetlands	P2, P3, P4, P5, P6

Objective WO2 has a focus on integrated waterway and wetland rehabilitation consistent with the Victorian River Health Strategy. It acknowledges the need to protect high-value waterways and wetlands and improve the condition of others where there is the highest environmental and community gain for the resources invested. It also acknowledges that, in some streams where threats are high, maintenance of current condition requires considerable effort and resources.

Objective	Sustainability Principles
WO3 Protect and improve the environmental health and social and economic values of estuarine, coastal and marine systems	P2, P3, P4, P5, P6

This objective acknowledges the importance of coasts, estuaries and bays for economic, environmental and social benefits while also recognising that foreshore and marine environments are subject to intense pressures. It seeks to ensure that intra-generational equity occurs, societal values are protected and ecological diversity is maintained. Integrated management of the coastal zone, as part of the catchment as a whole, will strengthen important understanding and partnerships.

Objective	Sustainability Principles
WO4 Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas	P2, P3, P4, P5, P6

Objective WO4 addresses threats to surface water and groundwater and to aquatic and marine ecosystems from sediments, nutrients, toxicants and other pollutants. It recognises that water quality must be protected to satisfy beneficial uses that provide for economic prosperity, community needs, ecological health and diversity.

Objective	Sustainability Principles
WO5 Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety	P3, P4, P5, P6

Objective WO5 recognises the inter-relationships between the ways we manage our water resources and the impacts that can have on ecosystems and social and economic values.

It embraces the need to protect and enhance remnant vegetation and to tackle critical threats to our aquatic flora and fauna including bed and bank instability, pollution, environmental weeds and barriers to fish migration, as well as protecting against the introduction of invasive land and aquatic plants, wildlife and aquatic organisms. It also acknowledges critical threats to our foreshore and wetland environments including climate change and shoreline migration.

It also includes recognition of the economic implications of floods and the social dislocations that can result. Natural flooding regimes need not always be modified, but a balance is needed between environmental benefits and asset protection.

The objective reflects sustainability principles relating to the protection of ecosystems and creation of habitat. It recognises that riparian and foreshore vegetation stabilises banks and fragile foreshores, thus contributing to improvement of natural assets for current and future generations.



## 5.5 Key components of the region's water resources

The region's water resources are made up of five key components:

- surface waters, rivers and streams
- groundwater and aquifers
- wetlands
- coasts
- estuaries, bays and seas.

Because of their extraordinary significance to the region these five components, illustrated in Figure 6, are addressed individually, as Sections 5.6 – 5.10.

Each component is assessed for its values, and the key threats to those values, in order to identify the key areas of risk. The ways in which the overall water objectives (WO1 – WO5, as set out in Section 5.4) relate to these risks are highlighted, and targets and actions are then developed for each component.

Describing the key components of the region's water resources separately is a useful way of presenting a large volume of information, but it must also be recognised that strong linkages exist between the components. The summary table (Section 5.11) shows these inter-relationships.

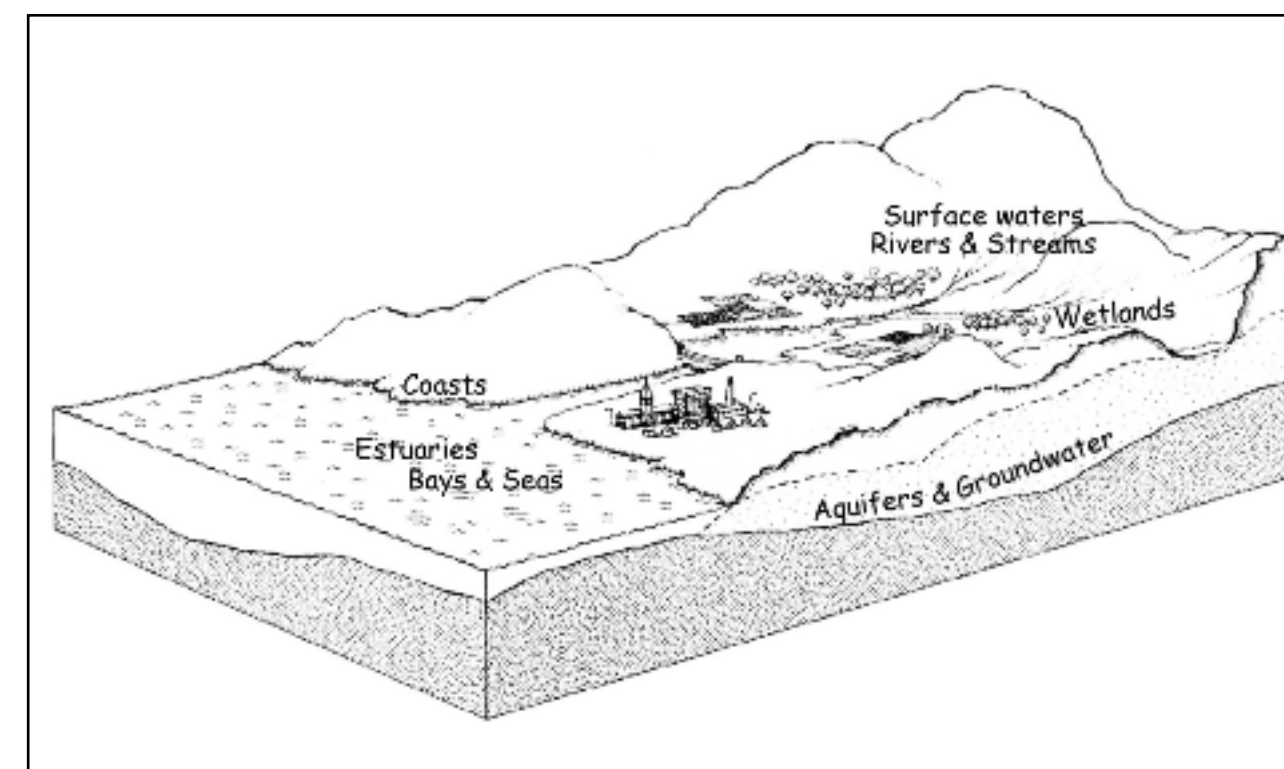


Figure 6: Key components of water resources in a catchment

## 5.6 Surface waters, rivers and streams

### 5.6.1 Overview

The surface water flow system in the Port Phillip and Western Port region is complex. It includes the region's natural waterways, some of which incorporate major storages, as well as the stormwater management infrastructure and the water reticulation and sewerage systems.

In the five main catchments - Werribee, Maribyrnong, Yarra, Dandenong and Western Port - there are some 8,000 kilometres of rivers and streams<sup>21</sup>.

The stormwater system comprises 25,000 kilometres of street drains and 1,000 kilometres of large drains. They discharge to the waterways and bays from more than 1,000 outfall pipes, nearly 400 of these leading directly into Port Phillip Bay.

The water reticulation systems generally bypass the natural waterways to provide potable water for the region's residents from large and small storages through a network of pipes. The sewerage system utilises separate pipes to remove waste and transport it to treatment plants. Ultimately, some of the treated wastewater is returned to the region's surface or ground waters, bays and the ocean.

Approximately 1,900,000 megalitres of natural surface water flows annually into the region's waterways and water storages<sup>22</sup>. This is supplemented by an additional average

140,000 megalitres per year piped in from the Thomson and Goulburn catchments<sup>23</sup>.

Around 550,000 megalitres is used annually for domestic and stock supply, industrial, agricultural and commercial purposes and drinking water for the 3.4 million residents of the region. The bulk of water harvested for potable use in the region comes from closed catchments, which are fully protected. However, water is also harvested from 'open' catchments that can contain multiple land uses. Of the 550,000 megalitres, some 335,000 megalitres enters the sewerage system.

An estimated 650,000 megalitres also enters the region's stormwater system. The volume is increasing as Melbourne and its drainage system expands. In total the region's stormwater and sewerage systems transport almost one million megalitres of water, much of this ending in the waterways or bays. This is more than half of the region's natural flow and there is the potential to reuse much of it.

The remainder evaporates, seeps into the soil and aquifers, is retained in wetlands, lakes and farm dams, or flows through the natural waterways into the bays and seas.

Figure 7 illustrates some of the region's water resource features.

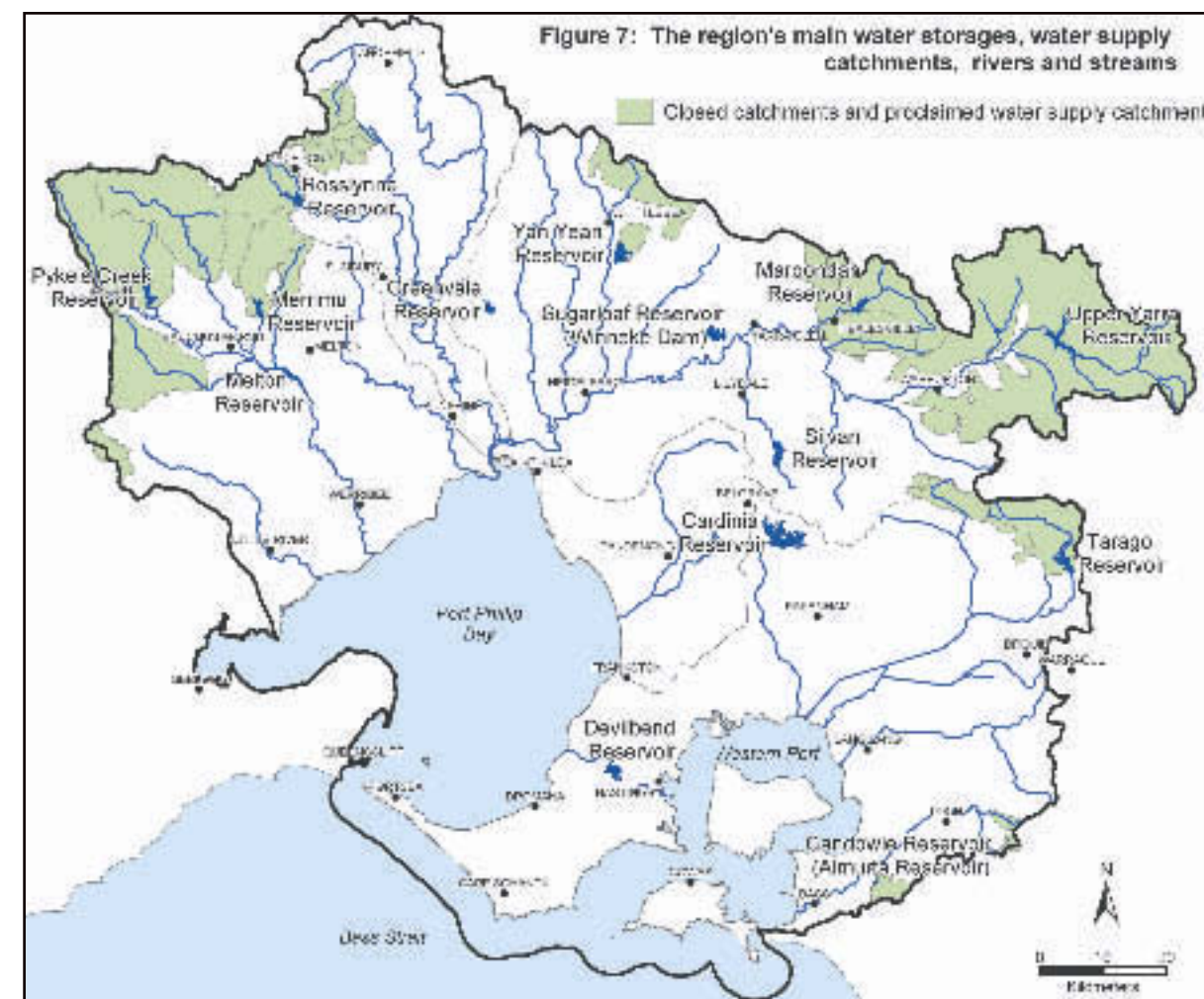


Figure 7: The regions main water storages, water supply catchments rivers and streams

The economic, environmental and social benefits delivered by our rivers and streams depend on their continued health. As part of an assessment of river health, the current condition of rivers can be indicated by the Index of Stream Condition (ISC) which measures flow regimes, water quality, the condition of the river bed and banks, the health of native vegetation in the riparian (riverbank) zones and the invertebrate fauna richness (where richness refers to the type and diversity of native species present) in the waterway. This assessment has been carried out for the region's waterways with the results provided in Table 1 and displayed pictorially in Figure 8.

Catchment	Stream length assessed (km)	Condition rating (% of length)				
		Excellent	Good	Moderate	Poor	Very poor
Dandenong	322	2	-	22	67	9
Maribyrnong	484	-	2	47	45	6
Werribee	825	7	8	51	32	2
Western Port	1,706	6	12	27	39	16
Yarra	3,333	22	15	25	27	11
<b>Overall</b>	<b>6,670</b>	<b>13%</b>	<b>12%</b>	<b>30%</b>	<b>34%</b>	<b>11%</b>

Table 1: Summary of Index of Stream Condition ratings for catchments in the region

<sup>21</sup> Draft Port Phillip and Westernport Regional River Health Strategy

<sup>22</sup> Australian Natural Resources Atlas (2003)

<sup>23</sup> Discussion Starter for developing a water resources strategy for the Greater Melbourne area

As shown in Table 1, only 25% of the region's waterway reaches are in good or excellent condition, and many of these are located in the closed water supply catchments or forested areas. This indicates a pattern of decline in waterway condition from a stream's headwaters to its lowland reaches that is due to the influence of intensive land use and urban development. This is a serious issue for the 20% of the region's waterways that are in existing and future urban areas, though there are examples of water quality in some waterway reaches being improved in recent times, such as the nitrogen and e.coli levels in the Dandenong Creek.

*Only 50% of the region's waterway reaches are in good or excellent condition*

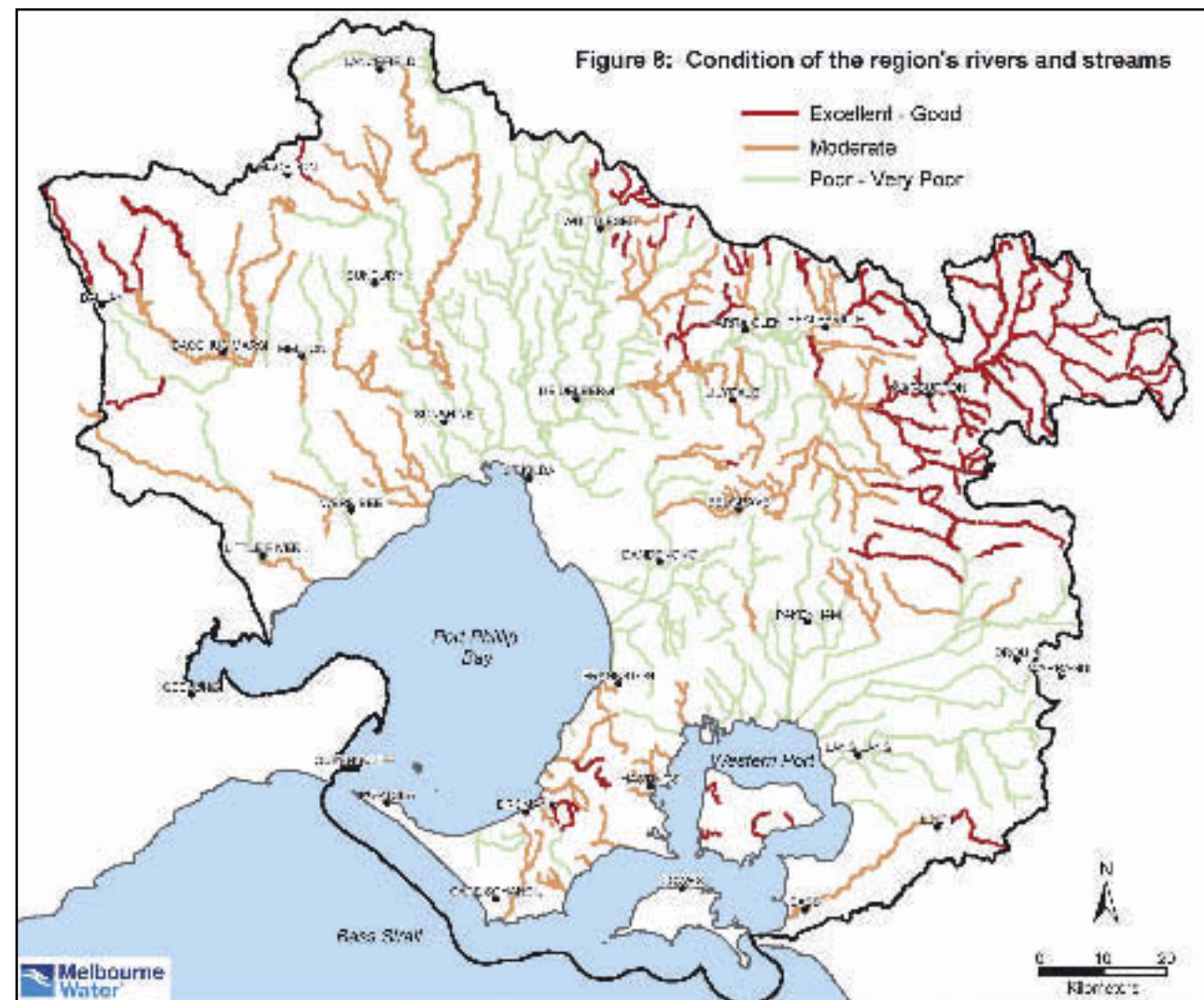


Figure 8: Condition of the region's rivers and streams

The protection of water quality in Victoria is legislated under the State environment protection policy (Waters of Victoria). This is a key government policy that sets environmental quality objectives and the actions needed to achieve them. In addition to the broad objectives of the policy, some areas in the region – Western Port and its catchment, Yarra catchment and Port Phillip Bay – are the subject of localised objectives set out in specific schedules. These are designed to protect the specific values of the areas concerned.

Monitoring programs have been established throughout the state and within the region to monitor the achievement of the environmental quality objectives. These sites comprise the Victorian Water Quality Monitoring Network, the Statewide Biological Monitoring Program, the Melbourne Water Waterway Water Quality Monitoring Network and the Melbourne Water Waterway Biological Program.

Our aim is to achieve these environmental quality objectives, including biological and water quality objectives, for all parameters within the next 20-30 years. Given this long-term view, combined with the extensive urban development in the region, it is understandable that the targets may not currently be met at a number of sites and for a number of parameters. A Regional Water Quality Improvement Plan will be prepared to set shorter-term targets across the region. Table 2 summarises data on the attainment of environmental quality objectives for various water quality parameters in 2001, and for biological parameters which were measured for the period 1997-2001.

Environmental quality objectives	No. of sites where objectives were met	No. of sites where objectives were not met	No of sites with insufficient data to determine achievement of objectives	Total no. of sites
Turbidity	37	38	12	87
Total Phosphorus	11	62	13	86
Total Nitrogen	2	72	12	86
Dissolved Oxygen	3	71	13	87
pH range	36	38	13	87
Electrical Conductivity	31	28	8	67
Biological	16	431		447

Table 2: Attainment of key environmental quality objectives for water<sup>24</sup>

Policy objectives for total phosphorus, total nitrogen and biological (macroinvertebrates) parameters are consistently not being met at the majority of sites throughout the region. Elevated nutrient (nitrogen and phosphorus) levels may cause excessive plant growth and/or algal blooms. Of particular concern are cyanobacteria (blue-green algae) blooms. Major sources of elevated nutrient levels in waterbodies include sewage treatment plants, urban stormwater run-off, irrigation drainage, intensive animal industries, soil erosion and agricultural run-off. In addition to the local impacts, downstream water bodies such as wetlands, lakes, estuaries and coastal marine waters are also affected.

The failure to consistently meet the biological objectives may be due to any of, or a combination of, issues.

<sup>24</sup> EPA Port Phillip and Western Port Rivers and Streams Assessment (2004)

## 5.6.2 Values of surface waters, rivers and streams

The draft Regional River Health Strategy outlines a detailed assessment and rating of the economic, social and environmental values of 175 sub-management units of the region.

### Economic values

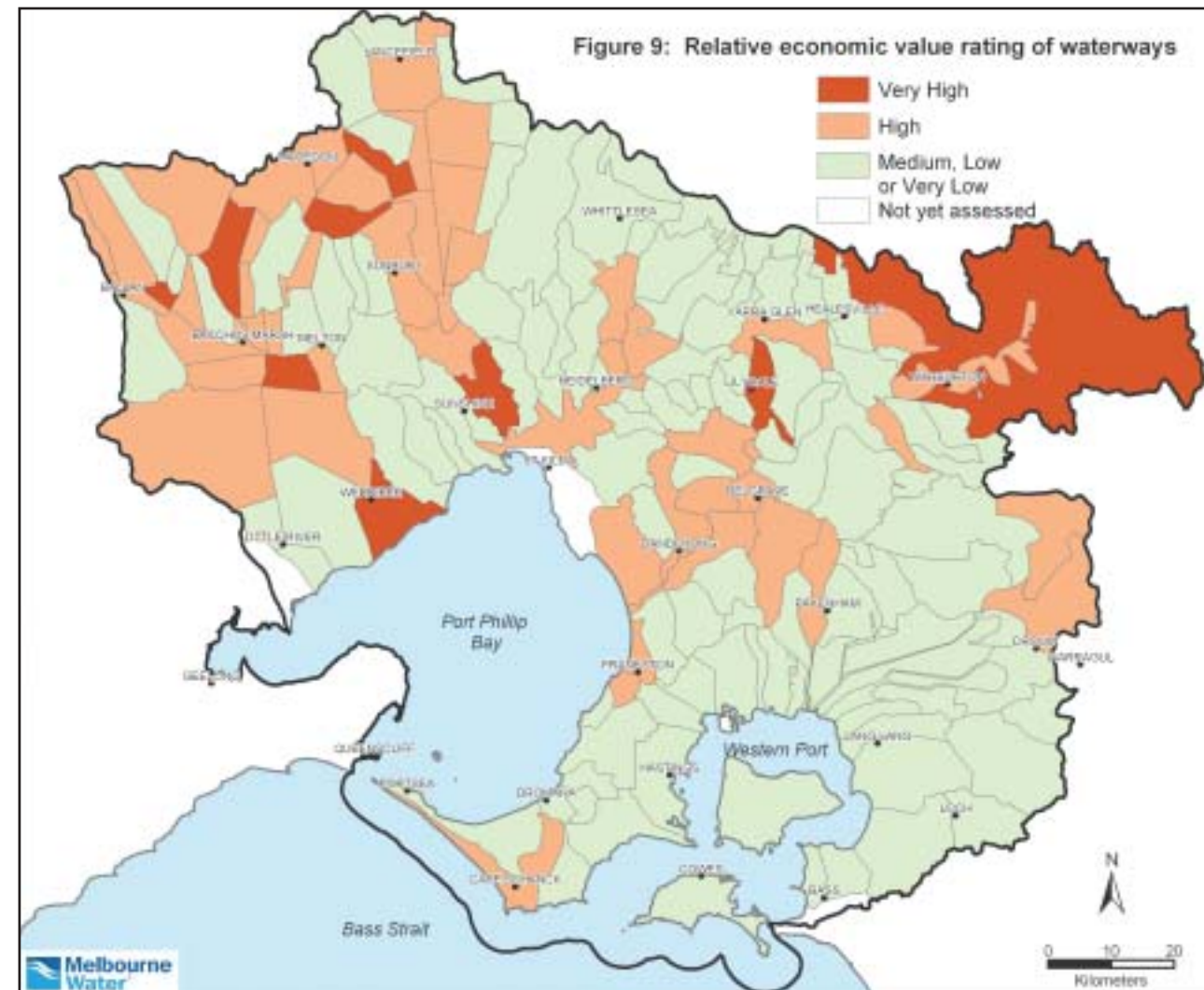
The economic values assessed include infrastructure, water supply for irrigation, proclaimed water supply catchments, land value and tourism. Figure 9 indicates the relative economic value ratings for each of the main rivers and streams.

Figure 9 shows that 37% of the 175 sub-management units have economic values rated as high or very high.

In the most developed part of the region, including the urban areas, high value waterways are clustered around the lower Yarra, and several tributaries including the Plenty and Diamond Rivers, the lower Maribyrnong and Dandenong Creek. These areas display a high rating for infrastructure, land value and in many cases, tourism.

In contrast, in the less developed parts of the region, many waterways are highly valued because they are a primary supply for irrigation water, such as the Werribee River, or where they are proclaimed catchments or supply potable water such as the Upper Yarra.

Areas that rate low for their economic value occur throughout the region. In general many of these areas are not well developed and therefore have a low infrastructure and land value rating.



### Social values

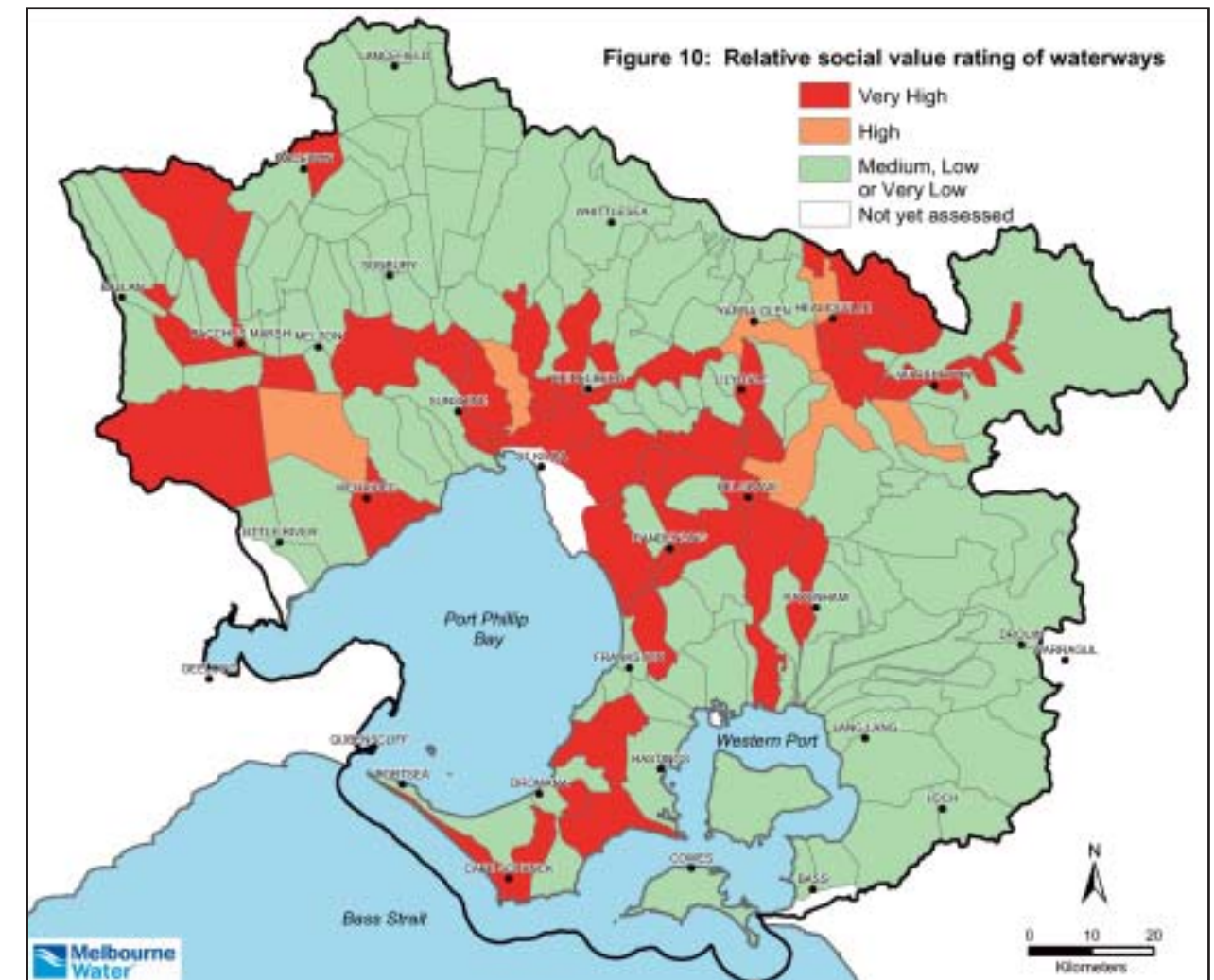
The social values assessed include recreational values (fishing, boating, camping, swimming and passive recreation) and cultural values (sites of Indigenous and non-Indigenous heritage significance, listed landscapes, geomorphological significance, land tenure and the presence of flagship species).

Figure 10 indicates the relative social values of the region's 175 sub-management units, of which 29% are rated as having high or very high social values, with a high proportion of these areas being in the middle to lower reaches of the region.

*Recreational visits to Melbourne's waterways exceed 50 million annually*

Most of the highly valued waterways are located in the urban areas where waterways have high visitor numbers and considerable infrastructure including trails, picnic facilities and parks. Recreational visits to Melbourne's waterways exceed 50 million annually<sup>25</sup>, indicating their accessibility to the population and perhaps the fact that more than 30% of Melburnians live within one kilometre of a waterway. In addition to recreation, many of these

waterways, such as the Lower Yarra, Lower Merri Creek and Maribyrnong River, display other important social values in terms of heritage significance, Indigenous spirituality and sites of geomorphic significance.



<sup>25</sup> StreamWatch Annual Report 1994.



## Environmental values

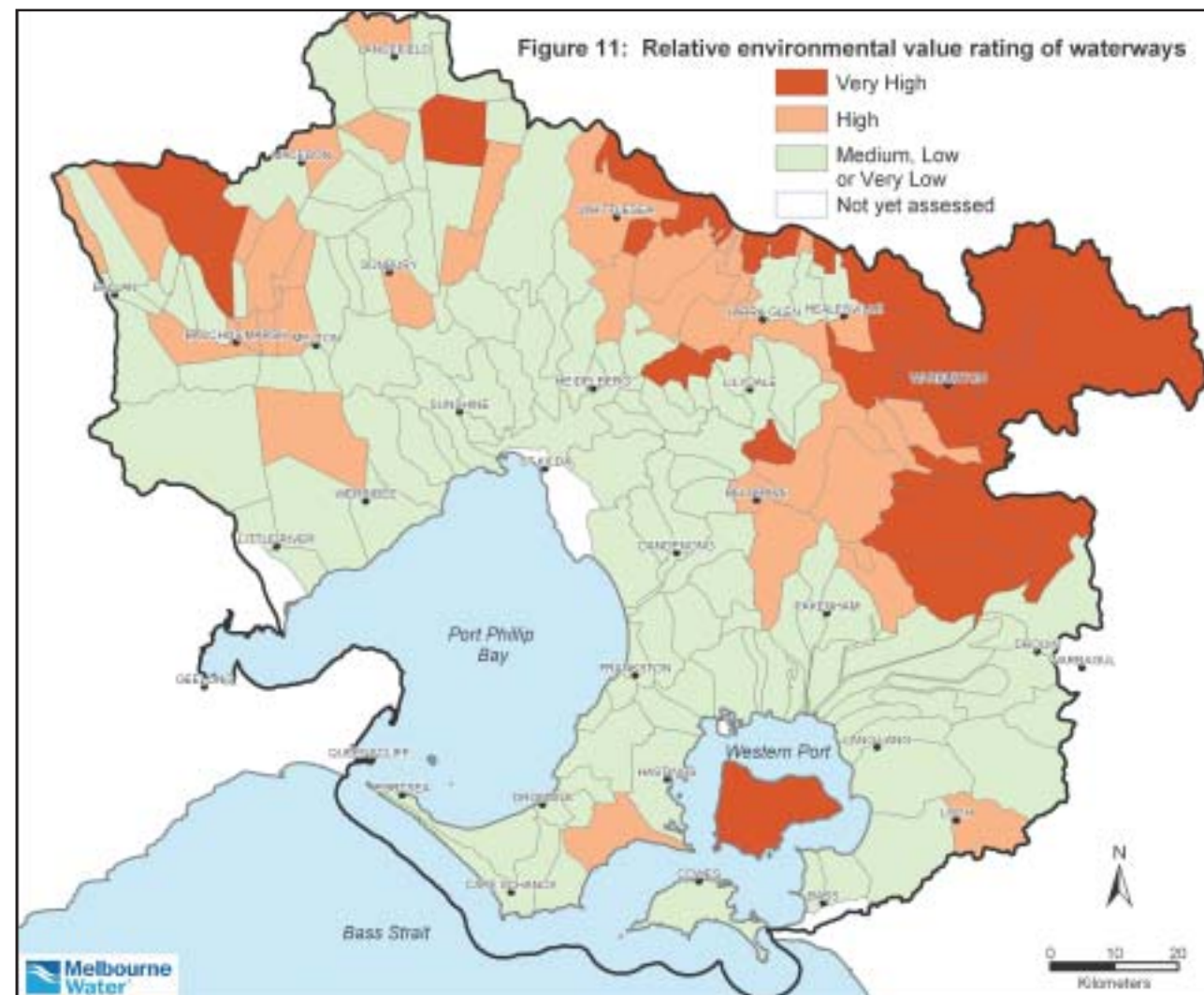
Environmental values include aquatic life, channel form, ecological health, continuity of vegetation, native fish, structural intactness and rare and threatened species and communities.

Our waterways support many rare or threatened species, including fish such as dwarf galaxias, Yarra pygmy perch, the endemic Australian grayling and other aquatic fauna such as the growling grass frog. The Macquarie perch population in the Yarra River is one of the largest remaining in the wild, and the State faunal emblem, the endangered helmeted honeyeater, is known to inhabit the riparian zone of Woori Yallock Creek. Sections of the Yarra and Lerderderg rivers are listed as heritage rivers for their natural and cultural significance.

*The Macquarie perch population in the Yarra River is one of the largest remaining in the wild*

Figure 11 illustrates the ratings of environmental values of the 175 sub-management units and shows that 34% of these are high or very high.

Rural landscapes show a range of environmental values. Rural waterways of high environmental value are those that have retained significant species and riparian vegetation. In lower value rural waterways threatening processes have influenced one or more of the environmental values. Urban waterways tend to have the lowest environmental value because these are heavily modified.



## 5.6.3 Key risks to surface waters, rivers and streams

Numerous existing and potential risks must be considered in planning to maintain the health and productivity of the region's surface waters, rivers and streams. Seasonal and intermittent events must be planned for, but the incremental and cumulative impacts of our day-to-day practices are also a serious concern. The draft Regional River Health Strategy identifies the major risks to waterway health and to the delivery of economic, social and environmental benefits.

### WR1 – Degradation of the streamside zone

Poor condition of streamside vegetation is a major risk across the region, threatening environmental values in 62% of the region's rivers and streams and social values in 60%.

A poor streamside can lead to a decrease in the quality of habitat, the quality and quantity of food sources to the river, and it can affect access to and enjoyment of recreational experiences. In rural areas, because streamside zones filter runoff, a poor streamside zone can also impact on water quality.

Land use changes, vegetation clearing, stock access and weeds are the main activities that have led to poor streamside zones within the region. A contributing factor has also been the absence of Crown frontages for most of the length of our rivers and streams<sup>26</sup>.

### WR2 – Land use change

Land use change, in particular urbanisation, poses a considerable risk to waterway health and water quality. An increase in impervious areas and in connections between urban stormwater systems and waterways means that water-borne pollutants can be very efficiently delivered to rivers and streams.

The growth of urban Melbourne over the next 30 years will be concentrated in several key growth corridors including Wyndham, South East, Hume, Melton/Caroline Springs and Plenty/Mernda. The density of some existing urban areas will also increase substantially. This poses a risk to many high value rivers and streams including the Cardinia, Grace Burn, Coranderrk, lower Jacksons, Diamond and upper Djerriwarrh Creeks and the lower Werribee River.

### WR3 – Hydrological stress

The diversion of river flows to provide water supplies continues to have significant effects on the ecology of the region's rivers by reducing the level of flows. For example, flows in the Yarra River now represent only 65% of its average natural flow, while the flow in the Werribee River is reduced to 77%<sup>27</sup>.

<sup>26</sup> Review of Crown Frontages for the Port Phillip and Western Port region  
<sup>27</sup> National Land and Water Resources Audit (2000).

Variations from natural flow levels threaten environmental values in 40% of the region's rivers and streams. Over-allocation can also have a significant economic impact by reducing the security of supply for existing water users, particularly during drought periods.

Victoria's water allocation framework seeks to ensure that all significant water use within a catchment is managed, and enables provision for flow levels and flow regimes that are important for the environment.

### WR4 – Pollutants that reduce water quality

Pollutants carried to rivers and streams from stormwater and other diffuse sources reduce water quality and pose a major risk to around 35% of the region's rivers and streams.

Runoff of nutrients, particularly nitrogen and phosphorus, is a problem in some rivers and streams, as are sediments from activities on land. As shown in Table 2, only two of the 86 monitoring sites in the region met the SEPP objectives for nitrogen in 2001 while eleven met the phosphorus objectives.



Nearly half the monitoring points showed persistent nitrogen and phosphorus concentrations at more than three times the SEPP objectives. This does not include the peak nutrient inputs that occur during high stream flows.

Risks from nutrients are to the bays and to potable water supplies. The Port Phillip Bay Study and Environmental Management Plan recognise nitrogen loads as a key threat to bay health. In waterways and storages, high nutrient loads can lead to algal blooms. This has occurred in several storages

including the Melton, Merrimu, Rosslynne, Yan Yean, Tarago and Candowie reservoirs. Water storages in catchments with multiple land uses are particularly at risk. High nutrient levels in rivers can also lead to problems for stock, native flora and recreational values.

Toxicants such as zinc, lead, copper, nickel, cadmium, petroleum hydrocarbons and pesticides have been detected in many urban streams. The level of other chemicals in the rivers and streams, such as biocides and other synthetic chemicals that may interfere with the human body's hormonal system (endocrine modifiers), needs to be monitored and managed.

Litter is a highly visible symbol of water pollution. It reduces the visual amenity of our waterways and can also have a significant impact on aquatic flora and fauna. Litter travels to waterways and bays mainly through the urban stormwater system. Each year, approximately 230,000 cubic metres or 2 billion items of litter enter the waterways from the urban system. This equates to more than one litter item for every person in the region reaching the waterways each day.

#### WR5 – Barriers

In-stream barriers such as dams, weirs and road crossings pose a major risk to 56% of the region's rivers and streams. While many barriers have been addressed in recent years, those that remain impede the movement of fish and other aquatic species such as platypus. For example, thirteen of the 20 native fish species recorded in the region are known to have life stages that require migration upstream or downstream.

#### WR6 – Erosion of bed and banks

Accelerated erosion in many of the region's rivers and streams has been stabilised, but 14% are still threatened by bed and bank erosion leading to an increase in sediment loads in rivers and streams. Land use change that has resulted in vegetation clearance is a major cause of erosion. The erosion can undermine infrastructure, lead to a loss of archaeological sites and reduce available habitat for native fauna. Sediments can also build up in storages, reducing their utility. Because phosphorus and other pollutants can bind to soil particles, increased sediment loads can also result in increased nutrient levels of waterways. Sedimentation is a particular threat to Western Port - this is addressed in more detail in Section 5.10 regarding Estuaries, Bays and Seas.

#### WR7 – Stock access

Around 20% of the region's rivers and creeks are at serious risk due to the access of stock which can degrade the riparian zone and the quality of the water. This is particularly so in rural areas. Vegetation is reduced, erosion increased and human health threatened through faecal contamination.

#### WR8 – Introduced species

The streamside zone of waterways is vulnerable to weed invasion. Weeds have colonised many waterways in the region with species like blackberries, willows and arum lily. Introduced fish are present in all regional waterways, with 13% of rivers and streams being particularly at risk from a high level of exotic fish populations. These fish displace native fish populations by either out-competing for food or disturbing habitat.

#### WR9 – Climate change

Climate change and associated rises in sea level could have significant effects on water resources. Impacts may include incursions of salt water into estuaries and waterways, increased peak flows in rivers and threats to private and public infrastructure. Of great significance are the potential implications of a changed rainfall regime and more frequent and intense fires, droughts and flooding.

### 5.6.4 Significant rivers and streams

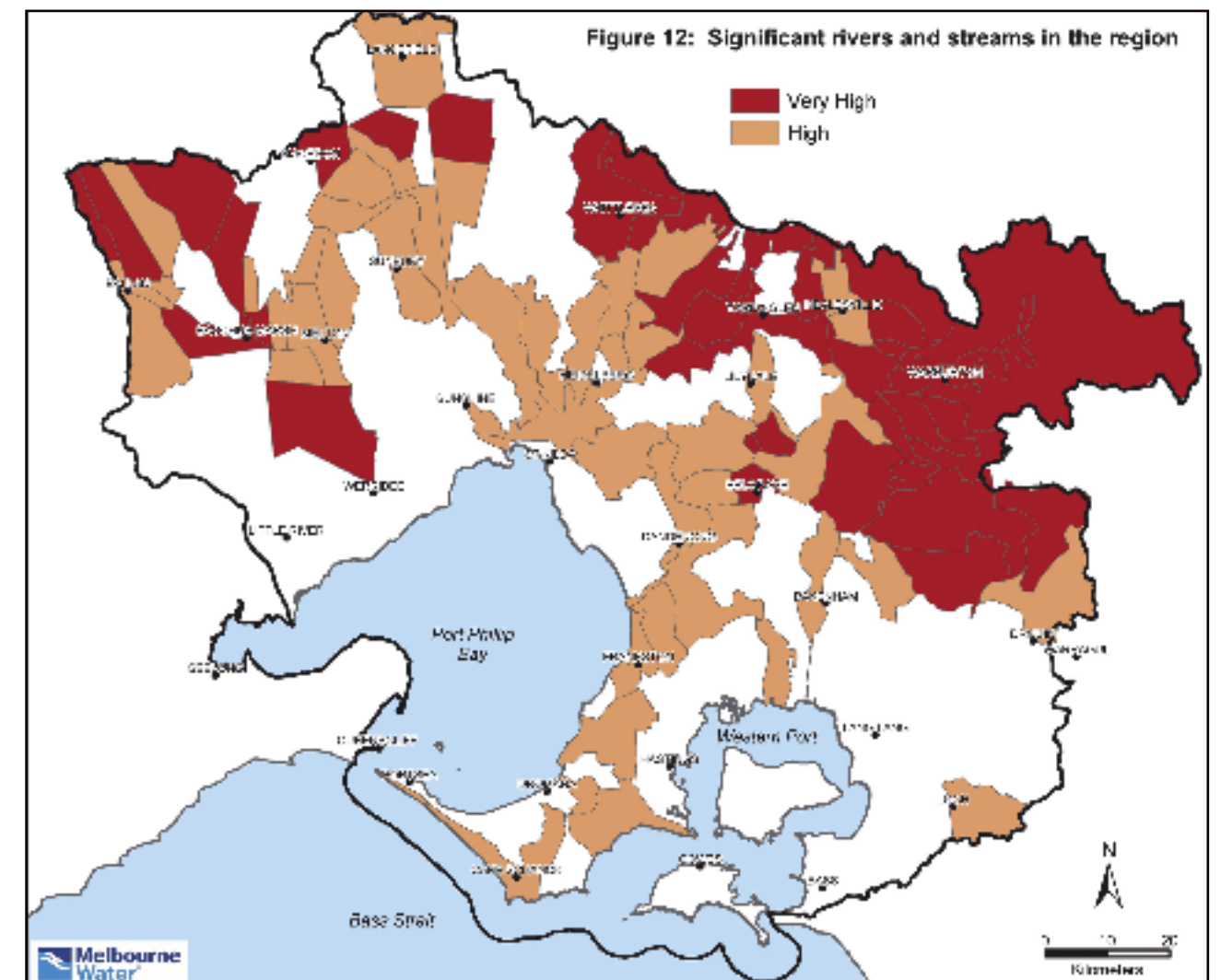
By combining the analyses of the values and risks, the draft Regional River Health Strategy identifies the rivers and streams that are significant to protect and manage, as shown in Figure 12.

Of particular importance are the 25% of the region's rivers and streams that are either:

- rivers of special interest including heritage rivers, representative rivers or ecologically healthy rivers
- rivers with very high social, environmental and/or economic values where the risks to these values are also very high.

Many are within forested areas high in the catchments and are therefore in excellent condition, but this category of high value, special interest and high risk also includes the entire main stem of the Yarra River down to Warrandyte.

A further 35% of the region's 175 sub-management units are at the next level of significance for management. These occur across both urban and rural landscapes.



<sup>28</sup> Melbourne Water estimate

## 5.6.5 Objectives for surface waters, rivers and streams

The five Water Objectives (see Section 5.4) have been developed in line with the principles of sustainability and also address the key risks for surface waters, rivers and streams.

Current water use patterns and a growing population place severe stress on the region's waterways. This risk is addressed by ensuring efficient management of water resources with minimal new impacts on natural hydrological processes (Water Objective 1). The risks to our river health caused by pollution, excessive sedimentation and introduced species, are addressed by protecting and improving the health of our waterways and wetlands (Water Objective 2). The water quality and biodiversity effects of these risks are further addressed by progressively improving the water quality in our waterways (Water Objective 4) and ensuring the management of water environments improves the health, diversity and resilience of natural ecosystems (Water Objective 5).

Climate change scenarios suggest the possibility of both less water being delivered to the catchment, and of increased intensity of flood events. The risks thus posed need to be considered when working to achieve all the objectives, and the precautionary principle must be kept in mind.

## 5.6.6 Targets

This suite of Water Targets (WT1 – WT10) is proposed to meet the elements of the five objectives that are directly relevant to surface waters, rivers and streams.

### Efficient management of water resources

Target	Relevant objectives
WT1 Average potable water consumption per person reduced by 15% by 2010	WO1, WO2, WO5

Target	Relevant objectives
WT2 The volume of recycled water used in the region increased to 20% of the total treated volume by 2010	WO1, WO2, WO5

These targets are consistent with the Water Resources Strategy for Melbourne and recognise the need for the conservation of all water sources to meet future needs and maintain the health of rivers. The achievement of WT1 will be pursued through the implementation of various water conservation programs led by the State Government and water authorities including some flagged in the recent Water White Paper Securing Our Water Future Together. One of the important mechanisms to assist water conservation is to increase the availability of recycled water and to use it wisely and appropriately to substitute for the use of potable water.

Target	Relevant objectives
WT3 Diversions from all waterways to be within Sustainable Diversion Limits by 2015	WO1, WO2, WO5

This target recognises that to sustainably produce water to meet the economic, environmental and social needs of the region, our rivers must be healthy with extractions being within sustainable limits.

Target	Relevant objectives
WT4 Improved average value of irrigated agricultural production per megalitre.	WO1

This target recognises the importance of using water efficiently within agricultural industries to achieve optimum value.

### Healthy waterways

Target	Relevant objectives
WT5 Maintain the condition of the 13% of the region's rivers that are currently in excellent condition.	WO1, WO2, WO4, WO5
WT6 Improve the condition of the region's waterways so that: <ul style="list-style-type: none"> <li>- At least 50% of all the natural waterways will be in good or excellent condition by 2015</li> <li>- All natural waterways will be in good or better condition by 2025</li> </ul>	WO1, WO2, WO4, WO5
WT7 Progressive improvement in the condition of water ways across the region, as measured by the Index of Stream Condition, including the bed and banks, streamside zone and aquatic life	WO2, WO4, WO5

These targets, consistent with the Victorian River Health Strategy and the Regional River Health Strategy, aim to maintain waterways that are in excellent condition and improve the overall condition of all other natural waterways. The reporting against these targets is anticipated to occur at five-yearly intervals.

### Water quality

Target	Relevant objectives
WT6 Improve water quality in rivers and streams so that: <ul style="list-style-type: none"> <li>- At least 80% of monitoring sites attain State environment protection policy objectives or regional targets by 2009</li> <li>- All monitoring sites attain State environment protection policy objectives or regional targets by 2030</li> </ul>	WO2, WO4, WO5

The State environment protection policy (Waters of Victoria) and its schedules for the Yarra River, Port Phillip Bay and Western Port, specify long-term environmental objectives for water quality across the region. Shorter-term regional targets will be determined in the near future and outlined in a Regional Water Quality Improvement Plan as interim steps to be achieved.

Note: The management of waterways to reduce inputs of nutrients, sediments and other pollutants to Port Phillip Bay, Western Port and the ocean is also important. Specific targets for reduced inputs from waterways of nitrogen to Port Phillip Bay (WT22) and sediment to Western Port (WT23) are included in Section 5.10 – Estuaries, Bays and Seas.

## Floodplains and flooding

Target	Relevant objectives
WT9 No loss of hydraulic capacity and environmental values of floodplains	WO5

Target	Relevant objectives
WT10 Timely flood warnings provided for all major waterways and risks to infrastructure minimised	WO5

Flooding is a natural process that has many benefits. However, these targets also recognise that sound planning and timely warning is required in this region for safety and to protect public and private assets, a notion that is encapsulated, for example in the charter of Melbourne Water.

## 5.6.7 Actions

This suite of Water Actions (WA1 – WA18) is required to collectively meet the targets. The actions cover various aspects of the management of water resources, including needs for research, planning, education, on-ground works, monitoring and reporting.

Some actions will continue and build on existing programs in the region, while others are new initiatives.

### Policy

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA1 Implement the relevant directions of the 'White Paper – Securing our Water Future Together'	WT1 – WT8	2006	MW, CMA	DSE, Local government, Water authorities	Low

A range of State and Commonwealth legislation influences water resource management in the Port Phillip and Western Port region. The legislative framework establishes a range of institutions responsible for managing aspects of water resources and provides these institutions with a range of powers in order to discharge their responsibilities. Of particular importance for this region is the implementation of the recently released Victorian Government Water White Paper Securing Our Water Future Together.

The White Paper establishes Melbourne Water as the “caretaker of river health” for this region, responsible for waterway, drainage, floodplain and environmental water reserve management across the whole of the Port Phillip and Western Port region. In the past, gaps in arrangements for some areas were a major impediment to achieving the region’s targets for stream health. It is now important that the rollout of these responsibilities occurs to achieve comprehensive coverage of the region for waterway management.

It is important that the linkages between Melbourne Water and the Port Phillip and Western Port Catchment Management Authority be strengthened. The development of a partnership agreement between the organisations could assist regular interaction between the two Boards, improved coordination of regional grants processes, and the establishment of strong links between the Regional Catchment Strategy priorities and Melbourne Water’s annual investment processes and works programs. It will be important to evaluate the effectiveness of this partnership to deliver improved services that integrate waterway health with whole-of-catchment management and enable improved consideration of catchment management principles in urban growth planning, green wedge planning, major landscape change projects, etc.

### Planning

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA2 Determine, and ensure compliance with, Sustainable Diversion Limits and Bulk Entitlements for the region	WT1 – WT8	2007	DSE	CMA, MW, SRW, Retail Water Companies	Medium

Water storages and river flows are crucial for the production of water for economic, environmental and social values. It is important to ensure that water quantity is maintained at sustainable levels to deliver these values.

The allocation of surface water is managed by State government agencies under the Victorian water allocation framework. The framework uses a hierarchy of legal entitlements to water, starting with the right of the government to control any water in a waterway. Under this arrangement, bulk entitlements (BEs) are established for urban and rural water authorities to cover water for domestic, commercial, industrial and irrigation use. Outside these entitlements, Sustainable Diversion Limits need to be set for all waterways, and individuals diverting water for commercial or irrigation purposes must be licensed within these limits.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA3 Implement the State Government's policy for the establishment of diversion caps and an environmental water reserve for the region's rivers	WT3	2009	MW	CMA, DSE	Medium

The Victorian Government's Water White Paper Securing Our Water Future Together establishes that the catchments of this region are fully allocated and that diversion caps and an environmental water reserve will be put in place. Included within this action is the need to enhance flows in the Werribee River through the implementation of the Werribee Irrigation District Recycled Water Scheme.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA4 Complete Stream Flow Management Plans for the Plenty, upper Maribyrnong, Watts, Little Yarra, Don and Bunyip Rivers, and Olinda, Stringybark, Pauls, Steels, Dixons, Woori Yallock and Coranderrk (Badger) Creeks, plus additional waterways as required	WT3	2007	MW	CMA, DSE, SRW	Medium

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA5 Develop local stream flow management rules for waterways where Stream Flow Management Plans are not required, eg. Merri Creek, Moonee Ponds Creek and Gardiners Creek	WT3	2009	MW	SRW	Low

Stream Flow Management Plans (SFMP) may be developed in unregulated rivers and streams where changes to the flow regime have been identified as a threat. Other factors considered when determining priorities for development of SFMPs include the ecological values of waterways, any history of management difficulties and any pressures for future development. SFMPs have been developed for Hoddles Creek and Diamond Creek, and need to be developed for many other rivers and streams. For other streams in the region, local management rules are required to ensure equitable and sustainable flow regimes.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA6 Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port, and develop and implement a Regional Water Quality Improvement Plan to address the major sources	WT8, WT21, WT22, WT23	Mapping and plan completed by 2008	EPA	DPI, CMA, MW, DSE	Medium

A Regional Water Quality Improvement Plan is required to strategically identify and address key water quality issues including the management of nutrients, sediments and other pollutants from land-based sources such as leaking septic tanks and poorly managed effluent from some dairy farms. Catchment activities are identified in the Port Phillip Bay Environmental Management Plan as a large contributor to nitrogen loads to Port Phillip Bay. Similarly, recent studies such as the Western Port Sediment Study have indicated that catchment activities are contributing significant loads of suspended solids to Western Port via rivers and streams. The study has identified particular areas contributing high sediment loads to Western Port including the low cliffs of the northern Western Port shoreline and the streams of the Bunyip River, Cardinia Creek and Lang Lang River catchments.

The Australian Government's Coastal Catchments Initiative is an opportunity to bring together various agencies, organisations and communities into this strategic regional planning effort as a basis for coordinated and targeted works and monitoring programs for the future.

Within the development of the plan, appropriate mechanisms are required to estimate the loads of nutrients and other pollutants to waterways and the bays, and the reductions in loads being achieved through various programs and on-ground works.

### Works

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA7 Implement the Port Phillip and Westernport Regional River Health Strategy	WT5 – WT8	On-going	MW	CMA, DSE, EPA, SRW, PV, local government, community	High

The Regional River Health Strategy will be an important regional document outlining priorities for the management of waterways as a basis for works programs. It is vital that implementation of the strategy proceeds as quickly as possible and in a manner consistent with integrated investment priorities for the region.

Detailed targets within the Regional River Health Strategy will focus on various elements of river health and the protection of environmental, social and economic values. For example, in regard to native fish, the constructed barriers in our rivers are a particular concern if they affect the viability of native fish populations. Therefore it is proposed that the length of rivers accessible to native fish and platypus will be increased by 1,500 kilometres by 2010.

The continued protection and revegetation of the region's river corridors will also be an important outcome of implementing the Regional River Health Strategy. This will have multiple benefits for waterway health as well as for the quality and amenity of the region's open space and parks networks and offers considerable scope for coordinated and integrated action between Melbourne Water, Parks Victoria, councils, agencies, water authorities and various river management committees.

Other priorities of the Regional River Health Strategy include:

- Improving river and creek vegetation by protection existing remnant vegetation, removing introduced plants, fencing off streambanks to remove stock and replanting with native species
- Improving water quality through the development of a Regional Water Quality Improvement Plan, implementation of best land management practices combined with a comprehensive urban stormwater program of wetlands and implementation of stormwater management plans
- Maintaining an extensive program of fixed site monitoring, waterway investigations, fish surveys and research programs
- Establishing and managing environmental flows through stream flow management plans and the development of local area rules
- Improving beds and banks of waterways
- Protecting heritage values in the waterways and riparian areas
- Enhancing the special social and educational values of waterways in urban areas of this region, including optimising recreation opportunities in line with Parks Victoria's Linking People and Spaces Strategy.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA8 Design and implement schemes for recycling water from the Eastern and Western Sewerage Treatment Plants and smaller plants in the region.	WT2	On-going	MW	SRW, CMA, Retail Water Authorities	High

Sewage and stormwater represent opportunities for the region to recycle water and reduce potable water use. With appropriate treatment, sewage could be reused and be substituted for water extracted from reservoirs and rivers, thus reducing pressure on river flows. Technological innovation that is now taking place could raise the reuse level of treated effluent from the present level of 11% to the Government's target of 20% by the year 2010<sup>29</sup>. EPA endorsement for these schemes will be required.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA9 Complete an audit of stormwater management plan implementation for all municipalities and design and implement a program to address key gaps	WT8	2008	MAV	MW, EPA, local government	High

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA10 Meet best practice standards in urban stormwater discharges in new urban areas	WT8	100% compliance by 2006	Local government	MW, DSE, EPA	High

Historically, urban stormwater management has concentrated on regulating its quantity rather than its quality. But the effect of stormwater on the quality of the waterways and bays is now a major concern as it can be highly contaminated. For example, more than half the nitrogen and phosphorus from the Yarra catchment is sourced from urban areas. Urban stormwater has also been identified as a key source of suspended solids and heavy metals - including zinc, lead and copper - in urban streams<sup>30</sup>. Stormwater inputs to the bays are likely to be increased with continued urban expansion, especially from the identified urban growth areas. The meeting of best practice standards in both redevelopment areas and greenfield development areas will lead to the on-site retention of nitrogen and phosphorus loads. Agreement on cost-sharing arrangements for the implementation of Stormwater Management Plans would trigger accelerated work of these actions.

<sup>29</sup> Ministerial Statement on implementing 'Water for the Future'

<sup>30</sup> Toxicants in Melbourne's streams and wetlands: an emerging threat to healthy waterways

The application of water sensitive urban design requires a preparedness to challenge conventional methodologies for drainage design of new urban areas. It has significant potential to deliver greater protection of receiving waterways as well as achieving substitution of potable water with site-harvested stormwater.

Planning for, and management of, overland flow paths is also important to enable passage of water during flood events with minimal damage to private property and infrastructure.

The Environment Protection Authority, Melbourne Water and local government have major roles in managing stormwater quantity and quality. The Victorian Government's Water White Paper Securing Our Water Future Together has recognised stormwater as an important asset that is poorly utilised to date. The Government has therefore strongly advocated that stormwater harvesting should have an increased role in the water cycle management for Melbourne and other urban areas, particularly where it can assist with water conservation or enhance regional water quality.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA11 Reduce by 500 the number of properties vulnerable to a one in 100 years flood	WT10	2009	MW	Local government	Medium

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA12 All new developments constructed with floor levels at the required safety margin above one in 100 years flood levels	WT10	On-going	MW	Local government	Low

These actions, included in Melbourne Water's Drainage and Waterway Charter, are key mechanisms for reducing the risks from flooding to infrastructure and safety. Action WA11 deals with some of the existing infrastructure in known flood-prone sites. Action WA12 seeks to ensure that all new development is sited to take account of the likelihood and severity of flood events.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA13 Develop, and incorporate into relevant planning schemes, protocols that contribute to the protection of the environmental values of floodplains	WT9	2008	DSE	MW, Local government, CMA	Low

This action seeks to increase the protection of floodplains by increasing the capability of local government to manage land use in these areas with high environmental values.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA14 Develop and implement Special Area Plans for water supply catchments where appropriate	WT8	2009	DSE	DPI, Water authorities, Local government	Medium

The bulk of water harvested for potable use in the region comes from closed catchments, which are fully protected. However, water is also harvested from 'open' catchments that can contain multiple land uses. These have been proclaimed as Special Water Supply Catchments under the provisions of the Catchment and Land Protection Act 1994. Large areas of these open catchments are used for agriculture, horticulture, residences and infrastructure.

This action recognises that land capability mapping and Special Area Plans may be appropriate mechanisms to determine and define the best ways to manage these open catchments. It also recognises the need to audit the implementation of existing Special Area Plans and to address any situations where land use and management is not adequately protecting the supply and quality of water. The management of special water supply catchments involves many stakeholders, so consultation with local communities and landholders is an essential part of the development, implementation and auditing of Special Area Plans for water supply catchments.

### Research and development

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA15 Investigate and quantify the hydrological and ecological relationships between surface waters and groundwater, and develop catchment-based water budgets	WT3, WT5, WT6, WT7, WT8	2009	DSE	CMA, MW, SRW, research organisations universities	Medium

There is an important link between groundwater and surface water flows. Many rivers and streams receive inflows from groundwater that assist in the maintenance of their health. A thorough understanding of these relationships is needed to inform the development of catchment-based water budgets, particularly for the catchments of stressed rivers.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA16 Benchmark rural water use efficiency in major agricultural areas and increase water use efficiency by agricultural industries	WT4	2007	DPI	Agricultural industries, MW, SRW	Medium

We can pursue various actions to minimise the demand for increased diversions and to ensure the water is used to gain the best return. Given that agricultural industries are an important user of water, there is a need to better understand current agricultural practices and opportunities for improved water use. This action requires the strong involvement of primary producers within the region.

### Monitoring

Monitoring is of critical importance to the management of surface water resources. The monitoring system needs to be extensive enough to enable trends in water quality and quantity to be determined. The actions that follow are intended to ensure that the region has the best available monitoring network and that the information collected supports decisions by water managers.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA17 Review and implement a surface and ground water quality monitoring system to ensure adequate and coordinated coverage across the region, including reservoirs, high discharge areas, bays and seas, high rainfall events and nutrient loads.	WT8	Review by 2006 Begin to implement by 2007	CMA	EPA, DSE, MW, SRW, PV, CCB, Local Government	High

Water quality monitoring, including the attainment of SEPP objectives, is the basis for trend analysis, planning and priority setting for water quality management actions. This action recognises that substantial fixed-site monitoring occurs now across the region in rivers and streams, but that monitoring efforts are not evenly distributed and miss key sites including the bays and seas. Comprehensive and coordinated coverage is required across the region to remedy existing gaps. This action also recognises that the majority of nutrient and sediment loads are transported in storm events and therefore, to effectively reduce these loads, a better understanding is required.

The reservoir systems are vital for the provision of water for domestic, industrial and rural purposes. Consequently, early detection of any threats to the reservoirs is essential.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA18 Continue regular assessment of the Index of Stream Condition across the region	WT5, WT6, WT7	On-going	MW	DSE, CMA, EPA	Low

The Index of Stream Condition has developed into an important tool for monitoring stream condition and is the basis for some targets in the RCS. A regular monitoring program is essential to test the success of the actions we are putting into place to achieve these targets.

## 5.7 Aquifers and Groundwater

### 5.7.1 Values

Aquifers are underground layers of rock, often comprised of ancient sands and gravels that can hold and transport groundwater across geological basins.

Groundwater is an important component of the total water cycle and, where aquifers are close to the surface, groundwater interacts naturally with the flows of rivers and wetlands and contributes to their overall health.

Where the quantity and quality of the water in an aquifer is appropriate, significant amounts of groundwater can be pumped to the surface in bores and used for a range of purposes.

Like surface water, groundwater is recognised as a finite resource and its extraction from aquifers is managed by State Government agencies, in particular Southern Rural Water in the Port Phillip and Western Port region.

Groundwater is commonly used for irrigation, commercial, stock and domestic purposes in this region. Licences exist to extract more than 42,000 megalitres of groundwater each year for commercial and irrigation use in 11 Groundwater Management Areas (GMAs)<sup>31</sup>. Extractions are not limited to GMAs and not all extractions require licences. The total amount of groundwater used annually for stock and domestic purposes is not accurately measured but is likely to be many additional thousands of megalitres. There is potential for the growing use of groundwater in aquaculture. In particular, geo-thermal groundwater has the potential to reduce aquaculture production costs and several operations using this resource are current in the region. The natural salt content of groundwater is variable across different aquifers and is often a limiting factor in the ways that the groundwater can be used. For the

protection of various other aspects of groundwater quality, the State Environment Protection Policy (Groundwaters of Victoria) is a key government policy setting standards and performance objectives. This policy assigns roles and responsibilities to relevant agencies and directs actions relating to licensing discharges, pollution abatement and zones of restricted use.

In all of the GMAs in this region, most of the licensed extractions of groundwater are used to supplement

*Significant amounts of groundwater can be pumped to the surface and used for a range of purposes, but it is a finite resource*

surface water supplies for high value agriculture including production of vegetables, fruit, wine grapes, flowers and turf, or for use at golf courses and in industrial processes. It is estimated that the average gross value of production from these agricultural uses is around \$6,500 per megalitre<sup>32</sup>.

Table 3 shows the estimated sustainable economic value of groundwater from the region's 11 GMAs. Collectively, the GMAs of this region provide an economic value from groundwater use across the region of around \$250 million each year. Key contributions to this total come from the Koo Wee Rup, Nepean, Moorabbin and Wandin Yallock GMAs, each of which provide more than \$20 million each year.

<sup>31</sup> Southern Rural Water (2003)

<sup>32</sup> Estimates from RM Consulting Group



## 5.7.2 Key risks to aquifers and groundwater

### WR10 – Extractions exceeding recharge capacity

If extractions from an aquifer exceed its recharge capacity, the long-term viability of the groundwater resource is threatened. While short-term unavailability of water is an issue, prolonged dewatering of aquifers can also contribute to compaction, thereby reducing the future ability of the aquifer to store and transport groundwater.

Excessive extraction can also affect groundwater quality where aquifers are adjacent to the sea and salt water intrusion can occur. This is a particular issue for the Deutgam and Nepean GMAs where the groundwater is drawn from relatively shallow aquifers.

There are also serious environmental impacts from aquifer depletion. As an important component of the water cycle, changes in the hydrological balance of groundwater and surface water can affect ecosystems such as rivers, wetlands and estuaries.

*Changes in the hydrological balance of groundwater and surface water can affect ecosystems such as rivers, wetlands and estuaries*

An estimated sustainable yield, called a Permissible Annual Volume (PAV), has been established for most GMAs. This is a level beyond which no further groundwater licences should be issued. Comparing the PAV with the actual licensed allocations provides an indication of the threat of extractions exceeding recharge capacity, as shown in Table 3 for the GMAs of this region.

It should also be noted that there are unlicensed uses of groundwater that need to be taken into account, including the use of groundwater in urban areas. In addition, our understanding of complex groundwater dynamics is incomplete and the methods used to calculate PAVs will benefit from continued refinement.

Table 3: Licensed allocations, permissible annual volumes and estimated sustainable gross value of production from groundwater for the region's Groundwater Management Areas.

GMA	Existing licensed allocations (ML/yr)	PAV - Estimated sustainable yield (ML/yr)	Proportion of PAV allocated	Sustainable gross value of production (\$million/yr) **
Corinella	791	2,550	31%	5.1
Koo Wee Rup	13,512	14,916*	91%	87.8
Nepean	8,285	5,000	165%	32.5
Frankston	1,564	3,200	49%	10.2
Moorabbin	3,462	4,305	80%	22.5
Wandin Yallock	3,322	3,300	101%	21.5
Kinglake	2,858	3,830	75%	18.6
Lancefield	1,595	1,485	108%	9.6
Cut Paw Paw	515	3,650	14%	3.3
Deutgam	6,050	2,400	252%	15.6
Merrimu	452	450	100%	2.9
<b>TOTAL</b>		<b>42,406</b>		<b>229.6</b>

\* This is the combined total of draft prescribed volumes from 7 zones in the Koo Wee Rup water supply protection area

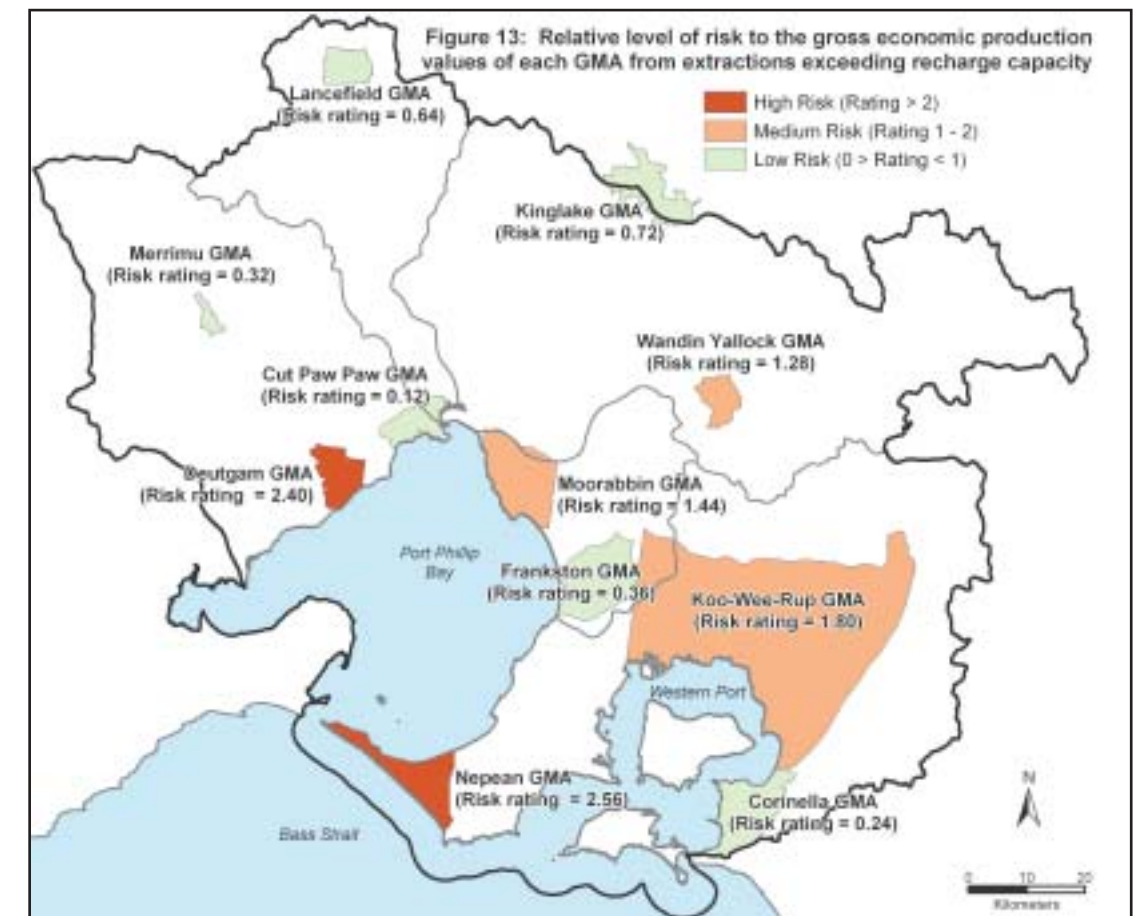
\*\* These values are calculated by multiplying the existing allocation (to a maximum of the sustainable yield) by \$6,500/ML

The following risk assessment methodology, as explained in Section 4.3, is used to assess the level of risk to the gross economic production values of each GMA from extractions exceeding recharge capacity, with the results shown in Table 4 and Figure 13.

Asset rating Gross value of production of the GMA from groundwater	Severity of threat Proportion of PAV allocated	Sensitivity Relative impact of the threat on the production value	= Risk
5 >\$50 million	1 >200%	0.8 Coastal GMAs	
4 20-50 million	0.8 100-200%	0.6 GMAs	
3 10-20 million	0.6 70-100%	0.4 Other GMAs	
2 5-10 million	0.2 <70%		
1 Up to 5 million			

GMA	Asset rating	x Severity	x Sensitivity	= Risk
Corinella	2	0.2	0.6	0.24
Koo Wee Rup	5	0.6	0.6	1.80
Nepean	4	0.8	0.8	2.56
Frankston	3	0.2	0.6	0.36
Moorabbin	4	0.6	0.6	1.44
Wandin Yallock	4	0.8	0.4	1.28
Kinglake	3	0.6	0.4	0.72
Lancefield	2	0.8	0.4	0.64
Cut Paw Paw	1	0.2	0.6	0.12
Deutgam	3	1.0	0.8	2.40
Merrimu	1	0.8	0.4	0.32

Table 4: Assessment of the relative level of risk to the gross economic production values of each GMA from extractions exceeding recharge capacity



## WR11 – Pollution

The protection of groundwater quality is important to ensure the water can be used in a variety of ways. However, this can be a difficult task because the impacts of land-based activities on groundwater quality take a while to show up. It can be decades before contamination of groundwater from a source at the surface becomes apparent. Often, by the time groundwater is obviously degraded, the clean-up measures are technically difficult, costly and ineffective in the short term.

It is therefore important to identify potential threats to groundwater quality and sustainability of supply, and to address them with the precautionary principle in mind.

Known threats to groundwater quality include increasing levels of nitrates, pathogens and pesticides. The main sources of nitrates leaching into groundwater are leaking septic tanks and excessive applications of fertiliser in agricultural activities. The main inputs of pathogens are from leaking septic tanks and inappropriate use of wastewater in irrigation practices. Pesticides leaching from perennial pastures can also contaminate groundwater<sup>33</sup>.

Groundwater can also be contaminated by other pollutants. Leaks from petrol stations and landfills may be particularly serious.

A risk is also posed to the uses of groundwater by potential increases in salt concentration of the water caused by inappropriate irrigation processes. Over time, the salt concentration may increase each time water percolates to the aquifer<sup>34</sup>.

The risk of pollution degrading the value of aquifers and groundwater is considered important across all of the region's GMAs but is particularly serious in the Nepean GMA due to problems with septic tanks.

## 5.7.3 Objectives

The five Water Objectives (see Section 5.4) have been developed in line with the principles of sustainability, and also address the key risks for aquifers and groundwater.

The high risk in some GMAs of extractions exceeding recharge capacity and thereby reducing economic values is addressed by ensuring efficient management of water resources with minimal new impacts on natural hydrological processes (Objective 1).

The risk of groundwater quality being degraded by pollution and contaminants, and thereby reducing economic and environmental values, is dealt with by progressively improving water quality in aquifers (Objective 4).

The risks of declining quantity and quality of groundwater impacting on environmental values

are dealt with by protecting and improving the health of waterways and wetlands (Objective 2) and ensuring the management of water environments improves the health, diversity and resilience of natural ecosystems (Objective 5).

<sup>33</sup> A users guide to the groundwater risk management package.

<sup>34</sup> Groundwater for the future – Groundwater Notes.

## 5.7.4 Targets

These Water Targets (WT11 – WT14) are proposed to meet the elements of the five objectives that are directly relevant to aquifers and groundwater.

Target	Relevant objectives
WT11 Levels of extraction from each GMA in the region to be within the permissible annual volume by 2009	WO1, WO2, WO4, WO5

Target	Relevant objectives
WT12 Groundwater levels in key regional aquifers to be stabilised at sustainable levels by 2025	WO1, WO2, WO4, WO5

As an effectively finite resource, it is important that groundwater is used conservatively. Extractions need to be within set limits so that the groundwater levels in the main aquifers of the region are stabilised and sustainable for the long term. Assessment will be required of all of the uses of groundwater, including unlicensed use in urban areas. The scientific understandings underpinning the definition of PAVs also needs continued development.

Target	Relevant objectives
WT13 Progressively increase the average value of production per megalitre of groundwater extracted	WO1

Groundwater should be used productively to achieve optimum economic, social and environmental benefit. It is a valuable resource that, when applied appropriately to its highest value uses, can sustain farms, businesses, recreation opportunities and local communities. It can also significantly offset the use of other water sources and, in turn, enhance environmental flows in waterways and wetlands. Continual advances in technology and techniques for using and conserving groundwater will be important.

Target	Relevant objectives
WT14 All groundwater monitoring sites to attain State environmental protection policy objectives or regional targets by 2030	WO2, WO4, WO5

The quality of groundwater in this region enables a range of environmental benefits and consumptive uses. Groundwater quality targets for various parameters are outlined in the State environmental protection policy (Groundwater), and specific regional targets will also be developed and included in a regional water quality plan. Inherent in this action is the restoration of groundwater quality in aquifers that are currently polluted.

## 5.7.5 Actions

The following Water Actions (WA19 – WA27) have been developed to meet the four targets relating to aquifers and groundwater.

### Groundwater management arrangements

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA19 Clarify the organisational arrangements for the management of aquifers and groundwater in this region	WT11, WT12, WT14	2006	DSE	SRW, CMA, EPA, MW	Low

There is a need to clarify the organisational arrangements for aquifer and groundwater management in this region, possibly as part of a statewide process.

While the recent Water White Paper Securing Our Water Future Together has established Melbourne Water as the “caretaker of river health” in this region, there would be advantages in designating an organisation with comparative responsibility for our aquifers and the valuable groundwater they contain. That is, an organisation should be designated the role of “caretaker of aquifer health” and be responsible for coordinating planning and actions to protect groundwater quality and ensure sustainable groundwater supply.

In the meantime, a number of the following actions are proposed to be lead by the Department of Sustainability and Environment (DSE) until such time that a caretaker of aquifer health is determined.

### Research and knowledge

There is an important link between groundwater and surface water flows. Many rivers and streams receive inflows from groundwater that assist in the maintenance of their health. We must improve our limited understanding of the interaction between groundwater and surface water and the processes that threaten sustainable and beneficial water uses. A thorough understanding of these relationships will enable the development of catchment-based water budgets, particularly for the catchments of stressed rivers.

Note: A specific action (WA15) to investigate and quantify the hydrological and ecological relationships between groundwater and surface waters is included in Section 5.6 – Surface Waters, Rivers and Streams.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA20 Further develop the regional risk assessment model to identify the level of risk facing groundwater assets.	WT11, WT12, WT14	2006	CMA	SRW, DSE, EPA, MW	Low

An enhanced risk assessment model is necessary to assist regional land and water managers identify the most likely circumstances or locations where groundwater quantity and/or quality could be compromised, thereby guiding investment. The risk assessment should also identify gaps in the science and other knowledge used to manage groundwater allocations.

## Strategic planning for groundwater use

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA21 Complete Groundwater Management Plans for all GMAs with allocations that approach or exceed their permissible annual volume.	WT11, WT12	2009	DSE and Consultative Committees	SRW, CMA, MW, Ground water user groups	Medium

Currently, the volumes allowed by licenses exceed PAVs in five of the region’s 12 GMAs - by a substantial amount at Deutgam.

Groundwater management plans are an appropriate planning mechanism for managing the diversion of water from aquifers when extractions approach or exceed the sustainable limits. For GMAs where the licensed allocations are between 70 - 100% of the PAV, in order to optimise benefits these plans must restrict additional allocations being licensed but enable temporary and permanent trading of individual allocations. For areas where the allocations are already more than 100% of the PAV, the plans must also provide a mechanism for sustainable management. This may include the clawback of licensed allocations, the introduction of restrictions on usage, the development of cost-sharing principles and the identification of alternate supplies such as recycled water. The plans are initiated by the Minister for Water through the Department of Sustainability and Environment, drafted by Ministerially-appointed Consultative Committees, then approved by the Minister.

Associated with the groundwater management planning is the need to develop guidelines for the artificial recharge of aquifers. This process, though largely untried here at present, is nearing reality. There is a need to assess the potential impact of this activity before it occurs and develop appropriate guidelines to ensure the environmental, social and economic benefits of the aquifer are not adversely affected.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA22 Assess the practices and efficiency of groundwater use in GMAs, and develop strategies to achieve higher efficiency and sustainable use of groundwater.	WT13	2006	DPI	SRW, Agricultural industries	Low

To achieve improved conservation of, and productivity from, groundwater, better understanding is needed about who the users of groundwater are, how much water they use, in what ways and why. The data would be used to measure changes in groundwater use over time and to set benchmarks for best practice comparisons. This information should then inform policies and strategies, including regulatory and market mechanisms, that will gradually move groundwater use to higher value practices and achieve increased production from less water.

## Strategic planning for groundwater quality

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA23 Develop and implement groundwater quality management plans for GMAs with a high level of risk to groundwater quality	WT14	Develop plan for Nepean GMA by 2006	DSE	SRW, EPA, Local government, DSE, MW, CMA, Retail Water authorities	Medium

The risk to groundwater quality within the Nepean GMA, mainly from failing septic tanks and salt water intrusion, is recognised as being particularly serious<sup>35</sup>, and leaking septic tanks are also an issue for groundwater and surface waters in various other parts of the region. In order to protect this important water supply, there is an urgent need to develop and implement a groundwater quality management plan. The plan needs to look at all options for protecting and improving groundwater quality including accelerating, where possible, the backlog sewerage program. This planning process should be undertaken as a pilot study and assessed for its applicability to other GMAs where the level of risk to groundwater quality is high from failing septic tanks (which is a serious issue at various areas across the region), contaminated sites, leaking landfill, etc.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA24 Develop guidelines and codes of practice for the management of risks to groundwater quality, and undertake programs with relevant land and water managers	WT14	2006	DSE	EPA, SRW, DPI, MW, Local government, Water authorities	Medium

There is a great deal of information about activities and situations that are most likely to threaten the region's groundwater, including leaking septic tanks, and about measures for reducing the risk. This information should be consolidated and made readily available to better advise and educate relevant land and water managers.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA25 In the local governments that contain GMAs, develop planning scheme guidelines/regulations to protect groundwater quality.	WT14	2006	DSE	Local government, EPA, SRW, MW	Medium

Local government has an important role in the protection of aquifers and groundwater due to the potential impact of urban development on groundwater. Guidance for local government from groundwater specialists is important to better inform planning and development decisions for effective protection of groundwater quality.

<sup>35</sup> Nepean Peninsula Groundwater Study Report.

## Monitoring

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA26 Meter all significant existing groundwater extractions used for commercial and irrigation purposes and all new licenses, and monitor groundwater levels within key aquifers to assess trends in relation to sustainable levels.	WT11, WT12	2007	SRW	DSE, MW	Medium

In this region there are in the order of 1,000 commercial and irrigation licences, of which only around 600 are currently metered. To ensure that significant individual licences are not exceeded and that overall management of the total resource is effective, it is important to implement the proposed requirement in Victoria for metering of all significant existing groundwater extractions and all new licences.

The cumulative impacts of the extractions on groundwater levels within aquifers must also be monitored to better understand sustainable yields, review PAVs and guide future policy and management directions.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA27 Develop and implement a comprehensive regional groundwater quality monitoring and evaluation program	WT14	2006	EPA	SRW, CMA, DSE	Medium

Groundwater resource managers monitor groundwater quality where it is affected by extraction but overall monitoring and evaluation of groundwater quality in the region is limited. Consequently, little record exists of what is happening to groundwater quality over time and there is no objective process for determining priorities for addressing groundwater quality issues. This also contributes to a relatively low level of awareness of the impacts of land-based activities on groundwater quality. A comprehensive and coordinated regional groundwater quality monitoring program is therefore required.

## 5.8 Wetlands

### 5.8.1 Overview

Wetlands are among the world's most ecologically diverse and valuable environments. They support an array of natural ecosystems and species and are key links in processes such as fish and bird breeding, water quality maintenance and flood protection. They also provide recreational opportunities and are important historical and landscape features.

The Port Phillip and Western Port region has more than 900 wetlands greater than one hectare in size, including the tidal flats of Western Port, with a combined area of more than 40,000 hectares. Seven major wetland types are represented in the region (see Table 5).

The region contains wetlands of international importance including sites at Edithvale-Seaford, Western Port and on the western shoreline of Port Phillip Bay that are listed under the Ramsar convention for the international protection of wetlands. In addition, wetlands at Laverton Saltworks and Werribee-Avalon are listed in the National Directory of Important Wetlands.

Wetland type	No:	Original area (ha in 1750) <sup>36</sup>	Current area (ha) <sup>37</sup>	Proportion remaining (%)	Examples
<b>Natural wetlands</b>					
Freshwater meadows	109	880	912	104	Carrum Carrum Swamp
Shallow freshwater marshes	51	5,372	825	15	Boneo Swamp, Jensz Swamp
Deep freshwater marshes	72	51,180	470	1	Rhyll Swamp, Swan Lake
Semi-permanent saline wetlands	57	4452	2,813	86	Truganina Swamp, Corinella Saltmarsh
Permanent saline wetlands	11	24,644	26,701	107	Cheetham Wetlands and Western Port
<b>Sub Total</b>	<b>300</b>	<b>86,528</b>	<b>31,721</b>	<b>37</b>	
<b>Constructed wetlands</b>					
Permanent Open freshwater	597		7,080		Pykes Creek Reservoir
Sewage Ponds	31		1,878		Werribee and Drouin Sewage Treatment Ponds.
<b>Sub Total</b>	<b>628</b>		<b>8,958</b>		

Table 5: Summary analysis of the region's wetlands.

Nearly two thirds of the region's natural wetlands have been lost due to draining, filling and other modification. The extent of the region's deep-water marshes has decreased significantly due to the draining of the Koo Wee Rup Swamp. The draining of the Carrum Carrum Swamp has had a similar effect on the extent of shallow fresh-water marsh wetland systems in the region.

Human activity has also been responsible for new wetland environments created through the construction of reservoirs, storm water treatment ponds and sewerage treatment plants which now provide around 22 per cent of the region's wetland coverage. The Western Treatment Plant at Werribee is recognised for its importance as bird habitat and is part of one of the region's Ramsar sites.

<sup>36</sup> Wetlands extent prior to European settlement (GIS Layer)  
<sup>37</sup> Current wetlands environment and extent (GIS Layer)

### 5.8.2 Values of wetlands

#### Environmental values

Wetlands are important as habitat for animal taxa at stages of their life cycle and provide refuge in times of drought. They are vital feeding grounds and nurseries for many land, marine and freshwater animals. They store and supply critical components of the natural food chains for rivers and inshore waters. Hundreds of bird species depend on the region's wetlands for all or part of their annual life cycles. Migratory birds travel to Port Phillip Bay and Western Port wetlands from as far away as Alaska, Siberia, China and Japan. Table 6 identifies the wetlands in the region that have been recognised as wetlands of international and/or national environmental importance.

*Hundreds of bird species depend on the region's wetlands for all or part of their annual life cycles*

The ability of wetlands to capture nutrient and sediment loads in urban stormwater and the need to protect their biological functions has made them an important part of the work to protect water quality in Port Phillip Bay and Western Port. Among actions to improve the quality of stormwater discharging from Melbourne's south-eastern growth corridor is the construction of 10 wetlands to treat stormwater run-off in the cities of Casey, Greater Dandenong and Kingston. Constructed wetlands are also planned or have been completed in other parts of Melbourne and in the

Western Port catchment. Wetlands also have important functions as groundwater discharge and recharge areas. Their potential benefits in both improving surface run-off quality for surface and ground water storage and later re-use has not yet been explored at any significant scale in the region.

Status	Sites in Port Phillip and Western Port region
Wetlands of international importance (Ramsar sites) listed under the Convention on Wetlands (Ramsar, 1971)	Western Port Ramsar site Edithvale-Seaford Wetlands Ramsar site Components of the Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar site at Point Cook Werribee, The Spit and Mud Islands
Sites included on the East Asian-Australian Shorebird Network	Western Port Shorebird site Components of the Port Phillip (Western Shoreline) and Bellarine Peninsula Shorebird site at Point Cook Werribee, The Spit and Mud Islands.
Areas of International and National Importance for Shorebirds identified in a National Plan for Shorebird Conservation in Australia <sup>38</sup>	Western Port, Seaford Swamp, Werribee, Altona, Laverton (Cheetham) Saltworks, Mud Islands,
A Directory of Wetlands of National Importance in Australia	Western Port, Edithvale-Seaford, Mud Islands, Werribee, Altona, Laverton (Cheetham) Saltworks, Point Cook, Lerderderg River (heritage component), Yarra River (heritage component)

Table 6: Wetlands status in the Port Phillip and Western Port Region

<sup>38</sup> A national Plan for Shorebird Conservation in Australia

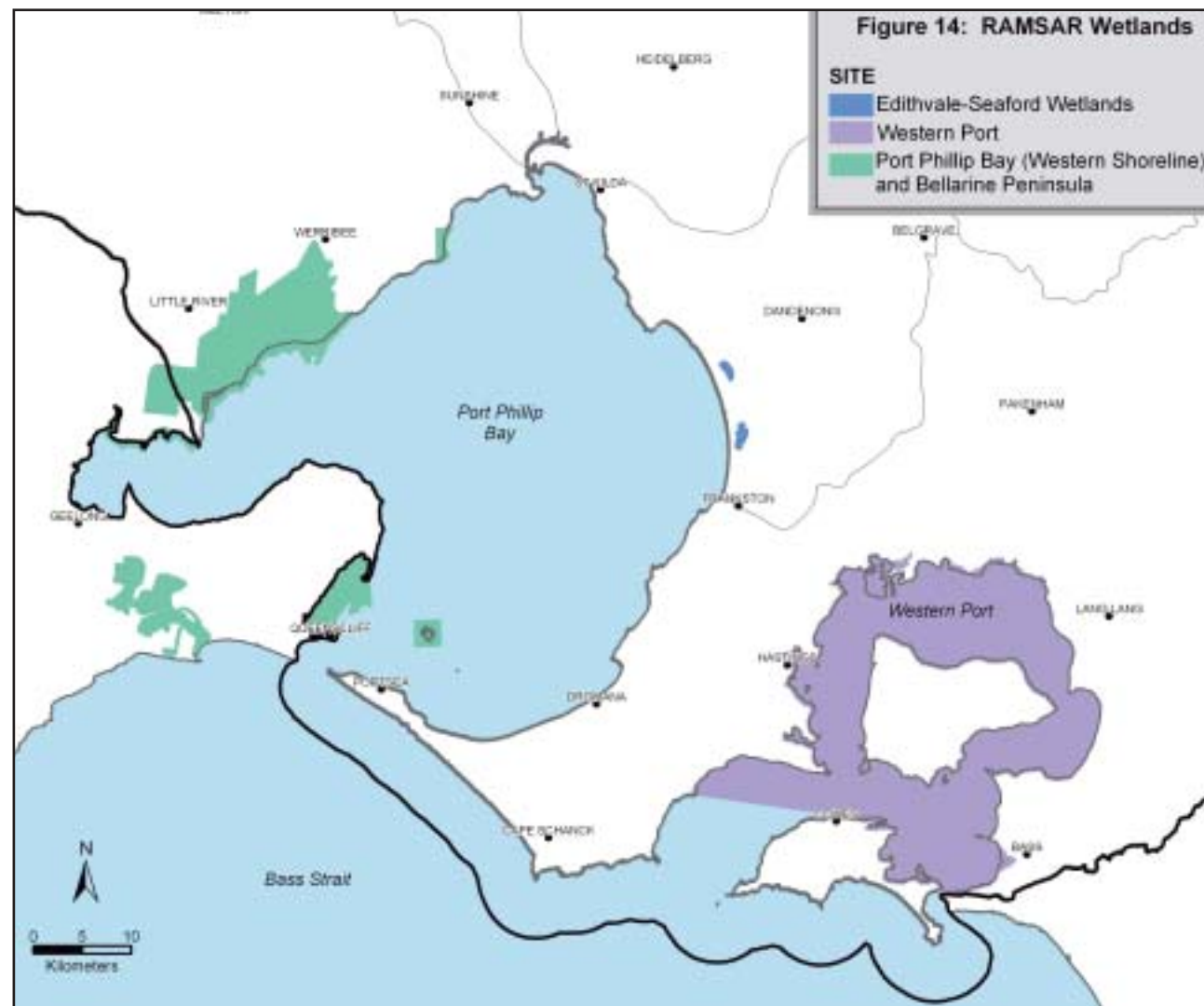


Figure 14: RAMSAR Wetlands

### Economic values

Wetlands have important economic values in urban and rural areas in reducing flood damage by storing floodwaters and retarding peak flows. For example, the remaining parts of the Edithvale-Seaford wetlands are critical parts of Melbourne’s flood management schemes for the south and south-eastern suburbs. Some of Melbourne’s existing network of flood retarding basins have also been earmarked for redevelopment as constructed wetlands to add environmental and social values to their flood management functions. Wetlands serve as nurseries for recreational and commercial fish species and the associated species that support them.

### Social values

Wetlands have many cultural and social values. Natural wetlands are an important component of Aboriginal cultural heritage and are regarded as sites of spiritual importance. Social values of both constructed and natural wetlands include landscape and aesthetics, recreational (such as water sports, fishing) and educational (nature observation). Due to an increasing recognition of the values provided by wetlands, many new housing estates are including construction of wetlands as integral parts of developments for their landscape, recreation and environmental benefits, and these have become important parts of the region’s network of parks and recreation areas.

## 5.8.3 Risks to wetlands

The following risks are incrementally diminishing the number, size and quality of the region’s wetlands.

### WR12 – Loss of wetlands from changes in land use

High protection status is provided for Ramsar wetlands and those in State and regional parks or areas dedicated to water supply or effluent treatment. However, these represent only a small number of the region’s wetlands and little emphasis is currently placed on monitoring and protecting wetlands on private land, particularly shallow wetlands.

Remnant wetlands on private land, often already degraded by land clearing and partial drainage, are often drained and filled in when urban development occurs or when rural land that is permanently or intermittently waterlogged is used for more intensive agricultural production.

### WR13 – Changes to water regimes

The conversion of the region’s catchments to agricultural and urban land use with high and rapid runoff rates has also changed the volumes, timing and frequency of flows to wetlands, altered their wetting and drying duration and seasons and, for coastal wetlands, altered their cycles of salt and fresh water flows.

The health of floodplain wetlands is intrinsically tied to the floods and droughts on their adjacent rivers and streams. These wetting and drying cycles have been significantly altered by river regulation and the loss of large and medium river floods due to dams and storages.

### WR14 – Sediments and toxicants

The input of sediments and toxicants from inflows is a major issue for natural and constructed wetlands. The capacity and quality of reservoirs in the north west of the catchment (such as Melton and Rosslynne reservoirs) are threatened by sediment inflows while around one-third of sampled metropolitan wetlands show elevated levels of heavy metals in sediments<sup>39</sup>.

While constructed wetlands are partly designed to capture sediments and pollutants, their biological functions and other social and environmental values need to be protected by capturing pollutants at their source.

## 5.8.4 Objectives for wetlands

The five Water Objectives (see Section 5.4) have been developed in line with the principles of sustainability and also address the most important risks for wetlands.

The high risk to wetlands posed by land use change is addressed by protecting and improving the health of wetlands (Objective WO2). The risks posed by changes to water regimes is addressed by ensuring efficient management of water resources with minimal new impacts on natural hydrological processes (Objective WO1). The risk of wetlands being degraded by pollution and contaminants, and thereby reducing economic and environmental values, is dealt with by progressively improving water quality in the regions waterways, which includes the management of stormwater (Objective WO4).



<sup>39</sup> Toxicants in Melbourne’s streams and wetlands: an emerging threat to healthy waterways.

## 5.8.5 Targets for wetlands

These Water Targets (WT15 – WT16) are proposed to meet the elements of the five objectives that are directly relevant to wetlands. Wetlands will also greatly benefit from management actions to address the key risks that face surface water, bays and coasts.

Target	Relevant objectives
WT15 No net loss in the extent and health of wetlands of each existing type	WO2, WO5

Target	Relevant objectives
WT16 Progressively improve the overall health and social value of natural wetlands, including those that are nationally and internationally recognised	WO2, WO4, WO5

As indicated, natural wetlands in the region have generally decreased in number, extent and health. We need to protect and enhance the extent and diversity of what is left. To do this, we need to understand the elements of wetland ecology that make the wetlands healthy, including the volumes and frequency of flows, water quality, vegetation cover and diversity of species. And we must seek to put in place programs to address these elements.

The region retains some valuable and significant wetlands including some that are internationally recognised, and it is particularly important to protect and maintain these. As well as ensuring no net loss in the extent and health of wetlands in the region, there is a need to protect and enhance depleted ecological vegetation classes that exist in wetland environments.

Measuring achievement of this target will require development of an Index of Wetland Condition (see Action WA 28). This would likely be similar in concept to the Index of Stream Condition that is now applied across Victoria as a consistent approach to measuring the condition of waterways.

## 5.8.6 Actions for wetlands

These Water Actions for wetlands (WA28 – WA32) focus on implementing existing Strategic Wetland Management Plans for Ramsar wetlands. They aim to develop a greater understanding of wetland ecosystems and to incorporate the principle of wetland protection into land management policies and activities in the region.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA28 Develop and apply an Index of Wetland Condition method to determine the overall health of wetlands in the region and establish a benchmark to measure change into the future	WT15, WT16	2006	DSE	Parks Victoria, CMA, MW, EPA, Local government	Medium

A critical issue for managing complex ecosystems such as wetlands is to have in place a robust and nationally accepted method of assessing the condition of wetlands. Such a methodology is being developed by the Commonwealth and State Governments and is expected to be available in 2005.

Some wetlands, including those listed under the Ramsar convention or in the National directory of important wetlands, have been assessed and prioritised for their values and protection needs. However, most of the region's 900 wetlands have been mapped but not categorised to determine their relative importance or what the aims of conserving them might be. This makes it difficult to effectively prioritise actions, allocate funding or appropriately share the cost of works with private landholders.

Establishing the existing condition of the region's wetlands will enable risk assessment, and will underpin the development of a regional Wetland Plan identifying priorities for on-ground action.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA29 Consolidate and distribute data on regional wetlands to relevant stakeholders including local government, landholders and Kulin people.	WT15, WT16	2006	DSE	Local government MW, CMA, landholders	Low

Some data on the location, type, vegetation and native fauna of wetlands in the region is available but is not consolidated or readily available. As well as important environmental and water quality benefits, natural wetlands often contain Indigenous heritage sites. A region-wide inventory of wetlands on private and public land with information on condition and trends would therefore be useful. The consolidation and distribution of wetland information would enable local government, landholders and others to better plan for and manage these assets. Information on appropriate management techniques and assistance programs would also be valuable.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA30 Develop a Regional Wetland Plan to establish and implement priorities for investment.	WT15, WT16	2007	CMA	Parks Victoria, DSE, MW	Medium

Our activities often have an impact on the health of wetlands, especially activities including vegetation clearing, recreational boating and fishing, introducing pest plants and animals and fire. People's lack of awareness of wetlands and their susceptibility to our activities are often contributing factors to decline in wetland health.

A regional wetland plan is required that addresses the values of wetlands and the risks to them. It should also include consideration of flow requirements and natural flooding. It should also consider the current level of community awareness of, and attitudes to wetlands, opportunities for enhancing values and reducing threats, opportunities for building new wetlands and cost sharing arrangements including possible incentive programs for the management of wetlands on private land. Incorporating this into major, landscape-scale projects in the Western Port and Dandenong catchments should be explored as a way of generating new funding for this work, as discussed in Action PA10 in Chapter 8 on People and Organisations.

New, constructed wetlands can play important roles as silt traps and water retarding basins. However, an increased emphasis should also be placed on creating native vegetation at these new environmental assets to create refuge and habitat for native fish and other fauna. The monitoring of water quality at constructed wetlands, including in urban areas, will require consideration.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA31 Develop planning policy and protocols that contribute to the protection of wetlands, and incorporate them in relevant planning schemes	WT15, WT16	2007	DSE	Local government, MW, CMA, EPA	Low

Protecting the remaining wetlands within the urban areas of the region and those in the designated urban growth corridors requires strong partnerships with local governments. This will ensure that stormwater management and design of new urban areas take account of the needs of wetlands and the value that these wetlands can provide to residents.

The development of management practices that will incorporate wetlands into urban design will be important to manage the risk posed by urban development to environmental values and downstream water quality. Other tools for protection include placing conservation covenants on them, or purchase through the National Reserve System via Trust For Nature's revolving fund.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA32 Implement existing Wetland Management Plans for all three Ramsar wetland areas in the region (Port Phillip - Western Shoreline, Western Port and Edithvale-Seaford)	WT16	2008	MW, Parks Victoria	DSE	High

Strategic management plans<sup>40,41</sup>, exist for nationally and internationally significant wetlands, including Ramsar plans, and should be implemented to protect and enhance these valuable catchment assets. Discussions between agencies including Parks Victoria and Melbourne Water will be important to identify catchment-based threats to these wetlands and determine how these threats can be cooperatively managed.

<sup>40</sup> Western Port Ramsar: Strategic Management Plan

<sup>41</sup> Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site: Strategic Management Plan

## 5.9 Coasts

### 5.9.1 Overview

The Port Phillip and Western Port region has 600 kilometres of outstanding coastal landscapes bordering the two iconic bays and Bass Strait. Port Phillip Heads, Point Nepean, the bay beaches and foreshores, Bass Strait surf beaches, French Island and Phillip Island provide a wide range of natural and cultural assets and are the most accessible parts of the region's coasts.

The proximity of these areas to metropolitan Melbourne ensures they are popular for visits and are highly used. The emerging popularity of a "seachange" lifestyle is bringing more people to the coast as permanent residents. This high and growing demand on our coasts will increase the pressures on the coastal resources and amenity.

The coast, in its strictest definition, is the interface of the land and sea including foreshore and beach areas. Though this is often a narrow strip of land, coasts are dynamic ecosystems influenced by marine processes and by various aspects of the natural and built environment above the high water mark.

The region's coasts encompasses a diverse range of vegetation communities and geological landforms, built environments and managed open space, providing substantial environmental, economic and social benefits to the region and to Victoria.

*The emerging popularity of a "seachange" lifestyle is bringing more people to the coast as permanent residents.*

### 5.9.2 Values of coasts

#### Environmental values

The biological and geological elements of the coastal environments of the Port Phillip and Western Port region are a feature of these populous and popular areas. The region's coasts support a range of flora and fauna, with some of the region's most fragile and threatened flora and fauna found along the coastal strips. More than 50 of the region's ecological vegetation classes occur within two kilometres of the coast, with 27 of these listed as endangered in at least one of the three coastal bioregions<sup>42</sup> (Gippsland, Otway and Victorian Volcanic Plains). Among these EVCs is the 'Coastal Moonah Woodland', a floristic community listed as threatened under the Flora and Fauna Guarantee Act 1988. However, little of the original vegetation that once occupied the foreshore remains.

The environmental significance of the coast has been recognised through the creation of reserves such as National Parks, the declaration of Ramsar wetlands and more recently the recognition of the Mornington Peninsula and Western Port Biosphere Reserve. The coastal areas contain examples of all eight of Victoria's wetland types and provide important habitat for 14 nationally and internationally recognised shorebird species<sup>43</sup>. The inter-tidal zone contains reef systems that provide many important habitat and marine nursery areas.

#### Social values

Highly valued for their contributions to our lifestyles and industries, the coasts are sought for residential living as well as underpinning much of the region's recreation and tourism activity.

The coasts provide significant recreational values, with the Victorian Coastal Council's survey of coastal use in 2001 finding that the Victorian coast sustains more than 70 million visits annually<sup>44</sup> (this figure does not include trips under two hours duration), many of which occur in the region. The range of recreational activities includes swimming, surfing, sailing, fishing and walking. Figure 15 illustrates the spatial distribution of the recreational value of coasts.



<sup>42</sup> Draft Port Phillip and Western Port Native Vegetation Plan

<sup>43</sup> A National Plan of Shorebird Conservation in Australia

<sup>44</sup> Market Research Report: Victorian Coastal and Marine Research, Wave 2



Utilisation by the region's Indigenous people of the coast's productivity and abundance of wildlife resulted in many important cultural values, particularly relating to coastal landscapes and biodiversity<sup>45</sup>. Indigenous relationships with coastal and marine environments stretch back many thousands of years and are reflected in the cultural sites present along Victoria's coast and in this region. These sites, which include shell middens and camping places, date back as far as 6,000 years which is when the sea rose to its present level. Access for Indigenous people to these resources for cultural purposes remains a key challenge given the impacts of development on the coast.

### Economic values

The region's coasts provide substantial economic value, particularly in and around Melbourne. Both bays support commercial fisheries and both are home to operating ports of international significance. The region's excellent coastal amenity and resulting recreation and tourism operations depend on natural coastal assets such as beaches, biodiversity, water quality and aesthetic values. The economic value of the coasts in terms of recreation was estimated in 1997 at \$140 million per year<sup>46</sup>.

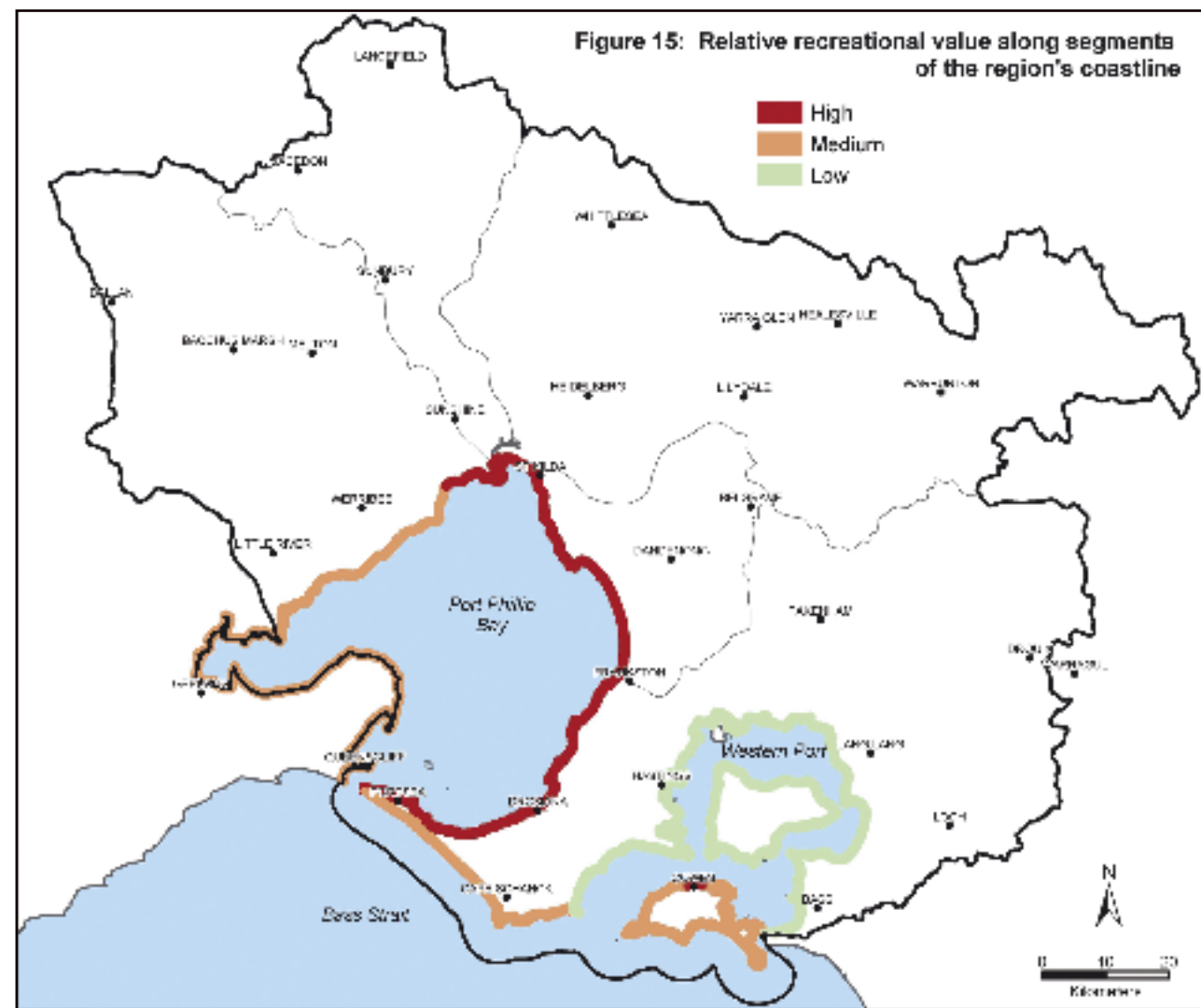


Figure 15: Relative recreational value along segments of the region's coastline

## 5.9.3 Key risks to coastal values

In terms of coastal values, the popularity of the coastal zone provides both risks and opportunities. Often, increasing the value that one use bestows on coasts (for example, urban and residential development) decreases other values (for example, coastal areas for recreation and habitat). Achieving a balance between these values requires triple bottom line decision-making processes, and involves some significant risks.

### WR15 – Coastal uses that compromise other values

The popularity of coasts continues to increase, with opportunities for both development and recreation on the coastal fringe being highly sought after. The very high demand for coastal living and recreation opportunities, and the resulting scale of development and use, threatens the ability of some coastal systems to adapt and respond. There is increasing pressure for residential, access, boating, car parking, tourism and uses in highly sensitive coastal settings. Development poses particular threats to landscape, biodiversity and amenity values. Inappropriate development also impacts on other values such as water quality, notably through stormwater and urban run-off.

Inappropriate access by vehicle and pedestrian traffic also threatens many coastal values. Impacts include erosion, degraded habitat and displacement of the associated native animal species.

This risk of further loss of value is high, due to the increasing popularity of the coast and a recognised need for additional infrastructure. The areas of greatest risk are those zones where ecosystems are largely undisturbed, predominantly around the Mornington Peninsula and Bass Coast.

### WR16 – Increased rates of coastal erosion

Changing rates of coastal processes, such as erosion and deposition, also pose significant threats to coastal values. Erosion and sedimentation caused by both natural and human activities threatens the ongoing viability of recreation and tourism by diminishing access to beaches and threatening safety, indigenous relics and infrastructure.

*There is increasing pressure for residential, access, boating, car parking, tourism and other development in highly sensitive coastal settings*

Increased erosion and the presence of hard structures can also have a direct impact on biodiversity values through habitat fragmentation, with impacts also occurring as a result of sediment smothering aquatic habitat. Particular examples in the region include clay cliff erosion on Western Port's eastern shore and beach erosion in Port Phillip Bay which have been outlined in a Beaches at Risk report.

This risk is expected to increase if climate change forecasts are realised.

### WR17 – Pest plants and animals

Pest plants and animals pose a major risk to coastal remnant vegetation and associated biodiversity values. There are few areas of the coastal zone unaffected by pests. Garden escapes threaten indigenous vegetation in many areas while foxes, dogs and cats threaten a range of coastal flora and fauna through predation and displacement. The impact of pests on biodiversity values also affects tourism and recreation values.

### WR18 – Inundation

Global climate change predictions suggest a rise in sea levels, which will threaten many coastal values in low-lying areas including infrastructure, remnants of indigenous habitat and recreational amenity through increased erosion. Impacts from storm surges and increased intensity and/or frequency of storm events may be a key concern. Habitat fragmentation is also likely to occur with the area available for habitats being reduced because of the existence of hard structures such as roads. The risk of inundation is high in several areas, particularly saltmarsh habitats in Western Port.



<sup>45</sup> Aboriginal occupation of the Melbourne Area, District 2A

<sup>46</sup> Risk assessment framework and outputs for Port Phillip and Western Port Region

### WR19 – Litter

Litter is a highly visible pollutant that finds its way to beaches largely through waterways, but also from shipping. Litter threatens recreational and tourism values through its impact on amenity, and places a significant financial burden on local government to maintain substantial beach cleaning programs for key recreational beaches. It also poses many risks to wildlife such as discarded fishing line entangling birds and fauna being entrapped in plastic mesh. The risk of litter being transported to the coast is exacerbated during storm events, when volumes of run-off increase.

### WR20 – Nutrients and other pollutants

Nutrient threats generally originate in the catchments and have predominantly marine impacts, however these can also threaten coastal values. Similarly, toxicants, suspended solids and seepage from septic systems can threaten particular areas of coasts

### WR21 – Oil spills

There is a high volume of shipping in this region and although programs are in place to prevent oil spills, there remains a risk of oil pollution. While oil spills will generally occur in the marine environment they have coastal impacts when oil contacts the shoreline adversely, affecting tourism and recreation values, and on biodiversity. Depending on spill scenarios, clean-up can be very costly, so the economic impacts can also be significant.

The physical characteristics of Western Port mean an oil spill may not be effectively contained in some common tidal conditions and oil would be quickly dispersed throughout the marine and coastal environment.

### WR22 – Coastal acid sulphate soils

The region contains the majority of Victoria’s coastal acid sulphate soils (CASS)<sup>47</sup>. Disturbing these soils and exposing them to air can cause the production of sulphuric acid affecting land, biodiversity and water values. Future urban and infrastructure development needs to recognise the constraints associated with CASS, as the future costs of ameliorating impacts would be significant. The risk posed by CASS is high due to a general lack of awareness of their presence and potential impacts.

### WR23– Deliberate loss of coastal vegetation

Coastal vegetation provides important habitat and aesthetic values, and exists primarily on coastal Crown land. Historically, there has been a cumulative loss of native vegetation along the coast, mainly for residential, industrial, tourism and recreational opportunities. In recent years, some areas of coastal vegetation have been subject to deliberate clearing and damage, often for maintaining or creating views and for convenient coastal access. The deliberate loss of coastal vegetation provides a significant risk to coastal values, and is particularly important where the remnant vegetation occurs in small or fragmented areas and where the vegetation comprises ecologically significant systems such as saltmarsh and mangroves.

### WR24 – Threats to inter-tidal areas

The region contains an array of inter-tidal areas that provide important habitat, fishing and recreational opportunities. While some of these areas are protected, others are subject to intense pedestrian traffic and harvesting activities. The risks to these systems can be magnified when water circulation is limited or when they are in close proximity to urban influences such as stormwater.



<sup>47</sup> Acid Sulphate Soil Hazard Maps: guidelines for coastal Victoria

## 5.9.4 Objectives for coasts

The five objectives (see Section 5.4) for the region’s water-based assets have been developed in line with the principles of sustainability, but also address the key risks for coasts.

The risk to coastal values posed by land use change is addressed by ensuring that the management of coasts improves the health, diversity and resilience of natural ecosystems (Water Objective 5).

The risks posed by acid sulphate soils, erosion, pest plants and animals and inundation are addressed by protecting and improving the health of coastal systems (Water Objective 3).

The risks posed to coasts by pollutants such as oil, litter and excess nutrients are addressed by protecting and improving the health of coastal systems (Water Objective 3) and by progressively improving water quality (Water Objective 4).

## 5.9.5 Targets

Water Targets (WT17 – WT20) are proposed to meet the elements of the six objectives that are directly relevant to coasts. The targets are a way of measuring both the protection of the key environmental, economic and social values of coasts, and the management of the major risks to those values. Environmental values will be enhanced through achievement of the targets relating to native vegetation, litter reduction and beach health. Social values will be enhanced through achievement of the targets relating to Indigenous cultural heritage, public accessibility and beach health targets. Achievement of the environmental and social targets underpins the capability of coasts to provide economic values.

Target	Relevant objectives
<b>WT17</b> Reduce the proportion of coast in the region where environmental values, recreational beaches, Indigenous cultural values and public infrastructure are at high risk from accelerated coastal erosion and other degrading	WO1, WO3, WO5

Erosion is an integral part of the normal biological and physical processes for the region’s dynamic coastal environments. However, accelerated coastal erosion is an important issue for a number of coastal sites and beaches here, with major threats to social and recreational values along with public risk issues being identified at 20 of our major recreational beaches<sup>48</sup>. Coastal biological diversity, heritage and Indigenous cultural values are also at risk at some of these sites.

There is a need to broaden the assessment of coasts to cover the whole region, assess their current state as a benchmark, determine the level of risk to the coast’s values from various processes, and then revise Target WT17 to quantify it and make it timebound.

<sup>48</sup> Beaches at risk report

Target	Relevant objectives
<b>WT18</b> A net gain in the extent and quality of native coastal vegetation, as measured by habitat hectares	WO3, WO5

Coastal vegetation is very important due to its role in protecting the environmental, social and economic values that occur at this dynamic land-sea interface. The protection of coastal ecological vegetation classes therefore makes an important contribution to maintaining coasts in good condition. While native coastal vegetation provides multiple benefits, non-indigenous vegetation can also be valuable in protecting highly-visited coastal areas.

Target WT18 focuses on increasing the extent and quality of native vegetation on coasts and recognises that the coastal fringe in this region contains some of our most sensitive and degraded native vegetation types. The Regional Native Vegetation Plan will specify targets for each of the region's ecological vegetation classes, including those that occur along our coasts. Meeting these targets will require protecting some areas plus revegetating others. Ongoing assessment will be required to assess the habitat hectares of our coastal vegetation, which is a combined measure of both its extent and quality, with a view to progressively increasing the total habitat hectares in the coastal areas.

Target	Relevant objectives
<b>WT19</b> Public access to the region's beaches and bays maintained	WO5

One of the main reasons for coasts being highly valued is their accessibility to the public. This target seeks to maintain the ability of the public to access and enjoy many areas of beach and bay in this region where other values are not diminished or compromised. An associated issue is managing the sites of access so that coastal values are protected.

Target	Relevant objectives
<b>WT20</b> The number of days that beaches are classified unsuitable for swimming reduced to zero by 2010	WO4

Personal contact with the waters of the bays is the basis of many social and economic activities. Achieving standards of water and beach quality that ensure beaches are suitable for swimming will support these values and is an indicator of how well we are managing our catchments.

## 5.9.6 Actions

These Water Actions (WA33 – WA40) have been developed to meet the coastal targets.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
<b>WA33</b> Investigate, assess and manage accelerated coastal erosion and other degrading processes at high value sites where recreational, heritage, Indigenous culture, environmental values and public infrastructure are at risk	WT17	Risk assessment by 2006 Begin to implement	DSE	CCB, local government, Committees of Management	High

Addressing coastal issues at priority sites, including beaches at risk from accelerated coastal erosion, is a key component of protecting and maintaining the values of the region's coasts.

Building on the work undertaken to prepare the Beaches at Risk report, this action requires further identification of sites across the region where environmental, social, Indigenous culture and public infrastructure values are at risk from coastal erosion, longer-term climate change and other degrading processes.

Programs then need to be developed and implemented to maintain normal biological and physical processes, whilst recognising the dynamic nature of coasts and beaches and accommodating the needs for public infrastructure, use and access.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
<b>WA34</b> Communicate the requirements of contingency plans for oil spills to all relevant stakeholders	WT17, WT20	On-going	Marine Safety Victoria	Port authorities, EPA	Low

Oil spills are a major risk to coastal values, and demand an on-going and vigilant effort by appropriate authorities, including communication with relevant stakeholders, is required.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
<b>WA35</b> Map areas susceptible to inundation in Port Phillip Bay and Western Port	WT17, WT18	2006	DSE	CCB, MW, Port authorities, local government	Medium

Not enough is known or understood about the threat of inundation addressed in this action, though it is recognised that climate change and the subsequent inundation represent a major risk to all coastal values.

While managing the threat of climate change requires coordinated national and international efforts, it is possible for the Port Phillip and Western Port region to mitigate some of the potential impacts. To do this, we need to understand where inundation might occur and to develop strategies for adaptation. To a lesser extent, changes to the Port Phillip Bay's shipping channels could also affect the region's susceptibility to inundation, and we need to understand the potential impact.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA36 Map the occurrence of coastal acid sulphate soils and develop overlays for inclusion in relevant planning schemes	WT17, WT18	2009	DSE	CCB, Local Government, DPI, EPA	Low

Not enough is known or understood about the threat of acid sulphate soils addressed in this action. Disturbance of coastal acid sulphate soils is an emerging but manageable risk. We particularly need to understand the distribution of the soils and ensure that the information is available to local government planners for inclusion in planning schemes.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA37 Develop and implement plans to increase the extent and quality of coastal ecological vegetation classes	WT18	2009	DSE	DPI, CMA, CCB, Parks Victoria, Local Government, Committees of Management	Medium

The protection and enhancement of native vegetation is crucial in maintaining the overall health of the region's coasts. This includes the management of impacts from weed infestations, pest animals, erosion and vandalism. Particular attention is required for the coastal ecological vegetation classes that have been depleted below 10 per cent of their original extent and remnant vegetation in urban areas which provide particular educational and social value in addition to their inherent environmental value. This action will contribute to implementation of the State environment protection policies.

### Aligning coastal development and social value

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA38 Ensure planning schemes in coastal areas reflect the Victorian Coastal Strategy and Coastal Action Plans	WT17 – WT21	2005	DSE	Local government, CCB	Medium

Protection of our coastal values requires a strong land use planning framework in which the unique characteristics of the coasts are understood and the risks to the values are mitigated. The provision of appropriately located and designed infrastructure can enhance the benefits we derive from coasts while minimising the impacts on its values. However, inappropriate development can result from inadequate detail in local planning schemes and/or the interpretation of planning controls. As a key initial action, the content of the Victorian Coastal Strategy and Coastal Action Plans needs to be reflected in relevant planning schemes. The 3-yearly reviews of all Municipal Strategic Statements provide opportunities to progress this action. As the links between coastal management and planning schemes develops further, key outcomes may also include buffer zones for habitat and waterway protection and the protection of coastal open space. The establishment of minimum sizes for coastal reserves should also be considered to protect coastal areas when land use change or subdivision occurs in these sensitive areas.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA39 Audit coastal public facilities and develop guidelines for coastal infrastructure that reflect environmental and social values and provide for public access and use	WT17 – WT21	2008	DSE	Parks Victoria, CCB, Local government, Marine Safety Victoria	Medium

This action recognises the importance of integrating coastal protection with tourism and recreational values. It seeks to ensure that infrastructure including toilets, paths, buildings, boat ramps, etc. are designed, constructed and managed in ways that provide social benefits whilst also protecting landscape and ecosystem values. The guidelines for this task may be appropriately developed under the provisions of the Coastal Management Act.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA40 Identify coastal areas with significant discharge of stormwater and sewage effluent directly to the bays and implement programs to manage the quantity and quality of these discharges	WT17, WT20	2008	MW, Local government	DSE, CCB, EPA	High

The design and management of stormwater systems in rapidly developing coastal towns is a very important issue for this region due to the high level of urban development around the bays. Townships such as Corinella are experiencing rapid development and there is a need to ensure stormwater and sewage management systems are adequate to deal with the increased populations and visitor numbers. This action will make an important contribution to meeting water quality objectives to be determined in a Regional Water Quality Improvement Plan.

## 5.10 Estuaries, bays and seas



### 5.10.1 Overview

The Port Phillip and Western Port region has significant estuaries, two renowned bays and important marine areas (with a nominal regional boundary to three nautical miles offshore) that provide substantial economic, environmental and social benefits for the region and Victoria.

#### Estuaries

Estuaries are situated at the end of every river and stream that reaches the sea and provide a unique environment for species that rely on a mixture of marine and fresh water to survive. They are important habitats and nursery grounds for many fish and a wide array of aquatic plants and animals. They often support wetlands and provide ideal habitats for migratory birds.

Larger estuaries in Port Phillip Bay are located at the entrance of the Kororoit, Skeleton and Laverton creeks, and the Yarra, Werribee, Maribyrnong and Patterson rivers. In Western Port the larger estuaries occur at the entrances of the Bunyip, Bass, Lang Lang, Cardinia and Tarago rivers.

All estuaries have been modified since European settlement due to urban, industrial and agricultural activities<sup>49</sup>, with a number of them also modified by port operations and the development of boating facilities. Many smaller estuaries in urban areas have been converted to stormwater drains. Other estuaries and wetlands surrounding Port Phillip Bay have been converted to sandy beaches, which require regular, ongoing maintenance.

#### Port Phillip Bay

Port Phillip Bay is one of the largest examples in the world of a shallow embayment in which the benthic or sea floor ecosystem is crucial to the overall health of the bay. It covers 1,930 square kilometres and is 24 metres deep at its deepest central point<sup>50</sup>. Its narrow entrance, 'the Rip', is three km wide and reaches depths up to 94 metres. Substantial sand deposits located just inside the entrance restrict the tidal exchange for the entire Bay with only four per cent of its contents exchanged in each tidal period<sup>51</sup>. However, the narrow entrance creates significant tidal currents within the lower part of the Bay that help to sustain environmental values such as sponge communities.

The average residence time of water in Port Phillip Bay is about one year. This, combined with the fact that the Bay is surrounded by a populated region with urban and agricultural activity, makes it particularly susceptible to catchment based inputs

Drainage from the Bay's catchments, which cover 9,790 square kilometres, is predominantly from the Yarra River, with other inputs from the Maribyrnong, Werribee, Patterson and Little rivers, from Kananook, Mordialloc and Kororoit creeks and from a multitude of stormwater drains.

#### Western Port

Western Port is 680 square kilometres in area and is highly valued for its environmental benefits, recently highlighted by the establishment of three marine protected areas. It contains numerous sea-grass, mudflat, mangrove, saltmarsh and deep-water communities with high habitat values. French Island lies in the centre and Phillip Island at the entrance, providing shelter from Bass Strait seas. While Western Port is generally shallow with 40 per cent of its northern area exposed as mud flats at low tide, the south western part is known for its deeper channels of around 14.3 metres in depth<sup>52,53</sup>.

<sup>49</sup> National Land and Water Resources Audit – Estuaries Assessment

<sup>50</sup> Port Phillip Bay Environment Study Final Report.

<sup>51</sup> Port Phillip Bay Environment Study Final Report.

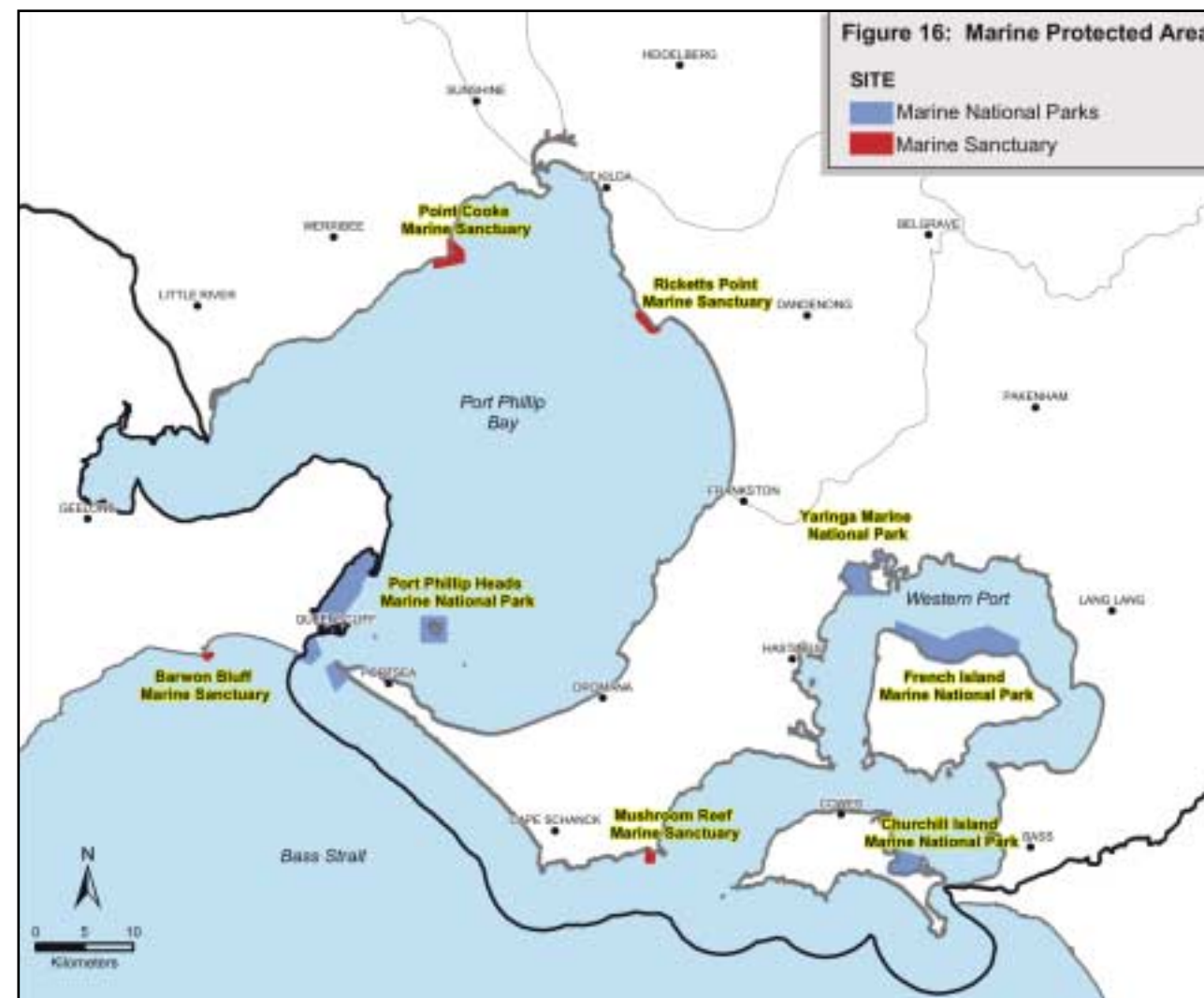
<sup>52</sup> State environment protection policy – Western Port and catchment

The watersheds of the Mornington Peninsula to the west, the Strzelecki Ranges to the east and the southern fringes of the Yarra Ranges to the north define the Western Port catchment area, which totals some 3,000 square kilometres. The majority of streams flow from the catchment to the East Arm of Western Port by way of the Bunyip, Bass, Lang Lang, Cardinia and Tarago systems. While waters in the western area exchange with Bass Strait over a period of days, it can take months for this exchange to occur in the East Arm.

### Near-shore Bass Strait

The scope of this Regional Catchment Strategy extends offshore to the limit of State waters (3 nautical miles or approximately 5.5 kilometres). Like the region's terrestrial environment, the offshore marine environment is diverse.

Dominated by ocean swells and currents, the offshore component of the region is a high energy environment and Bass Strait is influenced by large-scale tidal movements of water. On an incoming tide, waters enter Bass Strait from both the east and west almost simultaneously, although in the area near our two Bays the waters are more influenced by the cool sub-Antarctic waters moving in from the south-west.



**Figure 16: Marine Protected Area**  
**SITE**  
 Marine National Parks  
 Marine Sanctuary

## 5.10.2 Values of estuaries, bays and seas

The estuarine and marine environments are valuable for environmental reasons and they also support substantial economic activity and are a focal point for social and recreational activity. They are important from a national perspective as around one-fifth of the entire Australian population live within the catchments of Port Phillip Bay and Western Port.

### Environmental values

The estuarine and marine waters of the region support unique ecosystems that have significant intrinsic value and provide a range of ecosystem services. Port Phillip Bay supports a diverse range of aquatic flora and fauna, including plankton, seagrass, seaweeds, numerous species of invertebrates, fish, shellfish, marine mammals and aquatic birds. It is of considerable importance for providing critical nursery habitat for juvenile fish and important feeding grounds for aquatic birds, particularly those associated with the Bay's internationally significant wetlands.

The southern part of Port Phillip Bay is one of Victoria's most significant marine areas. The interplay of currents and coastal landscape in the tidal bottleneck known as The Rip has given rise to a unique concentration of marine ecosystems including sponge gardens, kelp forests, seagrass meadows, sandy plains and mudflats. Over 78% of the invertebrate species found within the Bay are found in its southern reaches. The Point Lonsdale intertidal platform also supports some of the highest diversity of any sandstone reef in Victoria.

The ecosystem is unique and areas of environmental and scientific significance have been recognised with the establishment of representative marine national parks and sanctuaries within its boundaries. The nitrogen cycling processes that occur across the Bay are critical to the health of its ecosystem. The animals and plants living in the sediments on the Bay's floor play an important part in these processes, which are crucial for converting much of the nitrogen input from the catchment to nitrogen gas.

Western Port has a highly diverse variety of habitat types. In its northern part, are unique and highly productive communities of seagrass, mangrove and saltmarsh habitat. This habitat provides food and shelter for invertebrates, insects, crabs, reptiles, fish and birds, and critical nursery habitats for a range of commercial and recreational fish species. This habitat is also critical to the survival of many internationally protected migratory birds and the whole area is an internationally recognised Ramsar wetland site.

The southern parts of Western Port also support diverse habitats including intertidal rock platforms and deeper waters. The ecosystem is unique and areas of environmental

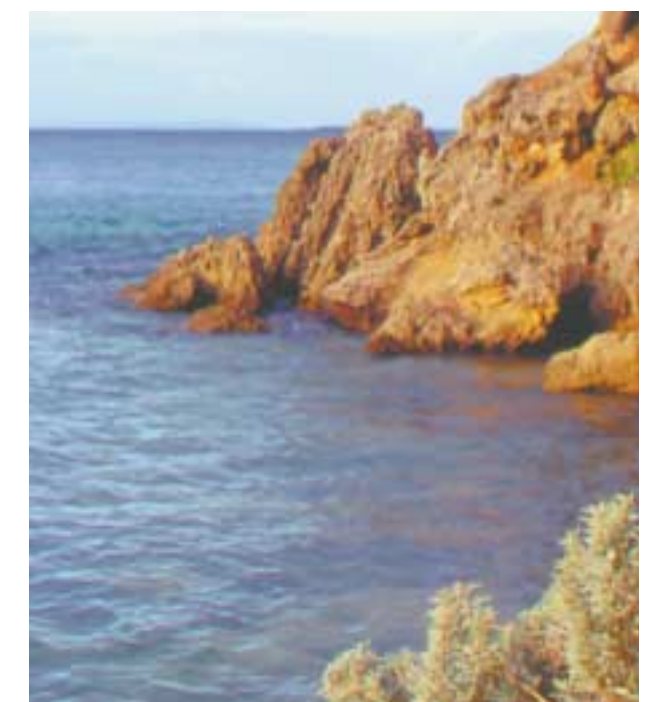
and scientific significance have been recognised with the establishment of representative marine national parks and sanctuaries, as shown in Figure 16.

In Bass Strait, the unvegetated subtidal carbonate sands and muddy habitats that exist offshore are rich in faunal species. Closer to shore, these sandy and muddy areas are broken by low limestone and basalt reefs. Shallow, sandy areas also hold important stands of *Amphibolis* seagrass communities. Rock platforms and shallow subtidal reefs are dominated by kelps such as the *Macrocystis* species and other algae, while deeper reefs are covered by an array of sessile invertebrates including sponges, hydroids and soft corals. The marine waters also support true pelagic species that are not commonly found within the bays including barracouta, Australian salmon, southern right whales, Australian fur seals and bottlenose dolphins.

### Economic values

The region's estuarine and marine waters are particularly important for their economic value. These values rely heavily on clean waters and a healthy ecosystem. Together, Port Phillip Bay and Western Port make a significant contribution to Victoria's economy, estimated in 1997 at \$7.7 billion annually or 7.4 per cent of the gross state product<sup>54</sup>.

*Together, Port Phillip Bay and Western Port make a significant contribution to Victoria's economy*



<sup>53</sup> The Bays Asset Assessment Study

<sup>54</sup> The Bays Asset Assessment Study

Port Phillip Bay underpins some of the State's most important shipping activity. Major international shipping ports are located at Melbourne and Geelong, with around 3,000 ships docking annually and handling some 25 per cent of Australia's sea cargo. Western Port is also of vital economic importance to Victoria. As a deep water port, it supports shipping trade primarily related to oil and gas extractions and metal production, together valued at over \$200 million to the State<sup>55</sup>.

Fisheries are highly valued in the region, with the annual landed value being around \$20 million, mostly from abalone. The ocean fishery between Cape Woolamai and Point Nepean accounts for around \$11 million, and Port Phillip Bay \$9 million while the average Western Port catch is valued at approximately \$220,000<sup>56</sup>. The aquaculture industry is growing and becoming increasingly important. Around 320 hectares of the bays are being farmed for mussels and abalone, with current production valued at \$3.6 million<sup>57</sup>. The region's fisheries support snapper, the most important recreational fish in Victoria, which is not only of economic value to the State as a whole, but provides substantial economic and employment benefits to the local communities. Western Port's most important recreational fish is the King George Whiting. In 1997, the recreational fisheries were valued between \$430 million and \$680 million<sup>58</sup>.

The variety of open ocean and sheltered waters within the region provides excellent opportunities for a wide range of recreational pursuits, in turn supporting a significant tourism industry. These waters are visited by many Victorians, but are also a key destination for Australian and overseas visitors. Activities in the region include sight-seeing, swimming, angling, sailing, boating and surfing.

Revenue from ecotourism operations is also very significant although few studies have clearly articulated the dollars generated by these activities. Over 90% of all scuba diving in Victoria occurs in southern Port Phillip Bay, generating an estimated \$48 million annually<sup>59</sup> and providing significant economic and employment benefits to local communities on

the Mornington and Bellarine Peninsulas. Marine tourism based on seals and dolphins is also significant within southern Port Phillip Bay.

A significant degradation of these waters would result in severe economic consequences to the range of industries that operate within or around the Bays. In addition there would be economic flow-on effects to activity on the surrounding land that is indirectly linked to the adjacent seascape, for example residential activities.

### Social values

Port Phillip Bay is the most significant water body in Victoria due to the siting of the city of Melbourne around its edges. It is the most intensively used and plays a crucial role in providing a recreational resource for more than three million residents living within its catchment, as well as for visitors to the region. It is estimated that there are 40 million visits to the bay each year.

The waters of Western Port and Bass Strait are becoming increasingly popular for water-based recreation activities, as residents and visitors travel further seeking more space and fewer crowds. The region's marine and estuarine waters are also important for their cultural values. Indigenous people have an ongoing and intimate relationship with coastal and marine environments stretching back thousands of years. Contemporary Indigenous people see the sea as a natural extension of country, and continue to have a cultural affiliation with these environments.

The region is also valued for its European cultural significance. Victoria's earliest European exploration and settlement was heavily reliant on coastal shipping and from the early 1800s, whalers and sealers established stations in Victoria, exporting seal pelts, whalebone and whale oil. Throughout the 19th century as settlement and trade increased ships were the most reliable means of transport for local produce and passengers. Shipwrecks were a regular occurrence, and over fifty rest at the entrance to Port Phillip Bay. This underwater heritage includes a range of sailing, steam, wooden and iron ships.

### 5.10.3 Risks for estuaries, bays and seas

The health of our estuaries, bays and seas is threatened by land-based activities taking place in the region, including unsealed roads and road construction. These activities result in inputs that drain into rivers and streams, through estuaries and ultimately to the marine waters. Atmospheric inputs, such as vehicle emissions, can also enter marine waters directly. The inputs are particularly significant where large populations in high densities live within the catchments, along the foreshore and in areas of intensive land use. Human activities, including recreational and commercial uses, and natural processes taking place in the ocean also affect these waters.

Numerous reports have identified the risks posed to the region's marine and estuarine environments. The more recent reports include the Port Phillip Bay Study, the Port Phillip Bay Habitat Assessment, the Western Port Habitat Assessment, the Western Port Sediment Study, Victoria's Biodiversity Strategy and State of Environment Protection Policy (Waters of Victoria) schedules.

A specific risk assessment was prepared for Port Phillip Bay during the development of the Port Phillip Bay Environmental Management Plan (EMP). The assessment considered the threats that could result in potential ecological impacts that could become irreversible, with have significant adverse long-term implications for the region's social and economic benefits. The EMP listed nutrient inputs and exotic marine organisms as the two highest ranked current threats to the Bay. While other threats may also have the potential to cause significant impacts on the Bay, these two require immediate attention. A similar approach to that used for Port Phillip Bay will be used for assessing other marine and estuarine environments in the region.

While the recent Western Port Sediment Study has added to our knowledge of threats to Western Port, further research is required to identify key threats to the sensitive Western Port ecosystems and to determine specific targets and the actions required to achieve them.

The key risks to marine and estuarine waters in the region include (but not in priority order):

#### WR25 – Algal blooms from increased nutrient loading and detrimental changes to nutrient cycling

Since European settlement, changes to the environment have significantly altered water quality. Catchment activities in the region continue to affect the quality of its coastal waters. Nutrient inputs draining into coastal waters remain a key threat to the marine and estuarine environments, while potential new sources of nutrients, through activities such as intensive marine farming, need to be carefully managed..

Benthic (sea floor) organisms help to maintain the water quality by recycling nutrients that naturally drain from catchments. An increased supply of nutrients from catchment-based activities may overload the recycling capacity of these organisms, potentially leading to eutrophication and algal blooms. There would be serious environmental, social and economic repercussions if widespread eutrophication and prolonged, persistent algal blooms were to occur in Port Phillip Bay or Western Port.

The protection of nutrient cycling processes, largely through limiting nitrogen loads, is a key issue for Port Phillip Bay. The Bay Study emphasised the links between eutrophication risk to the bay and both nitrogen-input levels and adverse effects on cycling processes. Key nitrogen sources for the bay include urban stormwater, agricultural run-off entering the rivers and streams in the catchments and the discharge from the Western Treatment Plant that treats most of Melbourne's sewage.

In 2001, only eleven of the 86 waterway monitoring sites in the region fully met the State environment protection policy (SEPP) objectives for phosphorus and two met the nitrogen objectives. Numerous monitoring points showed persistent nitrogen and phosphorus concentrations at more than three times the objectives, figures that excluded the peak nutrient inputs that occur during high stream flows. These objectives are largely designed to protect the waterways themselves. For Port Phillip Bay it is the nitrogen loads that these waterways deliver, particularly from high flows occurring during storms, that pose a major threat to nutrient cycling processes. Storm-event monitoring is now in progress. In the long term this will allow the nitrogen load reduction targets to be assessed.

*Nutrient inputs draining into coastal waters remain a key threat to the marine and estuarine environments*

<sup>55</sup> The Bays Asset Assessment Study

<sup>56</sup> S McCormack pers. comm.

<sup>57</sup> S Boreham, pers. comm.

<sup>58</sup> The Bays Asset Assessment Study

<sup>59</sup> based on estimates in Marine and Coastal Special Investigation, Land Conservational Council, 1995

## WR26 – Toxicant inputs

Toxicants have the potential to kill, or adversely affect living organisms. This can lead to changes in the abundance of species and the composition of ecological communities. Toxicants can also accumulate in the tissues of biota, potentially making them unsafe for human consumption. The risks of these effects vary with the toxicants involved, their levels and many other factors including toxicant form, exposure duration and various environmental conditions.

Different toxicants may interact with each other, creating different effects on organisms. The sensitivity of a species to a given toxicant can also vary. Toxicants stem from a wide range of sources and enter coastal waters through rivers, drains, licensed discharges, groundwater, the atmosphere and activities such as shipping and boating. They can then accumulate in sediments, for example sediments in the lower reaches of the Yarra River are known to contain elevated levels of toxicants. Sediments near marinas can also contain elevated levels of organotins such as tributyl tin. These sediments and the toxicants they contain can be re-suspended through disturbances such as dredging<sup>60</sup>.

## WR27 – High sediment loads and increased suspended solid levels

Catchment-based activities have significantly increased the sediment inputs to the estuaries and bays. This is particularly important in Western Port where sediment inputs have increased because of land-clearing and increased catchment runoff, and because of modifications to the natural catchment drainage system.

The drainage and channelisation of the Koo-Wee-Rup Swamp district in the 1800's particularly affected the sediment

delivery into Western Port. The Cardinia Creek system, Lang Lang, Bunyip and Bass rivers, and Deep, Toomuc, Cardinia and Red Bluff creeks were also significantly altered.

Increased sediment inputs can result in unnaturally high levels of suspended solids. Light penetration is reduced and natural processes, like photosynthesis in light sensitive biota such as seagrass, are impeded. Sedimentation is thought to have made a key contribution to the loss of more than 70 per cent of Western Port's seagrass cover since the 1970s.

Suspended solids can also smother biota, affect oxygen transfers through gills and can carry nutrients, toxicants and pathogens. Such solids include fine particles of soil from erosion, organic matter from plants and animals including sewage, dust and particles in urban runoff and bacteria and other micro-organisms.

The recent Western Port Sediment Study has indicated that catchment activities and coastal processes are contributing significant loads of suspended solids to Western Port via rivers and streams. Particular areas have been identified as making major contributions of sediment, including the low cliffs on the northern Western Port shoreline and the streams of the Bunyip River, Cardinia Creek and Lang Lang catchments.

## WR28 – Oil spills

Oil spills, although rare, can cause significant impacts to marine and estuarine environments. Oil coats the water surface and any animals that come to the surface to breathe, as well as rocks and beaches where the oil slick is washed ashore. Cleaning oil spills is a major logistical exercise that needs to be undertaken rapidly to be effective. Cleaning spills may not be possible at all in many areas of Western Port.

## WR29 – Changes in freshwater quantity

Natural flows of freshwater are important to estuarine ecosystems. These flows can trigger breeding and recruitment in fish stocks and other marine species. Increased urban water use and irrigation for agriculture can reduce the amount and change the timing of water reaching the marine and estuarine environments.

Conversely, too much freshwater can have a deleterious effect on marine ecosystems. This has been shown to be the case around Boag's Rocks where the output from the Eastern Treatment Plant enters the ocean<sup>61</sup>.

## WR30 – Presence of pathogens

Pathogens can cause health problems in plants, animals and humans. Pathogens originate from septic tanks, sewage overflows, damaged sewers, and animal faeces (from dogs, cats, horses, cows, pigs, birds, rats and other wildlife). They enter coastal waterways through sewage treatment plants, rivers, drains – and potentially through direct sewage discharges from vessels. They can also be remobilised from sediments by dredging. *Escherichia coli* or *E. coli* is often used as an indicator of faecal contamination and the SEPP sets quantitative *E. coli* objectives.

## WR31 – Presence of litter

Litter is a hazard to public health and to some marine life. Given the large population resident at its edges, Port Phillip Bay is particularly susceptible to litter which travels through waterways to the bay mainly by way of the urban stormwater system. Each year, approximately 230,000 cubic metres or two billion items of litter enter the waterways from the urban system. This equates to more than one litter item for every person in the region reaching the waterways each day. Around 95 per cent of litter polluting the bay and its beaches comes from the metropolitan area, costing bayside Councils more than \$2 million a year to remove. The remaining five per cent is dumped by beach goers or from ships and boats.

## WR32 – Exotic marine organisms

Exotic organisms are a key threat to marine and estuarine ecosystems. Their impacts include feeding on native wildlife or out-competing it for food and shelter. They threaten biodiversity, aquaculture, commercial and recreational fishing, recreation and tourism. Unless well-managed, shipping can introduce organisms that are carried on fouled hulls or are present in ballast water. This is also the case for the multitude of small vessels using the marine waters and for the movement of aquaculture equipment.

As an international shipping port, Port Phillip Bay is particularly susceptible to introductions. It currently hosts more than 100 introduced species and, on average, 2 or 3 new species establish each year. Not all of these introduced

species become pests, but those that do, such as the Northern Pacific seastar, Japanese kelp and European fan worm, have the potential to affect the ecosystems and marine industries. This highlights the importance of preventing further introductions to Australia. It is also essential that any introduced species already found in the marine waters, particularly those contained within embayments, are not spread to new locations.

While the other marine waters in the region are susceptible to pest introductions and spread, they have not had such a history of high introduction rates.

## WR33 – Physical disturbance of habitats

Sources of direct physical disturbance include harvesting techniques that involve contact with the sea floor, dredging, spoil disposal and engineering works that change water, and sediment movement patterns. Some fishing techniques, such as widespread scallop dredging, have now ceased in Port Phillip Bay. However dredging continues and involves removal and disposal of large quantities of material each year at Queenscliff, South Channel, the Port of Melbourne, the Yarra and small boat harbours and creeks. This is expected to increase should the channel deepening project proceed.

From time to time, capital works, such as construction of marinas, ports and shipping channels as well as beach renourishment activities, involve movement of large volumes of material.



<sup>60</sup> Determinants of TBT absorption and desorption in estuarine sediments, 1995

<sup>61</sup> Environmental Impact Assessment and Review of Effluent Disposal Options for Eastern Treatment Plant.



### WR34– Harvesting activities

Harvesting activities such as commercial and recreational fishing have direct effects on the abundance of marine species in the region and there is evidence of significant pressure on species such as tiger flathead, southern rock lobster and greenlip abalone. The impacts on marine ecosystems from prolonged fishing have not been well studied in the region, although removing certain age classes, size classes, gender classes and overall abundance of particular species is well known as having impacts on food webs and ecosystem functioning. Harvesting activities also have impacts on species that are accidentally caught in equipment or gear including non-target fish species and birdlife.

The cumulative impact of recreational harvesting of intertidal invertebrate populations over many decades has led to seriously depleted populations of marine life on many intertidal reefs within the region. In response to this practice, the taking of marine invertebrates in the Bay from the high water mark to two metres water depth was prohibited in 1998. In addition, illegal harvesting is placing significant pressure on species such as abalone and other intertidal gastropods in the region.

Close management of the region’s fisheries needs to continue in order to minimise its detrimental impacts on the abundance of target and by-catch species and on wider marine ecologies.

### WR35 – Climate change

Long-term, slowly changing characteristics of the marine and estuarine environment have been related to climate change. Of particular note are increased sea temperatures and rising sea level. Even minor increases in temperatures have the potential to cause significant changes to the entire ecosystem such as sea level rises affecting the mangrove and estuarine environments.

## 5.10.4 Objectives for estuaries, bays and seas

The five Water Objectives (see Section 5.4) for the region have been developed in line with the principles of sustainability, and also address the key risks for estuaries, bays and seas.

The first seven risks relate to inputs to the marine environment generated by humans that threaten a wide range of values. These risks will be managed by improving water quality (Water Objective 4) and protecting the health of the marine systems (Water Objective 3).

The management of disturbance, exotic organisms and over-harvesting will be dealt with by protecting the health of the marine systems (Water Objective 3) and ensuring that the management of our water environments improves the health, diversity and resilience of natural ecosystems (Water Objective 5). Climate change can also be managed by these objectives.



## 5.10.5 Targets

These Water Targets (WT21 – WT24) are proposed to meet the elements of the objectives that are directly relevant to water quality issues for estuaries, bays and seas. Additional targets related to marine and estuarine biodiversity are contained in Chapter 7 – Biodiversity.

Target	Relevant objectives
<b>WT21</b> Improve water quality in estuaries, bays and seas so that all monitoring sites attain State environment protection policy objectives or regional targets by 2030.	WO2, WO3, WO4, WO5

The State environment protection policy (Waters of Victoria) specifies long-term objectives for water quality. It contains generic objectives for open coasts and estuaries and inlets, with specific objectives for Port Phillip Bay, the Yarra River and Western Port being in schedules F6, F7 and F8 respectively. The objectives are currently being met in most of these waters. Shorter-term regional targets, specific to estuaries and marine waters, need to be determined in the near future, particularly where the objectives are not being met. These targets will be outlined in a Regional Water Quality Improvement Plan as interim steps to be achieved. This Target WT21 supports the attainment of those more specific water quality objectives and targets. Estuaries may require separate evaluation and investigation.

Target	Relevant objectives
<b>WT22</b> Reduce the average annual nitrogen load entering Port Phillip Bay by 1000 tonnes by 2006	WO2, WO3, WO4

Nitrogen levels have been identified as a critical threat to the health of Port Phillip Bay. The need for reduction of the annual nitrogen load was identified in the Port Phillip Bay Study. The target reduction of 1000 tonnes from an annual baseline by 2006 is consistent with the targets outlined in the Port Phillip Bay Environmental Management Plan and State environment protection policy, and will also be referred to in the future Regional Water Quality Improvement Plan. Within this target, it is proposed that 500 tonnes/year be reduced from the region’s sewerage treatment plant inputs and that the other 500 tonnes/year be reduced from the catchment inputs that enter the bay via the waterways. It should be noted that it may be five to 10 years before reductions become apparent and the effectiveness of actions can be specifically measured.

Target	Relevant objectives
<b>WT23</b> Reduce the total sediment load annually entering Western Port by 2015, measured against existing benchmarks	WO2, WO3, WO4

High sediment loads have been identified as a critical threat to the health of Western Port. Initial studies recently commissioned by EPA and Melbourne Water, and undertaken by the CSIRO <sup>62</sup>, have identified key sediment sources in the catchment and established estimates of the annual sediment load from various waterways. In the coming years, there will be increasing pressure on the health of Western Port as a result of urbanisation and infrastructure development within the catchment.

<sup>62</sup> Western Port Sediment Study

This target recognises the need to immediately substantially reduce the sediment load that is annually entering Western Port via the waterways. However, it is acknowledged that further studies are also required in order to better quantify benchmarks and include specific targets in the Regional Water Quality Improvement Plan that is to be developed.

Target	Relevant objectives
WT24 Reduce the amount of litter and other gross pollutants entering Port Phillip Bay and Western Port by 70% by 2015	WO2, WO3, WO4, WO5

Litter and other gross pollutants are a major problem affecting the environmental and social values of all water, but in particular the bay and marine waters. A great proportion of these pollutants enter the waterways and bays through our stormwater system. This target is consistent with the objective from the Victorian Stormwater Strategy and Action Plan for litter.

## 5.10.6 Actions

These Water Actions (WA41 – WA53) has been developed to meet the four targets relevant to waters quality of our estuaries, bays and seas. Additional actions related to marine and estuarine biodiversity are contained in Chapter 7 – Biodiversity.

### Research and coordination

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA41 Continue to investigate marine ecosystems and the links with key threatening processes, and identify an appropriate set of indicators and targets	WT21-WT24	Set of indicators and targets developed by 2006	DSE	EPA, DPI Fisheries, MW, Parks Victoria, CCB, CMA, Local government, Water authorities	High

Past research regarding the ecosystem processes of Port Phillip Bay, Western Port and the open ocean has highlighted key issues associated with maintaining their health. Some of the region's marine and estuarine waters have been the focus of significant research projects, such as the Port Phillip Bay Environmental Study, while others have had much less research attention.

The dynamics of marine ecosystems and the high number of threatening processes make the prioritisation of actions a complex task. This emphasises the need to progressively improve our understanding of these environments, the links with processes that threaten them (such as the relationship between seagrass health and turbidity) and the setting of targets to manage risks.

Outputs need to include an appropriate set of indicators and targets that assist monitoring of the marine environment and the associated threats.

Action WA41 generally reinforces the importance of continuing to improve our understanding of the key risks to the region's marine and estuarine ecosystems, and continuing to improve our management of these risks taking into account any relevant new understanding as well as reviews of progress. This target will assist in priority setting for filling key information gaps and developing programs to address risks.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA42 Research the health of, and risks to, estuaries in the region	WT21-WT24	2005	DSE	EPA, DPI, MW, CCB	Medium

There are significant gaps in knowledge about the region's estuarine environments. Targeted research is needed to improve our understanding of these environments and assist planning for their protection and enhancement. In the future, a robust method for measuring estuarine health, similar to the Index of Stream Condition method used to monitor the condition of waterways across Victoria, would be useful

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA43 Establish coordination forums for Port Phillip Bay and Western Port to identify priorities for research, planning and implementation programs	WT21-WT24	2005	CMA	CCB, EPA, MW, Parks Victoria, DSE, DPI, Local government	Medium

Action WA43 recognises the need to establish coordinated forums bringing together key stakeholders for Port Phillip Bay and Western Port to determine agreed future research, planning and implementation programs that build on the long history of research and management. The potential for working with existing multi-stakeholder forums, such as the Mornington Peninsula and Western Port Biosphere Reserve Foundation, should be explored as an efficient way of establishing these forums. The forums should invite the involvement of Kulin people and other groups with interests in heritage and other social values.

### Addressing marine water quality issues

There is an important link between the health of our estuaries, bays, seas and the activities that take place in the catchments. A specific action (WA6) to map the land-based sources of nutrients, sediments and other pollutants across the region, and develop and implement a Regional Water Quality Improvement Plan to address the major sources is included in Section 5.6 – Surface Waters, Rivers and Streams. This action will make an important contribution to meeting Targets WT21, WT22 and WT23.

While this is occurring, the reduction of nitrogen into Port Phillip Bay is already recognised as a priority. Similarly, the reduction of sediment entering Western Port from the catchments and waterways is recognised as a priority requiring immediate action. The following actions are included to specifically address these and other marine water quality issues.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA44 Implement the Port Phillip Bay Environmental Management Plan to reduce the average annual nitrogen input into Port Phillip Bay by 1,000 tonnes, and review and extend the plan to address additional risks to the Bay	WT22	Nitrogen target achieved by 2006 Review and extension of the EMP initiated in 2006	DSE, CCB	MW, EPA, CMA, DPI, Local government	High

The Port Phillip Bay Environmental Management Plan outlines reduction targets for key sources of input from the following three areas; the Western Treatment plant, the Yarra/Maribyrnong Rivers and Patterson River. The overall target was established in the Port Phillip Bay SEPP. As the target applies to a baseline which has been based on 1991-95 Bay inputs, further efforts will be required to reduce or compensate for the increasing loads expected from continued urbanisation of the catchment and the increasing intensive agriculture. The targets for waterway nitrogen loads will therefore be particularly challenging.

The Port Phillip Bay Environmental Management Plan is scheduled for review in 2006. The review of the Environmental Management Plan should consider possible mechanisms to provide a strengthened framework for all bay-related plans with a view to facilitating strong integration between all organisations, their plans and work programs. This will assist with the review of the Port Phillip Bay State environment protection policy scheduled for 2007.

The programs outlined in the current Port Phillip Bay Environmental Management Plan focus on mitigating two risks recognised as critical to the Bay's environment - nutrients and marine pests. However, the plan also emphasises that other key Bay risks require ongoing consideration. The review of the plan is an opportunity to identify and assess other risks to the Bay and to develop appropriate targets and actions to deal with these risks.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA45 Investigate and pilot ways for new nitrogen inputs to Port Phillip Bay to be offset by reduced inputs from elsewhere	WT22	Pilot programs initiated by 2009	DSE	MW, CMA, CCB, EPA, DPI	Medium

This action recognises that some bay uses, such as an expansion of permitted aquaculture, could result in additions to nitrogen load. In order to maintain ecologically acceptable levels of nitrogen, mechanisms such as an offsetting process may enable reductions made elsewhere in the region to offset these new loads.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA46 Initiate research and major integrated programs to identify the specific sources, and reduce the inputs of, sediment and other pollutants to Western Port	WT23	Programs initiated by 2006	EPA, CMA	MW, CCB, DPI, DSE, Local government	High

An improved understanding of the Western Port ecosystem and the threats to its health is vital to improve our management in the catchment and the bay and to ensure that major impacts on the substantial Western Port values are avoided. This will be progressed through Actions WA6 and WA41.

Contributing to our overall understanding, recent studies including the Western Port Sediment Study have indicated that catchment activities and coastal processes are contributing significant loads of suspended solids to Western Port via rivers and streams. Particular areas have been identified as making major contributions of sediment, including the low cliffs on the northern Western Port shoreline and the streams of the Bunyip River, Cardinia Creek and Lang Lang catchments.

Major programs are needed to immediately begin dealing with the identified major sources of sediments and other pollutants to Western Port. This will make a key contribution to the implementation of the State environment protection policy for Western Port. For best effect, these programs should be integrated so they simultaneously address other catchment management issues in these locations.

An improved science-based understanding of the links between some land uses and water quality in waterways and Western Port is also required. For example, intensive animal industries are widely established in the Western Port catchment and spirited community debate is occurring regarding the impacts of chemical use, waste management and other practices on local environmental values. The expansion of intensive animal industries is a complex issue as economic benefits must be accompanied by management practices that enable SEPP objectives for Western Port to be met. As an initial step to progress the debate and to assist future planning and decision-making, a detailed study of intensive animal industries in the Western Port catchment is required to research, assess and report on:

- The current extent of these land uses and the likely expansion of the industries in the Western Port catchment
- The management practices that are generally in use
- Any impacts on groundwater, surface water and other catchment assets.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA47 Refine and implement key actions in municipal Stormwater Management Plans to reduce inputs of sediments, nutrients, toxicants and litter to the bays	WT21-WT24	2009	Local Government	EPA, MW	High

The implementation of stormwater management plans will play a key role in reducing the level of pollutants entering our marine waters. In refining the Stormwater Management Plan actions, the potential for using stormwater as a valuable resource should also be considered and opportunities identified for recycling some of it to reduce the use of high quality water and subsequently benefitting the region's waterways.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA48 Implement ammonia reduction work at the Eastern Treatment Plant	WT21	2007	MW	EPA	High

This action addresses the effects on the environment at Boags Rocks, near Gunnamatta, of the levels of ammonia and fresh water entering the ocean from the outfall from the Eastern Treatment Plant at Carrum. This action is linked to Environment Protection Authority works approvals and licensing requirements.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA49 Implement priority litter management programs that include installation of gross pollutant traps at key sites on drainage systems	WT24	2009	Local government	MW, EPA	Medium

Litter entering the bays from urban areas affects coastal values, especially in highly visited areas. This action aims to reduce litter at its source or as it is carried to waterways. Priority sites have already been identified in municipal Stormwater Action Plans. The reduction of litter once it has reached the beaches is also important and the Association of Bayside Municipalities has developed beach-cleaning guidelines that could be adopted.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA50 Develop and implement environmental management plans for the region's ports and marinas	WT21	2010	EPA	Parks Victoria, Port and Marina managers	High

These management plans are required to effectively address risks to water quality such as oil, toxicants, litter and exotic pests. All these risks can be exacerbated by the disposal of waste and ballast water from ships and boats that use the local marine waters. Plans will include appropriate behaviour for boat owners, the provision of facilities to assist with waste management and the management and provision of other facilities to reduce impacts on the environment. Specific plans for improving the management of marinas will be developed from 2006 onwards.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA51 Ensure adoption of best practice guidelines for all marine dredging	WT21	Ongoing	EPA	DSE, Parks Victoria, Port managers, Marine Safety Victoria	Medium

Dredging is a necessary activity for the maintenance of shipping channels and boat harbours. However, how this is done and what is done with the spoil affects the quality of the environment at both the sites of extraction and deposition. Continued adoption of best management practices will reduce the affect on other values.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA52 Regularly review the marine pollution contingency plans to ensure world's best practice procedures are incorporated	WT21	Ongoing	Marine Safety Victoria	EPA, Port managers	Medium

The likelihood of major oil spills is small, however the potential impact on marine and estuarine environments is significant. Ongoing and vigilant management practices are required.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
WA53 Develop and implement a coordinated monitoring, evaluation and reporting framework regarding the condition of the region's marine environment, risks and the effectiveness of actions	WT21-WT24, BT5, BT7-BT10	Framework in place by 2008	DSE, EPA, DPI	CCB, Parks Victoria, CMA, Local government, Melbourne Ports	Low

The overall processes for managing the marine environment will be enhanced if a coordinated monitoring, evaluation and reporting framework is put in place to gauge the health and extent of the region's marine habitats, assess key risks, assess the effectiveness of current actions and determine priorities for future investment. This would enable reporting and would be the basis for review of actions and the development of future initiatives.

This would build on current regional monitoring and reporting processes and will link with state and national reporting on marine condition.

Current monitoring processes include monitoring of:

- long term water quality trends by the EPA at sites across the bay
- water quality monitoring at key recreational beaches by the EPA
- fish populations
- fish catches
- condition of habitat
- key nutrient cycling indicators by Melbourne Water and DSE
- nutrient levels from waterways during storm events
- nutrient inputs from the Western Treatment Plant.

However, there is variation in the extent and regularity to which the monitoring occurs and how widely the results are reported. In addition, other elements of marine health are not extensively monitored such as the quantitative assessment of nitrogen input to the bays and the extent of marine pest species. Further investment in monitoring activities may therefore be required.

## 5.11 Summary table

The following table summarises the translation of the goal for all of the components of the region's water resources through the steps of objectives and targets to actions.



## Goal

# Sustainable water use and healthy waterways, wetlands, estuaries, coasts, bays and seas

## Objectives

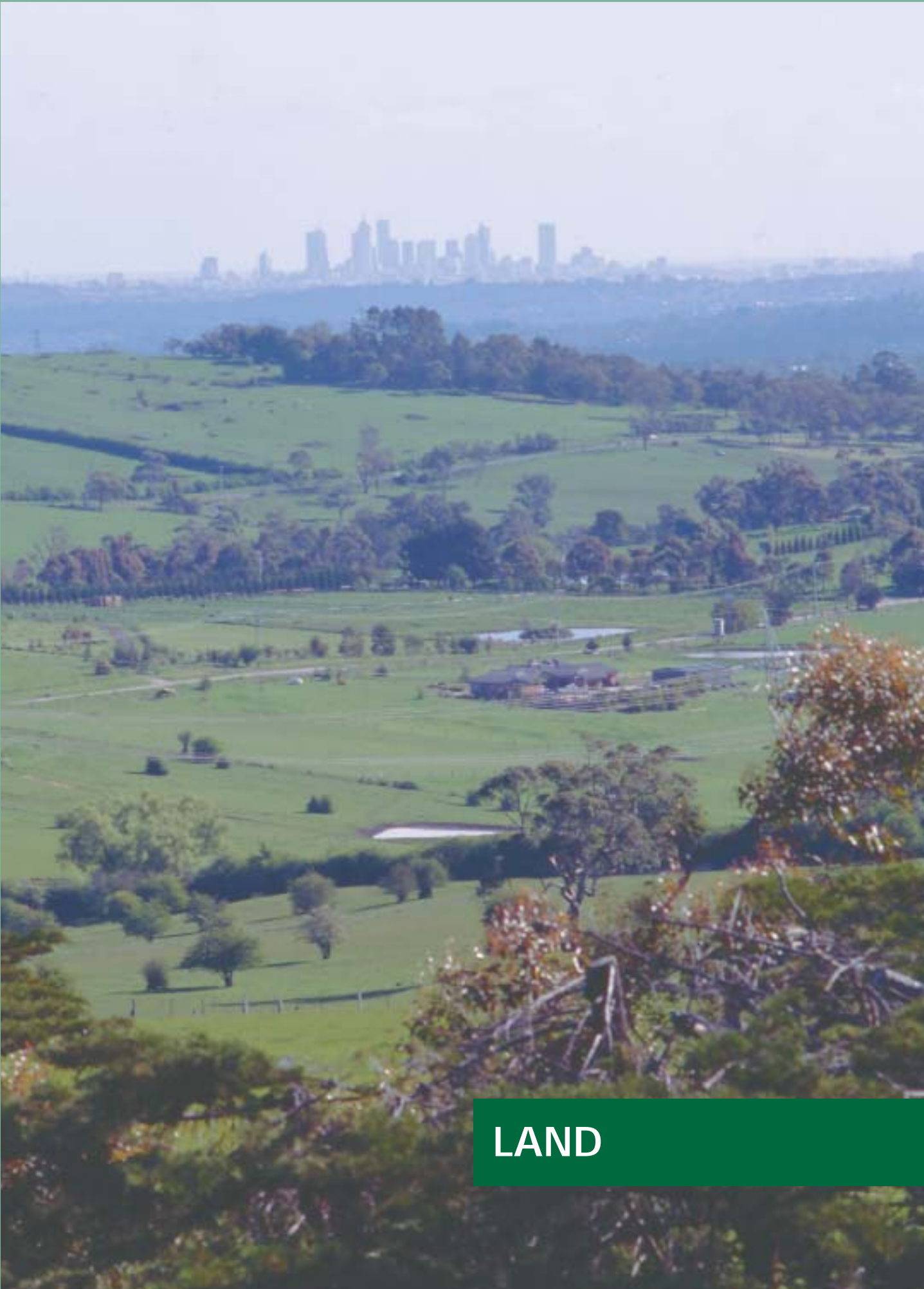
WO1. Ensure efficient management of water resources with minimal new impacts on natural hydrological processes	WO2. Protect and improve the environmental health and social and economic values of waterways and wetlands	WO3. Protect and improve the environmental health and social and economic values of estuarine, coastal and marine systems	WO4. Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas	WO5. Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety
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## Targets (pre-existing targets in Bold)

WT1. <b>Average potable water consumption per person reduced by 15% by 2010</b>	WT5. <b>Maintain the condition of the 13% of region's rivers that are currently in excellent condition</b>	WT17. Reduce the proportion of coast in the region where environmental values, recreational beaches, Indigenous cultural values and public infrastructure are at high risk from accelerated coastal erosion and other degrading processes.	WT8. <b>Improve water quality in rivers and streams so that:</b> • <b>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</b> • <b>All monitoring sites attain SEPP objectives or regional targets by 2030</b>	WT9. No loss of hydraulic capacity and environmental values of flood plains
WT2. <b>The volume of recycled water used in the region increased to 20% of the total treated volume by 2010</b>	WT6. <b>Improve the condition of the region's waterways so that:</b> • <b>At least 50% of all natural waterways will be in good or excellent condition by 2015</b> • <b>All natural waterways will be in good or better condition by 2025</b>	WT18. A net gain in the extent and quality of native coastal vegetation as measured by habitat hectares.	WT14. All groundwater monitoring sites to attain SEPP objectives or regional targets by 2030	WT10. Timely flood warnings provided for all major waterways and risks to infrastructure minimised
WT3. <b>Diversions from all waterways to be within Sustainable Diversion Limits by 2015</b>	WT7. Progressive improvement in the condition of waterways across the region as measured by the Index of Stream Condition, including beds and banks, streamside zone and aquatic life	WT19. Public access to the region's beaches and bays maintained	WT21. Improve water quality in estuaries, bays and seas so that all monitoring sites attain State environment protection policy objectives or regional targets by 2030	
WT4. Improved average value of irrigated agricultural production per megalitre	WT15. No net loss in the extent and health of wetlands of each existing type	WT20. The number of days that beaches are classified unsuitable for swimming reduced to zero by 2010	WT22. <b>Reduce the average annual nitrogen levels entering Port Phillip Bay by 1000 tonnes by 2006</b>	
WT11. Levels of extraction from each GMA in the region to be within the permissible annual volume by 2025	WT16. Progressively improve the overall health and social value of natural wetlands, including those that are nationally and internationally recognised	WT24. <b>Reduce the amount of litter and other gross pollutants entering Port Phillip Bay and Western Port by 70% by 2015</b>	WT23. Reduce, by 2015, the total sediment load annually entering Western Port, as measured against existing benchmarks.	
WT12. Groundwater levels in key regional aquifers to be stabilised at sustainable levels by 2025				
WT13. Progressively increase the average value of groundwater extracted				

## Actions (pre-existing actions in Bold)

WA2. <b>Determine, and ensure compliance with Sustainable Diversion Limits and Bulk Water Entitlements for the region.</b>	WA1. <b>Implement the relevant directions of the 'White Paper – Securing Our Water Future Together'.</b>	WA33. Investigate, assess and manage accelerated coastal erosion and other degrading processes at high value sites where recreation, heritage, Indigenous culture, environmental values and public infrastructure are at risk.	WA6. Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources.	WA9. Complete an audit of stormwater management plan implementation for all municipalities and design and implement a program to address key gaps
WA3. <b>Implement the State Government's policy for the establishment of diversion caps and an environmental reserve for the region's rivers</b>	WA7. <b>Implement the Port Phillip and Westernport Regional River Health Strategy.</b>	WA34. Communicate the requirements of contingency plans for oil spills to all relevant stakeholders	WA10. <b>Meet best practice standards in urban stormwater discharges in new urban areas.</b>	WA11. Reduce by 500 the number of properties vulnerable to a one in 100 years flood
WA4. <b>Complete Stream Flow Management Plans for the Plenty, Upper Maribyrnong, Watts, Little Yarra, Don and Bunyip Rivers and Olinda, Stringybark, Pauls, Steels, Dixons, Woori Yallock and Coranderrk Creeks plus additional waterways as required</b>	WA28. Develop and apply an Index of Wetland Condition method to determine the overall health of wetlands in the region and establish a benchmark to measure change into the future.	WA36. Map the occurrence of coastal acid sulphate soils and develop overlays for inclusion in relevant planning schemes	WA17. Review and implement a surface and ground water quality monitoring system to ensure adequate and coordinated coverage across the region, including reservoirs, high discharge areas, bays and seas, high rainfall events and nutrient loads	WA12. All new developments constructed with floor levels at the required safety margin above one in 100 years flood levels
WA5. <b>Develop local stream flow management rules for waterways where Stream Flow Management Plans are not required; eg. Merri, Moonee Ponds and Gardiners Creeks.</b>	WA29. Consolidate and distribute data on regional wetlands to relevant stakeholders, including local government, landholders and Kulin people.	WA38. Ensure planning schemes in coastal areas reflect the content of the Victorian Coastal Strategy.	WA18. <b>Continue regular assessment of the Index of Stream Condition [ISC] across the region.</b>	WA13. Develop and incorporate into relevant planning schemes, protocols that contribute to the protection of the environmental values of floodplains
WA8. <b>Design and implement schemes for recycling water from the Eastern and Western Sewerage Treatment Plants and smaller plants in the region.</b>	WA30. Develop a Regional Wetland Plan to establish and implement priorities for investment.	WA39. Audit coastal public facilities and develop guidelines for coastal infrastructure that reflect environmental and social values and provide for public access and use.	WA23. Develop and implement groundwater quality management plans for GMAs with a high level of risk to groundwater quality	WA14. Develop and implement Special Area Plans for water supply catchments where appropriate.
WA15. Investigate the hydrological and ecological relationships between surface waters and groundwater and develop catchment-based water budgets	WA31. Develop planning policy and protocols that contribute to the protection of wetlands, and incorporate them in relevant planning schemes.	WA41. Continue to investigate marine ecosystems and the links with key threatening processes and identify an appropriate set of indicators and targets.	WA24. Develop guidelines and codes of practice for the management of risks to groundwater quality, and undertake programs with relevant land and water managers	WA26. Meter all significant existing groundwater extractions used for commercial and irrigation purposes and all new licenses and monitor groundwater levels within key aquifers to assess trends in relation to sustainable levels.
WA16. Benchmark rural water use efficiency in major agricultural areas and increase water use efficiency by agricultural industries	WA32. Implement Wetland Management Plans for all three Ramsar wetland areas in the region (Port Phillip – Western Shoreline, Western Port and Edithvale-Seaford)	WA42. Research the health of and risks to estuaries in the region.	WA25. In the local governments that contain GMAs, develop planning scheme guidelines/regulations to protect groundwater quality.	WA35. Map areas susceptible to inundation in Port Phillip Bay, and Western Port.
WA19. Clarify the organisational arrangements for the management of aquifers and groundwater in this region		WA49. <b>Implement priority litter management programs that include installation of gross pollutant traps at key sites on drainage systems</b>	WA27. Develop and implement a comprehensive regional ground water quality monitoring and evaluation program.	WA37. Develop and implement plans to increase the extent and quality of coastal ecological vegetation classes
WA20. Further develop the regional risk assessment model to identify the level of risk facing groundwater assets		WA50. Develop and implement environmental management plans for the region's ports and marinas	WA44. <b>Implement the Port Phillip Bay Environmental Management Plan with a focus on reducing the annual nitrogen input into Port Phillip Bay by 1,000 tonnes per year and review and extend the plan to address additional risks to the Bay.</b>	WA40. Identify coastal areas with significant stormwater and sewage effluent discharge directly to the bays and implement programs to manage the quantity and quality of these discharges.
WA21. Complete Groundwater Management Plans for all GMAs with allocations that approach or exceed their permissible annual volume.		WA51. Ensure adoption of best management practices for marine dredging	WA46. <b>Initiate research and major integrated programs to identify the specific sources and reduce the inputs of sediments, nutrients and other pollutants to Western Port.</b>	WA43. Establish coordination forums for Port Phillip Bay and Western Port to identify priorities for research, planning and implementation programs.
WA22. Assess the practices and efficiency of groundwater use in GMAs and develop strategies to achieve higher efficiency and sustainable use of groundwater.		WA52. Regularly review the marine pollution contingency plans to ensure world's best practice procedures are incorporated	WA47. <b>Refine and implement key actions in municipal Stormwater Management Plans to reduce inputs of sediments, nutrients, toxicants and litter to the bays</b>	WA45. Investigate and pilot ways for new nitrogen inputs to Port Phillip Bay to be offset by reduced inputs from elsewhere.
		WA53. Develop and implement a coordinated monitoring, evaluation and reporting framework regarding the condition of the region's marine environment, risk and effectiveness of actions.	WA48. <b>Implement ammonia reduction work at the Eastern Treatment Plant by 2007</b>	



**LAND**

## 6. LAND

### 6.1 Overview

The Port Phillip and Western Port region covers around 1.28 million hectares, or 5.5 per cent of Victoria.

In simple terms, most of the land in the region can be described as rural or urban, though the urban-rural fringe is a significant part of the region where catchment management issues are often emphasised. Much of the urban and rural land is privately owned, but it also includes significant areas of public land.

#### Rural land

Some 83 per cent of the region, totalling 1.1 million hectares is rural including the upper catchment areas, water supply catchments, agricultural areas and green wedges. Much of the region's natural resource production comes from rural areas, including food, water, timber and minerals. Rural areas also provide habitat for native species, recreational sites, protected natural areas and scenic landscapes.

#### Urban land

The urban area of Melbourne currently covers around 215,000 hectares or 17 per cent of the region. It contains 1.4 million residences for 3.4 million people<sup>63</sup> as well as the infrastructure, open space and natural areas that they need. By 2030,

the population is forecast to grow by a further one million people which will require 600,000 new dwellings<sup>64</sup>. 'Melbourne 2030: Planning for sustainable growth', the planning strategy for Melbourne and its surrounding region, sets the direction for the way the metropolitan area will grow. Melbourne 2030 defines an urban growth boundary that will limit urban expansion and control new development. Figure 18 (on page 118) indicates the current and future urban areas of the region.

Setting the urban growth boundary is expected to considerably reduce urban encroachment onto rural land. However, it is estimated that housing and industrial requirements will still see a conversion of some 17,000 hectares of rural land to urban use in the next 30 years.

#### Public land

The rural and urban land in the region includes around 300,000 hectares of public land - a network of eight national parks, six state parks and numerous regional, metropolitan and local parks, conservation reserves and coastal reserves, historic and cultural sites, road reserves and waterways.

The parks include the closed catchments that supply Melbourne's water. Other areas supply timber and other forestry products. Social and environmental benefits of public land and open space include opportunities for recreation, tourism, nature conservation and protection of biodiversity, culture and heritage.



<sup>63</sup> ABS Census of Population and Housing

<sup>64</sup> Melbourne 2030 – Planning for Sustainable Growth



## 6.2 Policy context for the management of land

A range of legislation and supporting policies apply to the management of land in the region and support integrated catchment management.

The Planning and Environment Act 1987 is the basis for the direction and control of land use and development on freehold land through the Victorian Planning Provisions and planning schemes administered by local government. The planning framework includes:

- State Planning Policy Framework - sets statewide policies, including environmental protection measures, with reference to regional and state policies and strategies
- Local Planning Policy Framework, including the Municipal Strategic Statement - sets local policies, including environmental directions, to be used in reaching decisions as to whether development permits should be granted
- Zones and Overlays - identify where particular uses can occur in a municipality, areas of particular significance or value, which uses and works are 'as of right' and which require a permit or are prohibited.

Some development also requires works approval under the Environment Protection Act 1970. If sufficiently large or sensitive, a development may require an Environmental Effects Statement under the Environment Effects Act 1978.

The *Catchment and Land Protection Act 1994*, *Water Act 1989* and the *Coastal Management Act 1995* enable the formation of authorities to plan, manage and protect land, water and coastal resources. The *Catchment and Land Protection Act 1994* also enables the declarations of Special Areas for water supply purposes (formerly called Proclaimed Water Supply Catchments) with links to local planning schemes to regulate land use in these areas.

The *Forests Act 1958* specifies Forest Management Areas for Victoria's forests, and schedules to the Act provide sustainable yield rates for forest production. Targets for production and reserve systems within the Forest Management Areas are set out in *Regional Forest Agreements* and their associated *Forest Management Plans*.

The *Wildlife Act 1975* provides for the establishment and management of State wildlife and nature reserves, with national and other types of parks designated and managed by the *National Parks Act 1975*.

The *Crown Land (Reserves) Act 1978* provides for the reservation of Crown land for a variety of public purposes, and the management, leasing and licensing of reserves, primarily for grazing. The *Land Act 1958* makes provision for the leasing, occupation and sale of unreserved Crown land.

The Commonwealth *Native Title Act 1993* recognises and provides for the protection of native title for the traditional custodians of the land. The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* also protects indigenous heritage.

The *Environment Protection Act 1970* and its supporting State environment protection policies protect land from contamination.

Mineral, extractive and petroleum exploration and development activities are subject to the *Mineral Resources Development Act 1990*, the *Extractive Industry Development Act 1995*, the *Petroleum Act 1998*, the *Commonwealth Petroleum (Submerged Lands) Act 1967*, the *Petroleum (Submerged Lands) Act 1982*, and the *Pipelines Act 1967*.

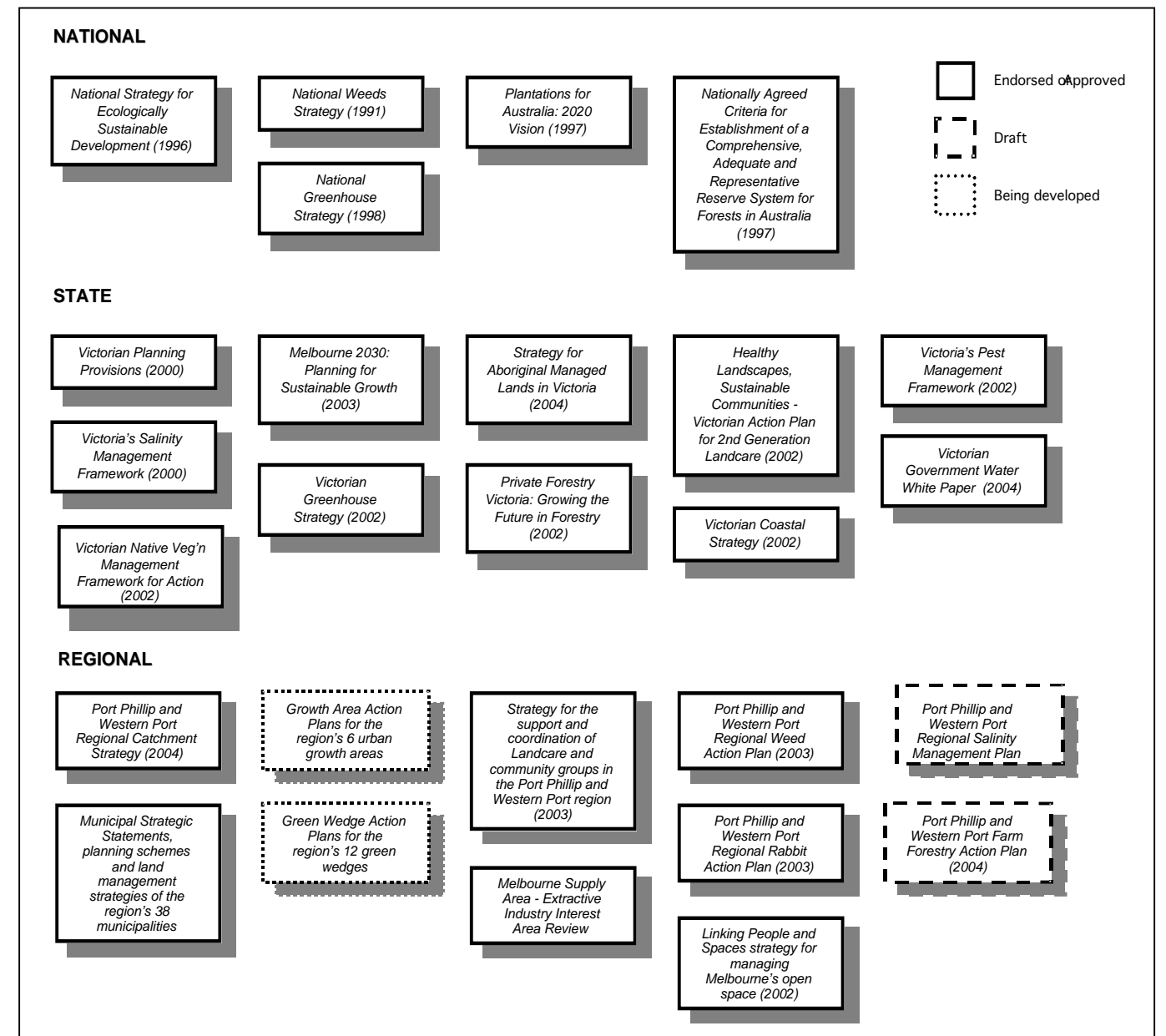
The *Fisheries Act 1995* is the umbrella legislation for the management of fisheries in Victorian Waters providing for the management, protection and ecologically sustainable development of the State's fisheries, aquaculture industries and associated aquatic resources.

Figure 17 depicts some of the national, State and regional policies, strategies and plans that are relevant to land use and management in the Port Phillip and Western Port region.



This RCS recognises that responsibilities for improving the sustainability of land management and its implications for surface and ground water protection are relatively fragmented, being spread across many Acts, strategies and organisations. A symptom of this complexity is that conflicts between development and biodiversity objectives are often unresolved. In response, particular emphasis needs to be placed on aligning RCS objectives and local government planning and on strengthening the conditions that will support sustainable rural land use including at the region's urban-rural interface.

Figure 17: Some of the important policies, strategies and plans relating to management of land



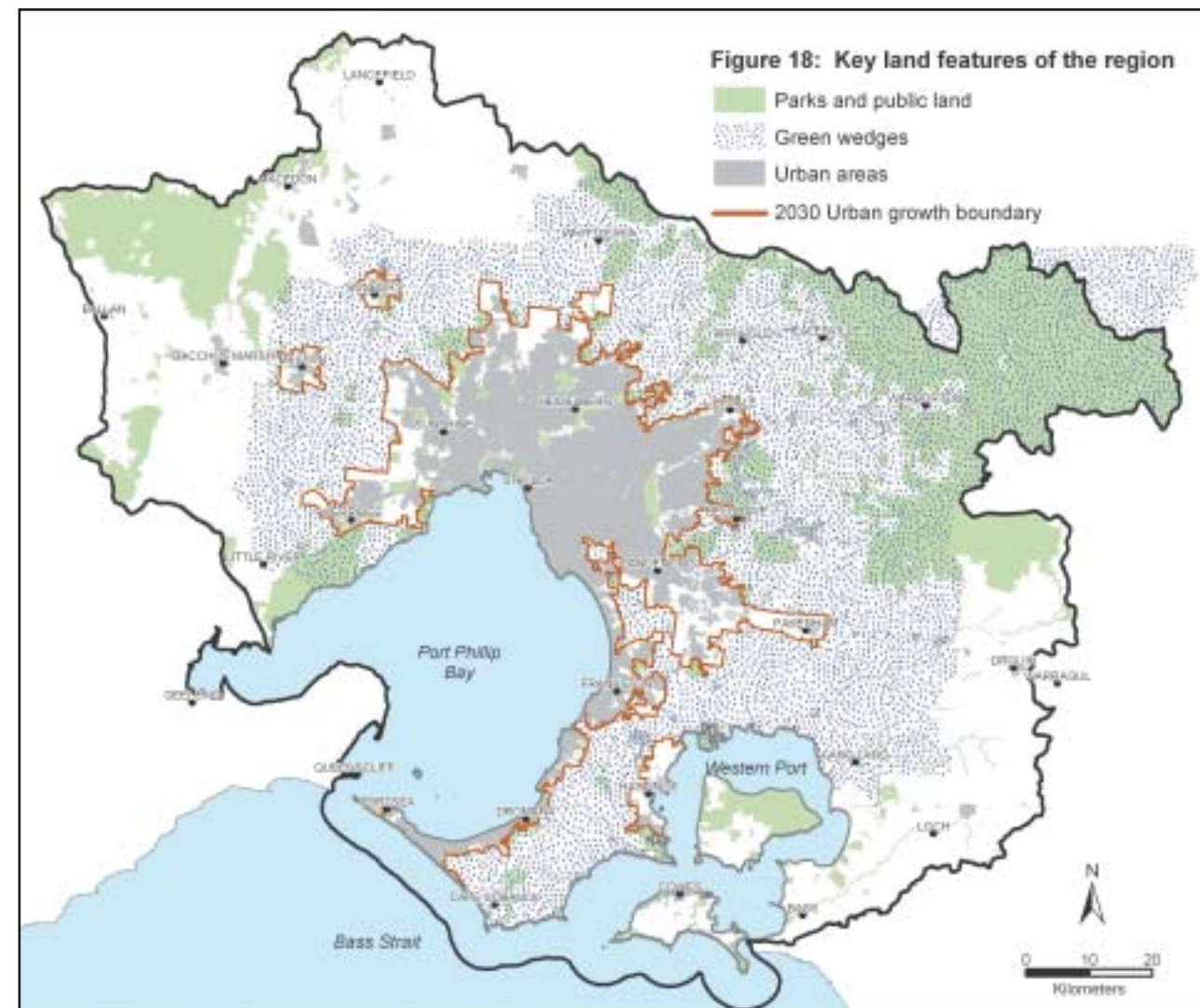
## 6.3 Regional goal

The long-term goal is to have:

### Healthy land used appropriately and productively

This goal encompasses:

- flourishing primary production systems with significant economic output from the use and management of the land
- the concept of land stewardship – acting on the recognition that landscape change will largely result from the actions of private landholders and their ability and willingness to pass their land to future generations in as good or better condition than it was received
- balancing the inherent pressures on land that come with accommodating 3.4 million people – and an even greater population in the future
- the sustainable use of the land for agriculture, timber and the harvesting of other natural products including clean water
- repairing land that has been degraded where this is beneficial and viable
- managing threatening processes such as native vegetation loss, pest plants and animals, salinity, acidity, erosion and nutrient runoff
- managing land to contribute to the maintenance and improvement of natural ecosystem processes
- protecting and managing land and open space for social, recreational, tourism and cultural benefits.



## 6.4 Asset-risk assessment

### 6.4.1 Values

The rural and urban land of the region, both public and private, is used in a variety of ways. Its values include economic production and environmental and social benefits. These values may be limited to particular landscapes, reflecting the varying geology, topography, soil types and climate.

### Agriculture

There are around 4,500 commercial agricultural holdings in the rural areas of the region. These undertake activities such as production of vegetables, poultry, dairy products, grains, wool, meat, flowers, grapes and other fruit. In addition, a significant number of non-commercial holdings are assumed to carry on some form of agricultural activity.

The annual gross value of agricultural production is formally estimated at around \$1 billion<sup>65</sup>, which is 15 per cent of Victoria's annual gross value of agricultural production. However, the actual value is likely to be higher due to unreported farm income from the region's many small or hobby farms. In addition, subsequent handling and processing of the produce (such as abattoirs, poultry processing, packaging, transport and rural supplies) generates a further economic benefit estimated to be in the order of \$3 billion.

Production in this region also makes a significant contribution to local, state and national supplies. For example, the strawberry fruit, strawberry runner, flower, nursery and vegetable industries supply a large proportion of the national crop.

An important feature of agriculture in this region is its intensity. The average gross value of agricultural production per hectare from this region's farms is the highest of any catchment management region in Victoria and is around 4 times greater than the State average.

Value-adding from agriculture also occurs as a result of its close relationship with tourism in certain areas and industries. The Yarra Valley's restaurants and wineries are the destination for 44 per cent of its visitors<sup>66</sup>. Many of these establishments are located within agricultural or horticultural enterprises. Similar relationships exist in the upper Maribyrnong catchment and the Mornington Peninsula, and on Phillip Island.

Figure 19 indicates the distribution and annual value of agriculture across the region on a per hectare basis. It indicates that agricultural value is higher in the east, in particular the Yarra Valley, Dandenong Ranges, Western Port

catchment and some sites on the Mornington Peninsula. The western part of the region has a generally lower agricultural value per hectare with the exception of the vegetable growing area of the lower Werribee catchment and the horticultural area at Bacchus Marsh.

Opportunities exist for increasing the region's economic output from agriculture. First, the urban growth boundary promotes agriculture as a long-term land use because it ensures that land will remain rural into the future. Second, substantial areas of rural land are suitable for more productive uses, and with the potential for increased use of reclaimed water for irrigation, the amount of high-value agriculture is likely to increase.

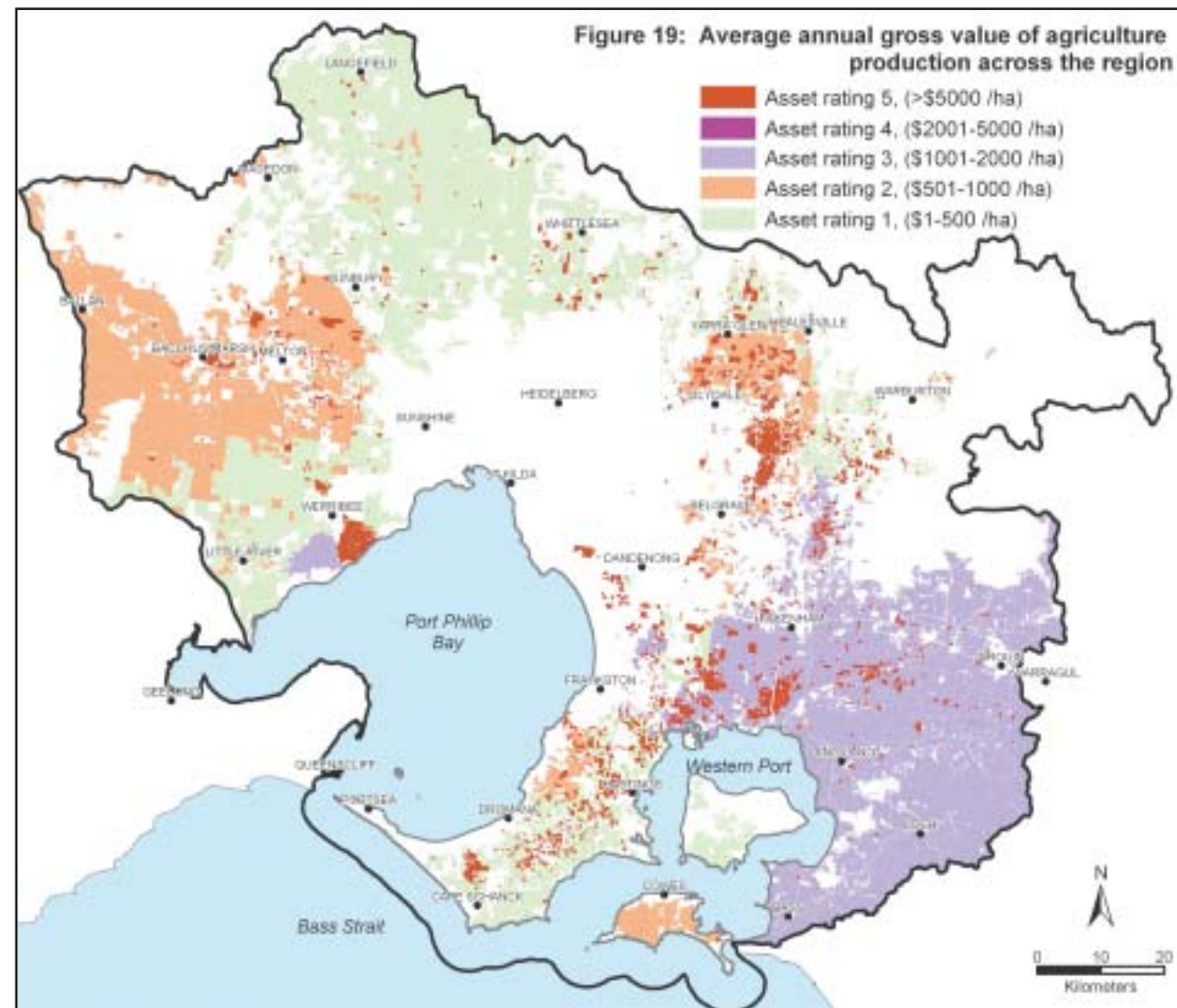
In addition to its economic values, productive and well-managed agriculture is fundamental to maintaining vibrant rural communities and is an effective way of maintaining landscape and environmental values.

*Value-adding from agriculture also occurs as a result of its close relationship with tourism*

<sup>65</sup> ABS 1999 – 2000 Agricultural Commodity Survey – Value of Agricultural Production

<sup>66</sup> Yarra Valley, Dandenongs and the Ranges Tourism Development Plan

Achieving profitable and sustainable agriculture requires effective use of natural resources, favourable market conditions and strong strategic policy and planning support by all levels of government. An example of where this has occurred is the Yarra Valley which has been able to secure significant agricultural investment and development with associated economic, tourism, social and landscape benefits. In contrast, many other conventional and productive agricultural areas have not had a similar level of strategic policy and planning support and have therefore been under continual pressure from subdivision and urban development. In some areas this has resulted in fragmented and unstable agricultural industries.



## Forestry

Based on annual wood consumption figures, each year the region uses an estimated 840,000 cubic metres of sawn softwood and hardwood timber and 650,000 tonnes for paper and packaging and 20,000 tonnes for wood panel products<sup>67</sup>. In addition, it consumes around 450,000 tonnes of firewood<sup>68</sup>. It is estimated that 360,000 hectares of hardwood and softwood plantations are required in order to meet this annual demand for timber<sup>69</sup>, which is a volume too large to be met from within the region. A high proportion of the timber and wood products used here is therefore imported from other parts of Victoria, interstate and overseas.

<sup>67</sup> National Association of Forest Industries – Fact and Figures

<sup>68</sup> Impact and use of firewood in Australia

<sup>69</sup> Estimate from Department of Primary Industries

Some local production does occur in 60,000 hectares of state forest available for timber harvesting inside four Forest Management Areas (Central, Dandenong, Midlands and Central Gippsland) that are partly within the region. In recent years, the region's timber production has been valued at around \$45 million per annum, however reductions in the permitted sawlog yield are likely to reduce future economic returns. It is estimated that there are approximately 1300ha of plantations on farms and other private land. This includes part of the private softwood plantation estate of approximately 800ha and about 240ha of water management authority plantings, mainly hardwoods. There is also a range of small plantations on rural and semi-rural properties. This sector of farm forestry is where growth has been most recent.

Farm forestry can have a positive impact on a range of land management issues in addition to producing economic returns. There is potential to increase the amount of land devoted to small-scale farm forestry, providing multiple environmental and economic benefits.

## Open space and landscapes

A feature of the region is its extensive array of open space, landscapes and parks. While a proportion of this is public land, private land also contributes greatly to open space and our landscapes, for example a significant amount of the region's remnant native vegetation exists on private land.

The social and environmental benefits of parks and open space are many. They include conservation of natural areas, maintenance of biodiversity, protection of cultural and heritage values, provision of recreation and tourism opportunities, provision of amenity and landscape values, and assimilation of some waste products including carbon dioxide. Many of these benefits can contribute to improved human health<sup>70</sup>.

Because areas within parks and open space are often managed to provide natural and environmental values, they generally have a lower impact on other catchment assets than more modified or intensive land uses such as urban development, mining and intensive agriculture.

The management of land for environmental values is described in more detail in Chapter 7 on 'Biodiversity'.

## Cultural heritage

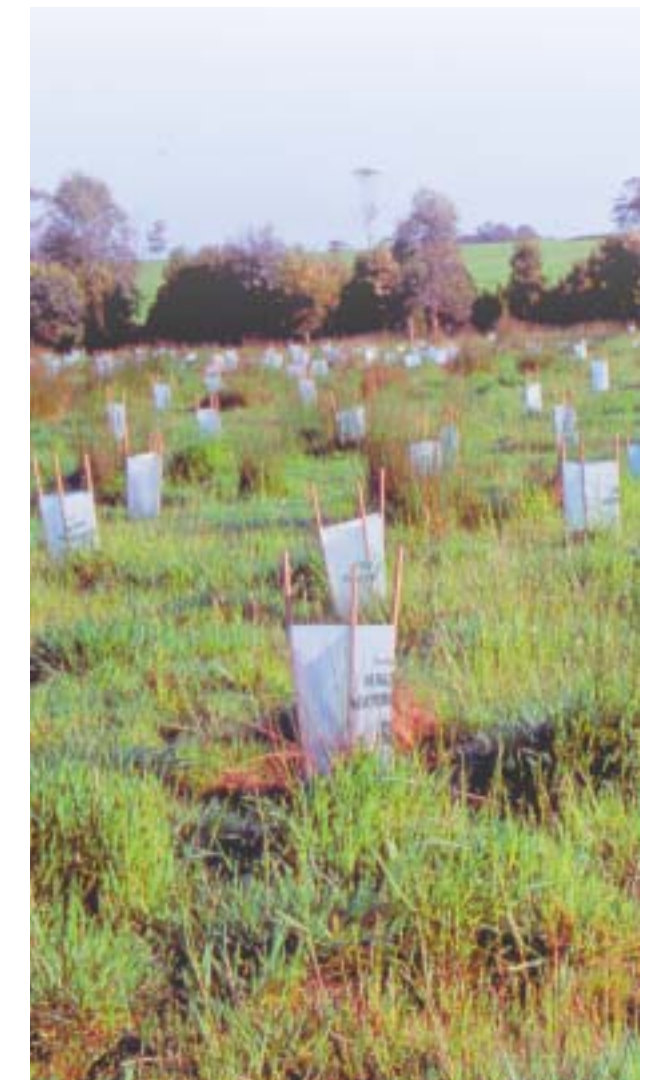
The region has a rich Indigenous history. More than 4,000 Aboriginal cultural heritage sites and places are registered at Aboriginal Affairs Victoria. These sites, many of which are located on land adjacent to waterways and the bays, provide a very important historical and ancestral connection. State and Commonwealth legislation provides protection for all Aboriginal cultural heritage sites, places and objects, whether they are registered or not.

There are also many sites of significance in the region whose heritage is more recent. A heritage place may include a building, garden, tree, ship remains, archaeological site or precinct. Cultural heritage significance includes aesthetic, archaeological, architectural, historical, scientific or social significance. Legislation also supports the protection of these sites.

## Extractive industry

Extractive industry in the region (Melbourne Supply Area) produces more than 40 million tonnes of hard rock, sand, clay and soft rock and gravel each year. Annual sales are valued at around \$300 million. Some 180 extractive licences are allocated, with new applications being continually developed and processed.

Most of the future hard rock supply is likely to be from the eastern part of the region, with existing licences adequate to satisfy demand for at least 50 years<sup>71</sup>. Existing sand licences will meet the area's requirements for only around 15-20 years.



<sup>70</sup> Discussion Paper Sustainable Cities 2025

<sup>71</sup> Melbourne Supply Area – Extractive Industry Interest Areas Review

## Housing and industry

Urban land provides essential space for residential housing and industry and associated infrastructure for the population. It is the focal point for Victoria's trade, commerce, industry and social interaction and development.

In addition, a growing amount of the region's rural land is now being sought and used for rural residential purposes, ie. small acreages, hobby farms and lifestyle properties.

## Tourism

Across the region there are key Victorian tourist destinations including the City of Melbourne, Phillip Island, the Yarra Valley, the Macedon Ranges, the Mornington Peninsula, Port Phillip Bay and Western Port. These areas provide renowned wineries, spectacular coastlines, notable maritime history and wildlife experiences, all close to a major international city.

Beaches, bicycle tracks, walking trails, urban reserves and large rural parks are part of a diverse and well-maintained network of recreation opportunities that serve the region's residents as well as interstate and international visitors. Popular aquatic pursuits include sailing, surfing, snorkelling and boating.

Surveys show that each year the region has more than 30 million visitors who collectively spend around \$7 billion here<sup>72</sup>. Around one-third of these visitors spend significant time outside the City of Melbourne and it is reasonable to suggest that much of this tourism is related to the natural environment.

## Water supply

The management of catchments for water production is a significant value of land. This value is described in detail in Chapter 5 on Water Resources.



## 6.4.2 Key risks

The management of key Land Risks (LR1 – LR6) in the region is a complex task that requires a coordinated approach with landholders and at all levels of government.

In urban areas, the sheer number of people is an issue. In rural areas and at the urban-rural interface, including the defined green wedges that surround Melbourne, it can be even more challenging due to the diversity of land use and land ownership. Land use in these areas ranges from commercial properties (such as intensive livestock, horticulture, broadacre grazing and dairy), to semi-commercial properties, lifestyle and rural residential properties. Landholders have many different aspirations for their land and they come from a range of ethnic, economic and educational backgrounds. The development of strategies to achieve sustainable land management must respond to all these elements. A particular challenge is for landholders to be able to meaningfully apply the concept of land stewardship and to meet their responsibilities and obligations to maintain the quality of land and soil.

A further complexity for this region is that a growing proportion of today's rural residents do not rely on their land as their major source of income. This can reduce their need to continually invest in land management and can result in an incremental reduction in the kind of landscape and ecosystem services that are provided by well-managed properties and that benefit the whole community. On the other hand, there are also a growing number of opportunities for these types of properties to be better managed for landscape and environmental benefits. This issue is an intrinsic part of the risk of changes in land use that compromise production systems and heritage values. It highlights the need for innovative and tailored policy.

The important biophysical threats to the future health and productivity of the region's land and its values include salinity, pest plants and animals, decline in soil health, wildfire and climate change.

*A particular challenge is for landholders to be able to meaningfully apply the concept of land stewardship*

## LR1 - Land use changes that compromise production systems, landscapes and heritage

Particular landscapes embody important or specific values. Whether these values involve issues of resource supply, production or heritage, they can be compromised or diminished by changes in the way land is used and managed.

We need to recognise and consider the implications of land use change, and to decide whether we want these values to be available in the region or whether we are willing to 'import' them, recognising that this may create problems elsewhere – as with the harvesting of water from the Thomson River with impacts on the Gippsland Lakes. Another example is sand extraction in the Western Port catchment, which harvests an important resource but often has impacts on biodiversity, surface water, groundwater and social values.

Examples of the relationship between the land and its values are many. The upper Yarra catchment is critically important for its ability to supply water. Some areas of land have climate and soils highly suited for profitable and sustainable agriculture. Elsewhere, landscape is recognised for its heritage values.

Production systems for water supply, agriculture and extractive industries, and landscape and heritage values can be compromised by certain land uses. Decisions regarding these valuable landscapes must therefore consider the implications of diminishing their values arising from land use change.

The Port Phillip and Western Port region has a relatively high rate of land use change, due to its large population. While most change occurs at the level of individual properties, we need to be capable of planning and influencing land use change at a regional scale and for the long-term benefit of the region.

A challenge facing planning for urban growth is how to balance the demand for diverse lifestyles while at the same time maintaining important production systems and heritage values. This challenge involves matching land use to capability, achieving sustainable agricultural production, appropriately siting transport and urban infrastructure, developing habitat corridors, protecting threatened ecosystems, securing water harvesting capacity and so on.

<sup>72</sup> Summary profile of visitations to Victoria's sub-regions

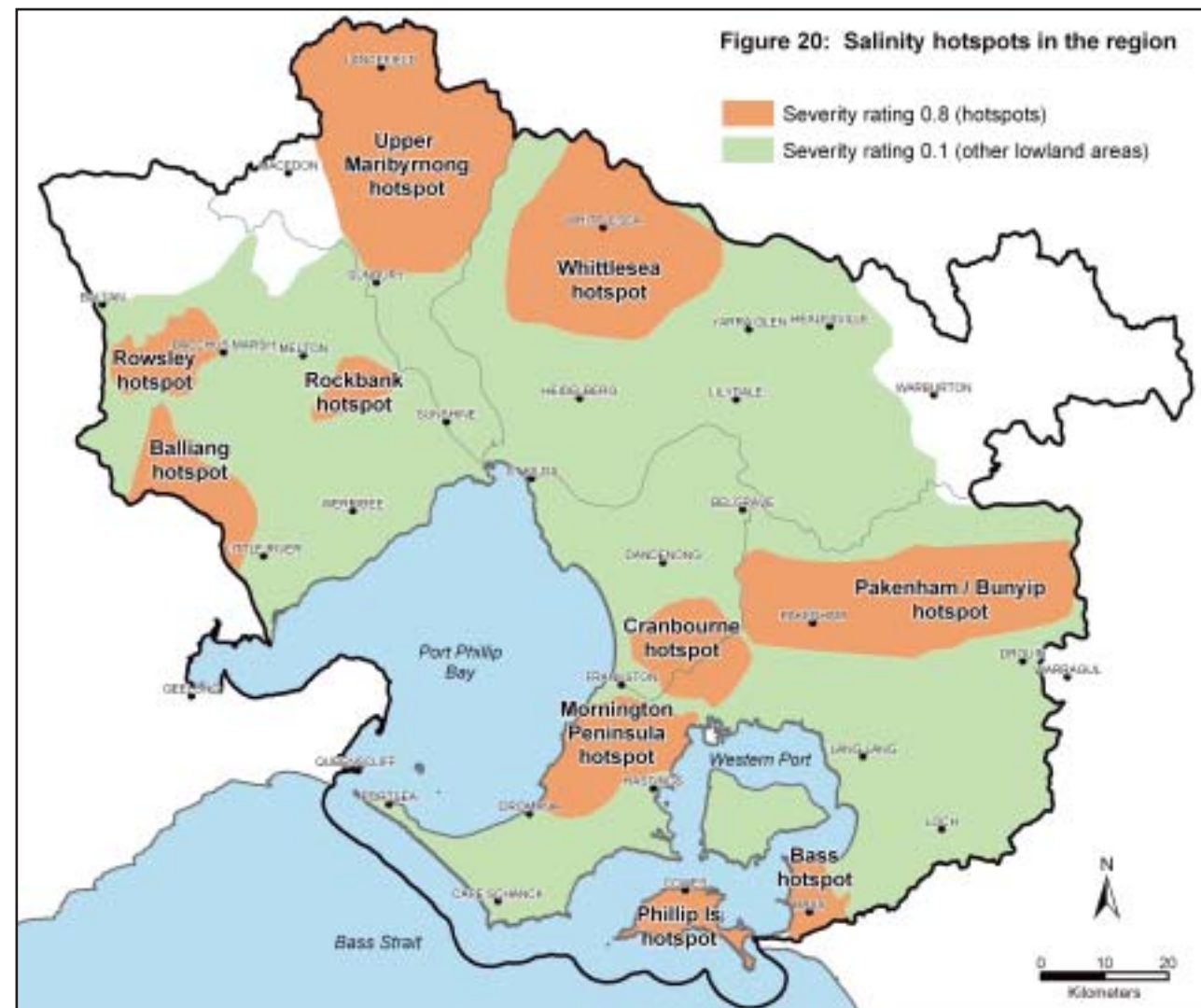
It is also important for adjacent land uses to be compatible. Changes in land use often highlight the different expectations and behaviours of landholders, particularly between adjacent commercial and non-commercial properties. For example, people who move to rural areas may take issue with the normal operations of commercial agricultural businesses, such as herbicide spraying, livestock movement along roadsides and out-of-hours machinery activities.

Overall the risks to economic, social and environmental values posed by land use change in the region are considered to be substantial. These risks have not yet been assessed completely due to lack of definite data, but it is envisaged that these data gaps will be filled and the asset-risk analysis undertaken in future years.

### LR2 - Salinity

A draft regional Salinity Management Plan has been prepared that identifies the significant economic, environmental and social impacts of salinity, particularly to infrastructure and agricultural production. These impacts may increase dramatically in the future. Salinity caused an estimated \$330,000 in losses in regional agriculture and horticulture production in 1998. If the worst-case trends occur, with no intervention, the potential annual loss could increase to more than \$17 million by 2050<sup>73</sup>. Figure 20 shows a number of 'salinity hotspots', where rising groundwater tables are expected to become a serious issue.

*Rising water tables and an increase in the areas affected by salinity are expected to affect the region's recreation and tourism opportunities*



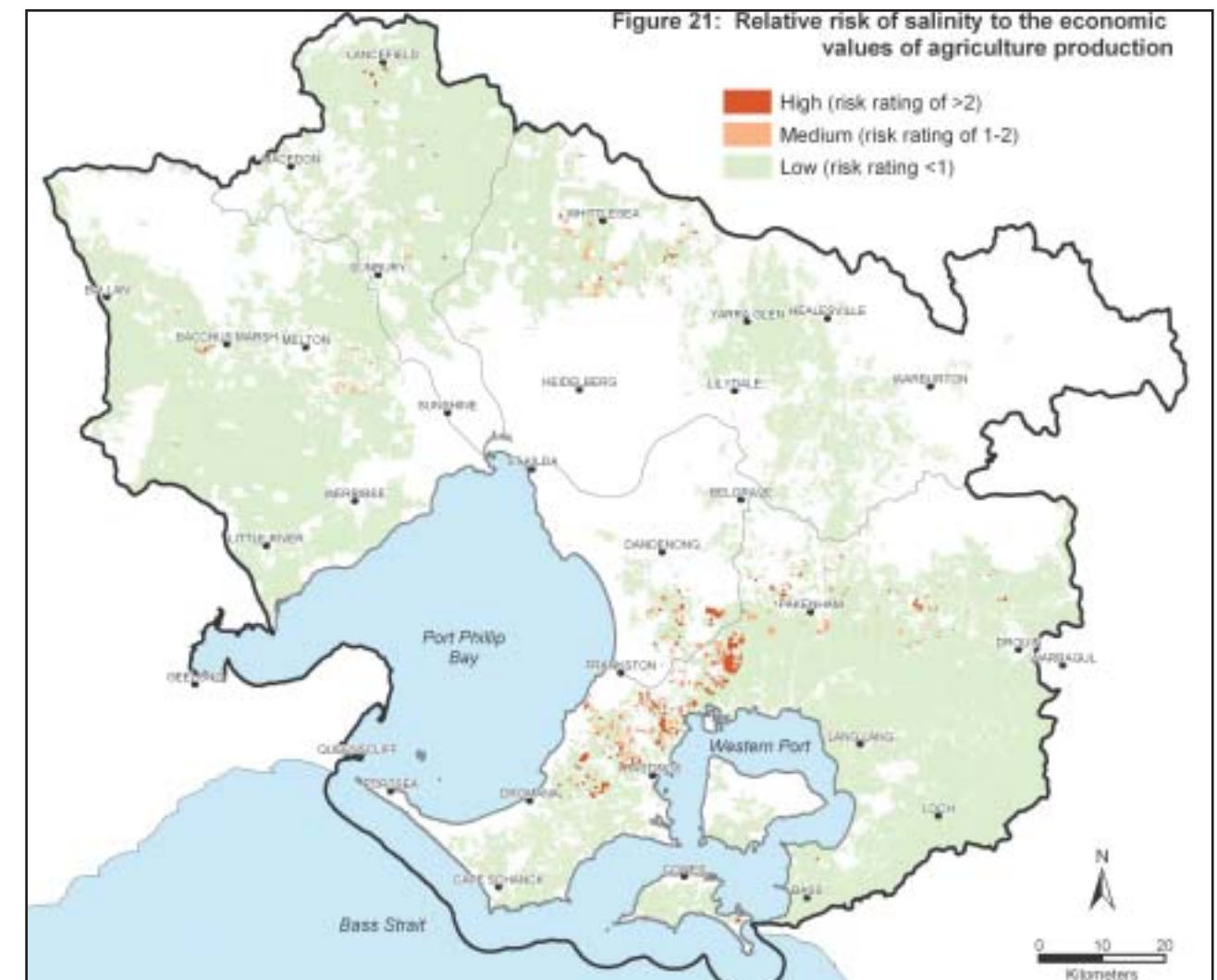
<sup>73</sup> National Land and Water Resource Audit – Extent and Impact of dryland salinity in Victoria.

The following risk assessment methodology has been used to assess the level of risk to the economic values of agriculture from salinity, with the results shown in Figure 21.

Asset rating		x	Severity of threat		x	Sensitivity		= Risk
5	>\$5,000/ha/yr		0.8	Salinity hotspots		0.6	Horticulture, viticulture	
4	\$2,000-5,000/ha/yr		0.1	Other lowland areas		0.4	Dairying, grazing, cropping, plantations	
3	\$1,000-2,000/ha/yr							
2	\$500-1,000/ha/yr							
1	\$1-500/ha/yr							

For example, and as seen in Figure 21, high value agricultural industries such as horticulture in the Mornington Peninsula salinity hotspot have an asset rating of 5, a severity rating of 0.8 and a sensitivity rating of 0.6, giving a relatively high overall risk rating of 2.4.

Figure 21 also illustrates that relatively high risks to agricultural production from salinity are particularly evident in the northern areas of the Western Port catchment and on the Mornington Peninsula. It should also be noted that substantial urban growth is planned for some of these areas and salinity poses a serious risk to residential and urban infrastructure here. Other areas of medium-high risk are also shown in parts of the Yarra catchment around Whittlesea, the upper Maribymong catchment and some areas of the Werribee catchment.





Damage caused to infrastructure by salinity includes physical deterioration of concrete, cement, bricks, metal and soil under buildings, roads and the like. The potential damage to rail infrastructure will increase from one kilometre in 1998 to an estimated 79km in 2050, and to road infrastructure from 107km in 1998 to 1,257km in 2050<sup>74</sup>. This issue is particularly important in areas of new urban growth that overlap with the hotspots, including the Pakenham growth area.

Rising water tables and an increase in the areas affected by salinity are also expected to affect the region's recreation and tourism opportunities. In the hotspot areas 56 native fauna species, 48 native flora species and two Ramsar sites may be affected.

A further salinity hazard is saline runoff and groundwater flows into streams and wetlands. Thirteen streams in the region often suffer from high salinity levels (>5,000 EC) with impacts on the associated aquatic and terrestrial flora and fauna.

The level of risk associated with the impacts of salinity on urban infrastructure and biodiversity values has not yet been

*Despite large commitments of time and money by private and public land managers over many years, weeds remain a serious issue in the region*

assessed completely. It is envisaged that data gaps will be filled and the asset-risk methodology further developed so that these analyses can be undertaken.

### LR3 - Pest plants and animals

Various pest plant and animal species have considerable impact on the environmental, agricultural and social values of the region. The most noticeable are pest plants – weeds – and rabbits.

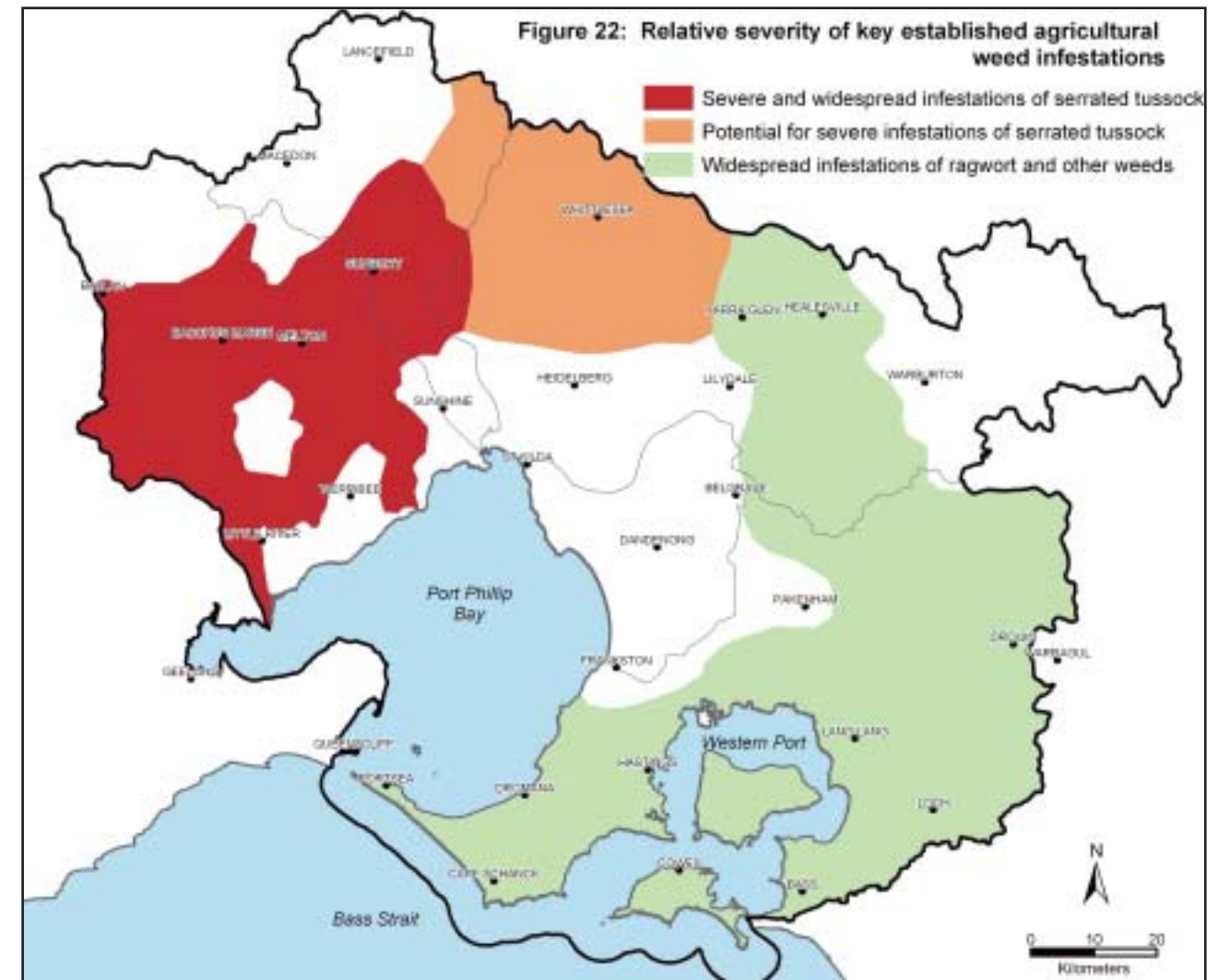
Pest plants cost landholders money, degrade natural ecosystems and agriculture and hasten some forms of soil degradation, particularly erosion. Pest plants and animals cause direct loss of production and profitability through competition. Weeds also have serious social impacts in the community, including reduced landscape and recreational values, increased responsibilities and workloads for land managers, and reduced land values. Despite large commitments of time and money by private and public land managers over many years, weeds remain a serious issue in the region.

The region has hundreds of established weed species. Infestations can originate from garden escapes, livestock and vehicle movements, poor choice of species planted in rural and adjacent areas, and inappropriate dumping of garden refuse in bush settings. Examples of significant established weed species include ragwort across the north-east and south-east of the region and widespread infestations of serrated tussock in the west, as shown in Figure 22.

The threat of new species being introduced from interstate or overseas is constant, and could have substantial impact at regional and statewide level. This threat is particularly high in the Port Phillip and Western Port region with its large population, major sea ports and airports, and overland transport routes from interstate.

On agricultural land, pest invasions are often a symptom of poor land use or land management, for example where land is no longer productively used and there is little incentive for landowners to control weeds. A productive rural landscape managed by well-informed landholders, coupled with compliance programs from Government, is an effective way of managing pests on private land.

It takes a concerted effort on the part of government authorities and all land managers, on private and public land, to manage the impact of weeds, contain their spread and prevent new infestations. The Port Phillip and Westernport Weed Action Plan identifies the responsibilities of land managers and Government authorities for this issue. The plan is based on the principles of the statewide framework for pest management<sup>75</sup>, and acknowledges the importance of public land managers meeting required standards of pest management, to act as leaders and role models for private land managers and the wider community.



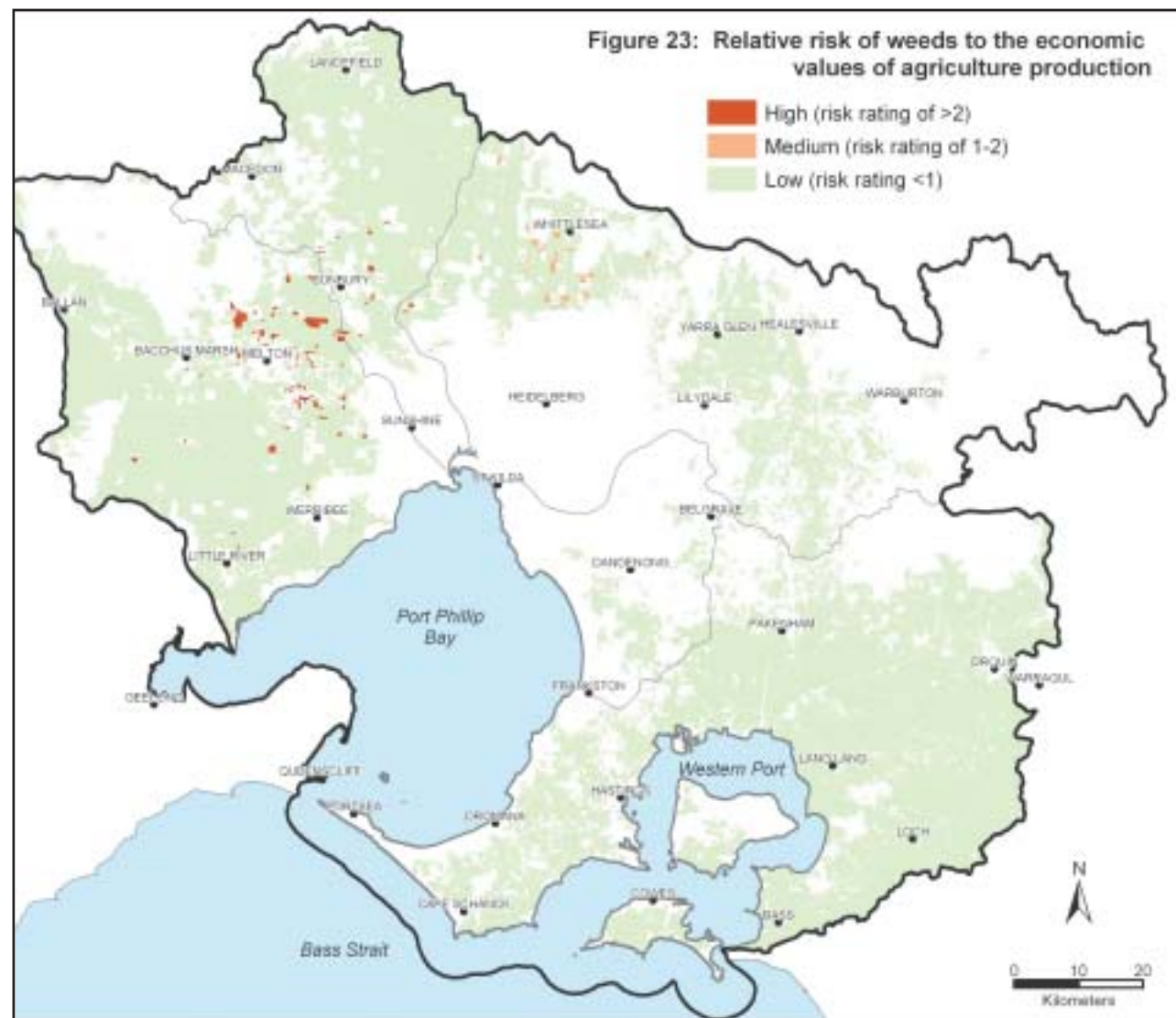
The following risk assessment methodology has been used to assess the level of risk to the economic values of agriculture from key established weed species, with the results shown in Figure 23.

Asset rating		x	Severity of threat		x	Sensitivity		= Risk
Economic value of agricultural production			Extent and severity of key established weed species			Level of impact of weed species on enterprises		
5	>\$5,000/ha/yr		0.8	Severe/widespread serrated tussock infestations		0.8	Grazing, cropping, dairying	
4	\$2,000-5,000/ha/yr		0.4	Potential for severe serrated tussock infestations		0.2	Horticulture, viticulture	
2	\$500-1,000/ha/yr		0.2	Widespread ragwort and other weed infestations				
1	\$1-500/ha/yr							

For example, and as seen on Figure 23, high value dairying enterprises in the Yarra Valley have a relatively low risk rating of 0.8. This is derived from the above table which shows an asset rating of 5, a severity rating of 0.2 and a sensitivity rating of 0.8.

<sup>74</sup> National Land and Water Resource Audit – Extent and Impact of dryland salinity in Victoria.

<sup>75</sup> Victorian Pest Management – A Framework for Action.

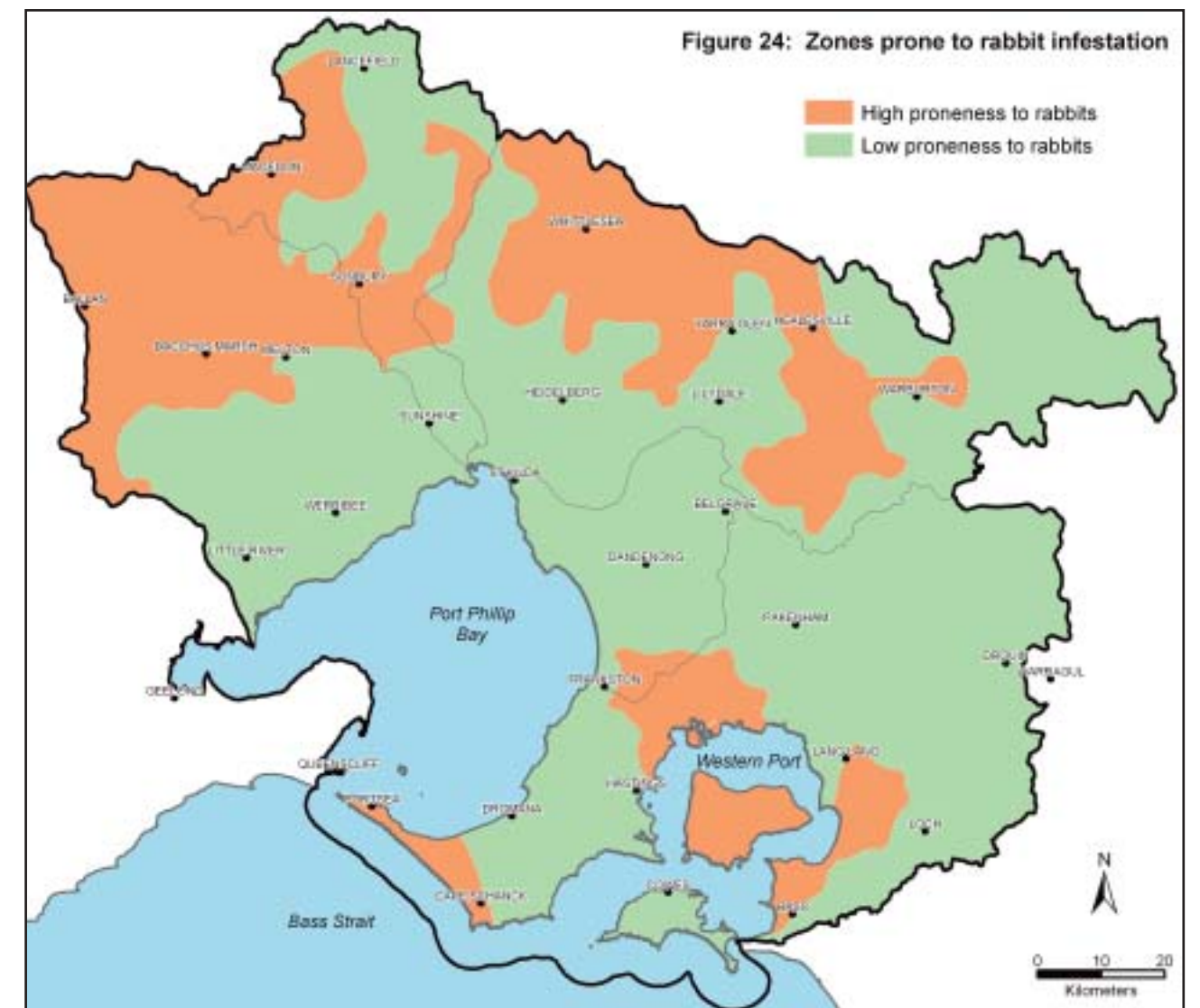


Under this preliminary methodology, Figure 23 illustrates that, in general and at a broad scale, there is relatively low risk to the region's agricultural production from weeds. However, there are certain areas of medium-high risk in the Werribee, Maribyrnong and Yarra catchments due largely to the existing or potential infestations of serrated tussock and other widespread weeds that can have major impacts on the productive capacity of the land and the profitability of its enterprises.

It must be noted that the methodology and data for assessing this risk are preliminary at this stage. They need to be further developed in the coming years to become more accurate and to better guide decision making and priority setting for weed management and integrated catchment management programs. Improving the asset-risk assessment methodology needs to include assessment of many other weed species and also consideration of the potential for certain weed species to spread within this region and into other regions.

Rabbits are the most widespread pest animal species in the region. Recognised as one of the most serious vertebrate pest species in Victoria, they cause major environmental and soil health damage. Their impact on soil stability, native vegetation, parks, gardens and water quality in the region is a major land management issue.

Areas in the north-west, north and south-east of the region are particularly prone to high rabbit populations, as illustrated in Figure 24<sup>76</sup>. Large-scale community commitment and integrated management of rabbits by all land managers is an effective basis for achieving long-term control. However, it should be noted that rabbits are very difficult to treat in urban and coastal areas which can lead to locally high populations and cause problems for some community groups, householders, councils and businesses.



The following risk assessment methodology has been used to assess the risk that rabbits pose to the economic values of agriculture, with the results shown in Figure 25.

<sup>76</sup> Port Phillip and Westernport Rabbit Action Plan

Asset rating x Severity of threat x Sensitivity = Risk

Economic value of agricultural production		Proneness to rabbit infestations		Level of impact of rabbits on agricultural enterprises	
5	>\$5,000/ha/yr	0.4	Areas highly prone to rabbit infestation	0.2	Grazing
4	\$2,000-5,000/ha/yr				
3	\$1,000-2,000/ha/yr	0.2	Areas with low proneness to rabbit infestation		
2	\$500-1,000/ha/yr				
1	\$1-500/ha/yr				

For example, and as seen on Figure 25, grazing in an area prone to high rabbit populations, such as the upper Werribee catchment, will have an asset rating of 2, a severity rating of 0.4 and a sensitivity rating of 0.2, giving an overall risk rating of 0.16.

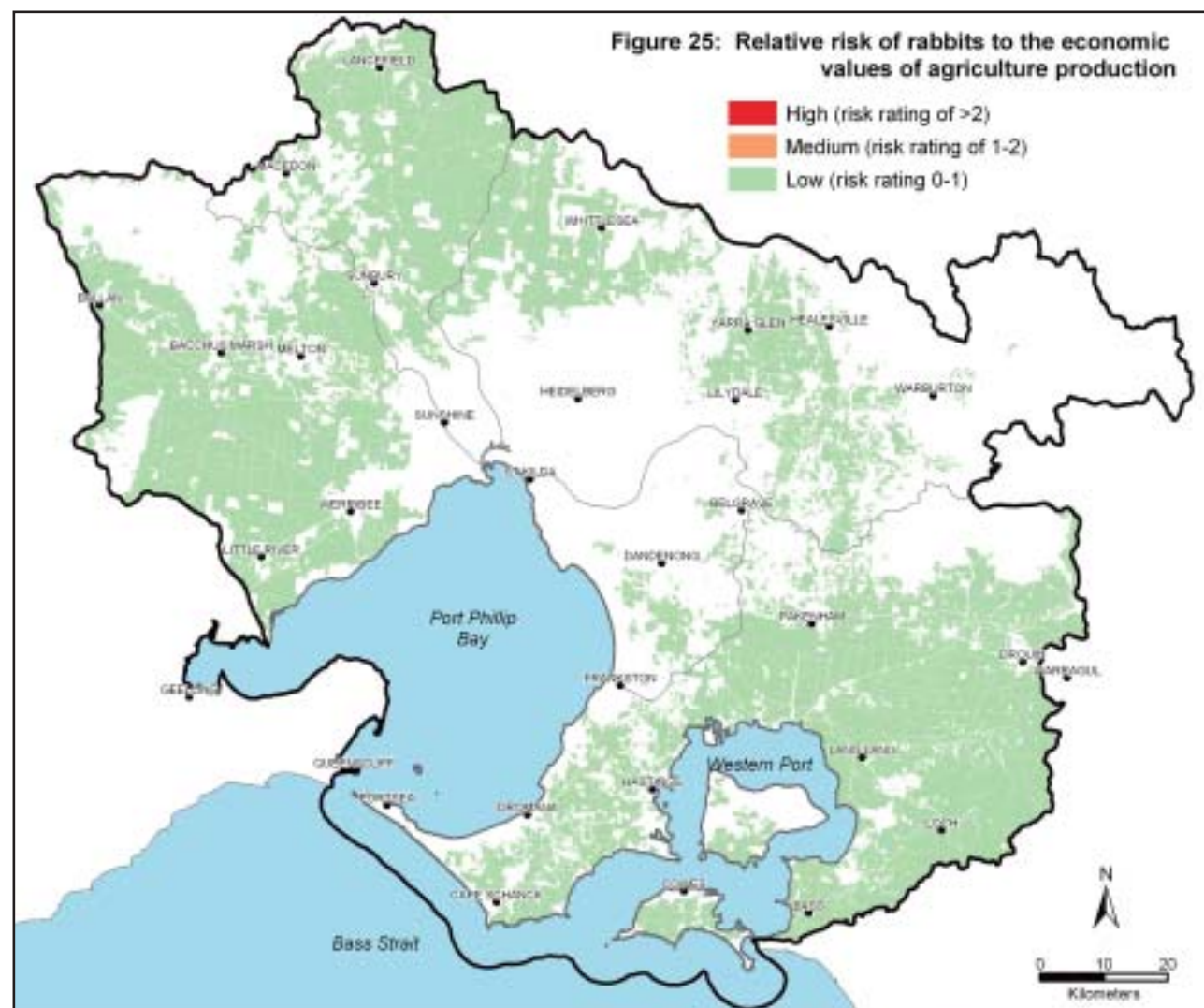


Figure 25 indicates that the risk posed by rabbits to agricultural production is generally low compared to some other catchment management issues. However, it is recognised that they pose a more serious risk to other land and environmental values and to soil health in non-arable areas and when restoring degraded land. There is not enough definite data to completely assess these risks, but it is envisaged that these data gaps will be filled and the asset-risk analysis revised more comprehensively in future years.

Other introduced pest animals with an impact on the region's land and its biodiversity values include foxes, feral cats and various exotic species. Domestic cats can also be a significant issue in urban and semi-urban areas where they can be present in large numbers and be poorly-managed in relation to their impacts on biodiversity. Native animal populations can also become over-abundant in some situations.

The interface between private and public land is an area where partnerships in pest plant and animal control programs are essential to achieve effective results.

#### LR4 - Decline in soil health

The soils of the region exhibit considerable variation, but can be broadly categorised as:

- heavy clays on the basalt plains west and north of Melbourne
- sedimentary clay loams in the foothills of the north and north-east
- sands and sandy loams of the coastal areas, and the plains south-east of Melbourne
- brown and red clay loams in the hills east of the Dandenongs, parts of the Mornington Peninsula, and the South Gippsland Ranges.

Excessive cultivation and cropping, decline in organic matter, vegetation clearing and the inappropriate use of fertilisers and other chemicals can affect the structure and biological health of soils, reduce their productive capacity and cause off-site impacts such as decline in water quality.

Soil erosion and sediment movement is a significant issue, particularly in the west of the region and in the Western Port catchment.

The region's soils in general have been identified as being at medium risk of acidification with future impacts being productivity loss and decreasing ground cover. Some areas in the east of the region have already been identified as highly acidic<sup>77</sup>.

Some 12,000 hectares of land, mainly around the coast, has also been identified as having acid sulphate soils<sup>78</sup>. This condition occurs naturally, but becomes a problem if the soils are disturbed and the iron sulphide layers come into contact with air. The resultant oxidation creates sulfuric acid which can have a detrimental effect on plant growth as well as corroding concrete and steel infrastructure and releasing metal compounds harmful to aquatic organisms.

There is a need for improved knowledge of the status and condition of the region's productive soils, in order to better assess risk and to assist farmers to understand and manage the risks to their soils asset.

#### LR5 - Wildfire

Parts of the region are susceptible to wildfire. The main risk occurs in the substantial forested uplands where there is potential for significant impacts on water quality, water supply, biodiversity and environmental values through loss of vegetation and subsequent soil erosion. Wildfire also poses risks to agriculture and social values such as human safety, houses and other infrastructure, tourism and recreation.

Prescribed fire regimes are used to manage fuel loads and to benefit the ecosystems. Community education campaigns can be effective in encouraging landholders to be prepared for fire and to be able to take responsibility for their own safety.

#### LR6 - Climate change

The prediction of climate change is an evolving science. It is expected that climate change will increase average annual temperatures in the region, make weather patterns more variable, and reduce spring rainfall<sup>79</sup>. Eventually agricultural production systems will need to adapt to these changes.

The threat of climate change is acting as a catalyst for substantial carbon sequestration activities, such as programs to create carbon sinks of vegetation that may offer alternative land use options for landholders. This will increase the value of activities such as farm forestry in addressing land degradation by providing alternative income streams and contributing to sustainable production systems in the region.

<sup>77</sup> The Impact of Acid Soils in Victoria

<sup>78</sup> Acid Sulphate Soil Hazard Maps: guidelines for coastal Victoria

<sup>79</sup> Climate change in Victoria: High resolution regional assessment of climate change impacts



## 6.5 Objectives

The following Land Objectives (LO1 – LO5) have been developed in line with the principles of sustainability and with the asset-risk assessment. These objectives are aspirational targets that guide the identification of more detailed targets and actions in subsequent sections.

Objective	Sustainability Principles	Risks
LO1 Achieve prosperous and sustainable primary production systems	P2, P3, P5	LR1, LR2, LR3, LR6

Objective LO1 embraces the need for primary production systems, including agriculture, forestry and extractive industries, to be economically robust and socially and environmentally acceptable. We will strive for new technologies and techniques and for increased awareness and adoption by producers and consumers. These advancements will help producers to manage the risks associated with their businesses. Enhancing the prosperity of agricultural and other production systems will probably involve intensification and must therefore be carefully managed within an ethos of land stewardship. In maintaining or enhancing the condition of the catchment assets, the systems will need to respond to threatening processes such as salinity, pests and climate change, and also to ensure minimal off-site impacts. Objective LO1 responds to the principles of inter-generational equity, conserving natural resources and cultural heritage and enhancing regional prosperity.

Objective	Sustainability Principles	Risks
LO2 Protect and improve the health of land	P2, P3, P4, P5	LR1, LR2, LR3

Objective LO2 supports the concept of land stewardship and also addresses some of the key risks to land in this region, in particular those exacerbated by human practices such as salinity, decline in soil health and infestations of pest plants and pest animals. Having healthy land helps in achieving inter-generational equity, conserving natural resources, maintaining ecological diversity and enhancing regional prosperity.

Objective	Sustainability Principles	Risks
LO3 Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the region's biodiversity, water resources and heritage values	P1, P2, P3, P7	LR4

Objective LO3 covers the location, design and operation of urban systems and relates also to changes in land use. When deciding on areas to develop, it embraces biodiversity protection and conservation of catchment assets. Locating new urban areas in parts of the region that will not be subject to significant salinity, flooding and fire; and adding adequate and appropriate buffer zones to minimise impacts on production systems recognises the precautionary and inter-generational equity principles. The reference to functionality embraces urban processes such as those relating to open space, energy use, use of water and nature-based recreation.

Objective	Sustainability Principles	Risks
LO4 Match rural land-use, development and management to land capability and minimise impacts on the region's biodiversity, water resources and heritage values	P1, P2, P3, P5	LR1, LR2, LR4

Objective LO4 identifies the need for detailed and informed rural land-use planning. All parcels of land, both small and large holdings, must be used within their capacity to minimise off-site impacts that degrade the region's land, water and biodiversity assets. Seeking to protect land now and ensure it remains productive into the future responds to the precautionary and inter-generational equity principles, as well as those of regional prosperity and conservation of natural resources.

Objective	Sustainability Principles	Risks
LO5 Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit	P4, P6	LR4, LR5

Objective LO5 aims to ensure that the region continues to provide parks and open spaces that are accessible to the community for a range of social and cultural purposes including recreation, heritage and tourism. It addresses the principles of maintaining ecological diversity and protecting societal and Indigenous and other cultural values.

## 6.6 Targets

These inter-related Land Targets (LT1 – LT10) are proposed in order to attain the objectives.

### Achieving prosperous primary production

Target	Relevant objectives
LT1 Increase the overall real net farm income per hectare and increase the proportion of rural land being used for profitable, sustainable agriculture	LO1

Target LT1 reflects the need for a profitable and productive agricultural sector that continues to make an adequate contribution to the regional and State economy, and also enables landholders to invest in the health and sustainability of their catchment assets. There is an opportunity in this region for the large and increasing number of 'lifestyle' farmers to become involved in profitable small-scale commercial enterprises managed sustainably.

### Protecting the health of land

Target	Relevant objectives
LT2 No more than a 10 per cent increase (from 2004 levels) in the area with shallow water tables (<2m) and the area of saline discharge	LO1, LO2, LO3, LO4

Due to changes in land use and vegetation clearing, it is inevitable that groundwater tables will rise in some areas and cause dryland salinity. Target LT2 recognises that the affected areas must be minimised and appropriately managed.

Target	Relevant objectives
LT3 The structure and biological health of the region's soils maintained	LO1, LO2, LO4

The structure and biological health of soil is vital in maintaining productive capacity and minimising impacts on catchment assets, particularly the movement of sediments and nutrients into waterways and bays. An ability to characterise what constitutes healthy soils is fundamental in achieving sustainable soil-based rural enterprises. Information is needed on the status and trends for soil structure and biological health, such as acidity and erosive potential, in order to quantify this target.

Target	Relevant objectives
LT4 No establishment of 'new and emerging' weed species, and no further spread of 'high-priority established' weeds	LO1, LO3, LO5

We cannot contain, let alone eradicate, all weeds. However, Target LT4 recognises that we will continue to target new and emerging weeds and key established weed species in accordance with the regional Weed Action Plan. Through targeted investment, the region has succeeded in containing high-priority weeds such as ragwort and serrated tussock.

Target	Relevant objectives
LT5 Long-term rabbit control' achieved on 400,000 ha of rural land by 2008	LO1, LO2, LO5

Given current technology, we will never be able to eradicate rabbits from the region. The key to minimising their impact on environmental and economic values is to keep the rabbit population low and 'under long-term control', as identified in the regional Rabbit Action Plan. Long-term control is defined as the number of rabbits at which there is no measurable impact on land stability, productivity and biodiversity. This can be maintained with a routine management program. Currently, around 200,000 ha in this region are classified as being under long-term control.

### Sensitively located and functional urban development

Target	Relevant objectives
LT6 All new urban development kept within urban growth and township boundaries	LO3

This target is consistent with the Melbourne 2030 urban planning strategy. It recognises the link between urban growth and the health and sustainability of catchment assets and seeks to have urban development planned and implemented in ways that minimise impacts on the social, environmental and economic values of our water, land and biodiversity. There is a need for urban growth boundaries around some of the rapidly-expanding townships in this region, including a number of coastal towns, with support for the rural councils to plan and manage the substantial urban growth that is occurring.

Target	Relevant objectives
LT7 Increase the area for which rural land use matches land capability	LO1, LO2, LO3, LO4

Matching the use of rural land to its capability provides a basis for minimising risks and optimising benefits. Further assessment of land capability across the region is required before this target can be quantified.

### Water quality

Note: The management of rural land in our catchments has substantial impacts on the waterways and bays. For example, the annual load of nitrogen to Port Phillip Bay has been identified as critical to the health of the Bay, and a substantial proportion comes from Melbourne's hinterland including the Yarra Valley. Similarly, the annual load of sediment transported from catchments and waterways into Western Port is recognised as a serious issue. Specific targets for reduced inputs of nitrogen to Port Phillip Bay (WT22) and sediment to Western Port (WT23) are included in Section 5.10 – Estuaries, Bays and Seas.

Target	Relevant objectives
LT8 All designated water supply catchments delivering water of the required quality	LO3, LO4

Target LT8 reflects the need to safeguard designated water supply catchments and ensures that land use is appropriate to deliver water at the required quality. The key action underpinning it is outlined in Section 5.4 on Surface Water and Waterways.

### Parks and open space

Target	Relevant objectives
LT9 Increase the ratio of urban open space to total urban area and the connectivity between regional open space and habitat assets	LO3, LO5

Open space in urban areas provides myriad social and environmental benefits. Target LT9 reflects the need to include substantial areas of open space in new urban development and to better link areas such as green wedges, parks, vegetation corridors, waterways and coasts. Further assessment of existing open space in urban areas and proposals for new urban development is required to quantify this target and will depend upon maintaining databases of relevant information.

Target	Relevant objectives
LT10 Increase the environmental quality of parks and other public land, and community satisfaction with these features	LO5

This target combines two quantifiable measures of the values we place on our parks; the contribution of parks to the environment and the enjoyment we gain from the parks. This target supports the directions of Parks Victoria's management plans for the region<sup>80</sup>. The State of the Parks reporting provides an assessment of environmental quality and risks to parks throughout Victoria and is used to guide investment. Parks Victoria undertakes surveys of visitor satisfaction and the Victorian National Parks Association also has an active program of parks surveys to assess visitor perceptions of parks.

<sup>80</sup> *Linking people and spaces*

## 6.7 Actions

These Land Actions (LA1 – LA13) are needed to meet the targets. The actions cover various aspects of the management of catchment assets, including the need for research, planning, education, on-ground works, monitoring and reporting.

Some actions will continue and build upon existing programs in the region, while others are new actions.

### Research and knowledge

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA1 Develop a comprehensive profile and understanding of rural land ownership and regional demographics as a basis for determining appropriate land use and management	LT1, LT2, LT3, LT4, LT5, LT7	2007	DPI	VFF, CMA, Local government, Landcare groups	Low

A sound understanding of the values, aspirations and characteristics of the people who own and manage land in the region is required to determine how land use and management should vary across the region to take account of social and environmental factors. This understanding will only be achieved by involving rural landholders in discussion and new thinking on policy and future directions.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA2 Develop a comprehensive risk assessment of rural and urban-rural land use compared to land capability	LT7	2008	DSE	CMA, DPI, local government, Landcare groups	Medium
LA3 Develop and apply a methodology for a comprehensive risk assessment of soil health, as a basis for development of a Regional Soil Health Plan	LT3	Assess risk by 2006 Develop plan by 2008	DPI	CMA, DSE, Landcare groups	Low

An important basis for assessing risk is an understanding of the causes, scale and implications of the issues. As noted, we do not currently have sufficient data or understanding about some important land issues in the region - in particular soil condition (including areas of erosion, land slip and acid sulfate soils) and land use compared to its capability. These issues are important so there is a need to quantitatively assess the level of risk and then plan for and respond to it.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA4 Undertake detailed mapping and modelling of salinity hotspots as a basis for completing and implementing the regional Salinity Management Plan	LT2	2006	CMA	DSE, DPI, Local government, Landcare groups	Medium

While strategic regional planning on salinity is under way with the regional Salinity Management Plan, we must significantly increase the level of data and understanding about this issue. This is particularly important given its potential impact on areas of valuable agricultural production, and given the rate of urban development in the region where massive costs could arise if infrastructure is inappropriately sited or designed for the possible future conditions. Once achieved, this more rigorous data and strategic planning must be applied directly to land use and land management. The regional plan must have strong links with local government planning schemes and achieve adoption of necessary land and water management practices in hotspot areas.

### Strategic planning

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA5 Develop and implement a strategic plan to promote productive and sustainable agriculture in the region	LT1	2007	DPI	CMA, DSE, VFF, EPA agricultural industry groups, Local government, Landcare groups	Low

Agriculture is a valuable industry in the region that contributes significantly to achieving the sustainability principles of enhancing regional prosperity, maintaining ecological diversity and conserving natural resources. One target of this RCS is an increase in the overall real net farm income per hectare so that the profitability of agriculture is increased and landholders are willing and able to invest in land stewardship. However, identifying the most effective way of achieving this target is a challenge.

While industry-based planning occurs at state and national level for some agricultural sectors, an integrated regional approach is needed in the Port Phillip and Western Port region where elements such as green wedges, urban-rural interfaces, intensive industries, lifestyle farming and agri-tourism make agriculture diverse and complex.

The aims of the regional plan should include:

- development of a range of options for enhancing the prosperity of agriculture and increasing the area of land used for productive agriculture
- determining and securing the future of agriculture through strategic and complementary policy and planning at all levels of government
- ensuring that agriculture and adjacent land uses are compatible
- helping landholders to make reasoned and practical business decisions about the use of their land.

This type of initiative, innovative for a Regional Catchment Strategy, reflects the unique situation of our region, the number of stakeholders that can affect agricultural outcomes, the value of agriculture and the link between land management and the sustainability of catchments. Clearly this is a major task, and the support and participation of industry leaders, agri-business forums and government in the planning process will be essential to its success.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA6 Develop and implement urban growth area and green wedge action plans as identified in <i>Melbourne 2030</i> , and major transport planning, in line with the targets and actions of the RCS	LT6	2008	DSE	CMA, DPI, Parks Victoria, Local government, land managers, Landcare groups	Medium

Complementing the strategic plan for the future of agriculture will be plans to address urban development and the management of the green wedges around Melbourne. *Melbourne 2030* gives high priority to these plans and the RCS supports them because of their importance to catchment management outcomes. However, it is important that plans for the region be developed in line with the principles, objectives, targets and actions of the RCS.

In terms of urban growth, it must be recognised that urban development has a profound impact on catchment assets, both where this occurs and off-site. As much as possible, the siting, design and ongoing management of urban areas must be undertaken in line with sustainability principles. There is a need for urban growth boundaries to be established around some of the rapidly-expanding townships in this region, including coastal towns, with support for the rural councils to plan and manage the substantial urban growth that is occurring. Bass Coast Shire's Coastal Strategy Framework which is setting town boundaries for six local townships is an example.

In terms of the green wedges, it must be recognised that it is becoming more difficult for many broadacre and other agricultural enterprises to remain viable, especially at the urban-rural interface. This is particularly so in the Port Phillip and Western Port region, where one consequence is a continuing decline in the number of broadacre commercial farms. As non-commercial uses proliferate, such as rural residential and hobby farms, there will be more and smaller properties with a diverse range of land managers, creating a group of landholders who may have different points of view to 'conventional' farmers.

Tailored approaches, including widespread development of property management plans, are needed to encourage responsible land management.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA7 Investigate and promote market-based mechanisms that reward landholders providing environmental services	LT1, LT7, LT8	Pilot programs initiated by 2008	CMA	DSE, DPI, Local government, land managers, Landcare groups	Medium

New approaches need to be piloted in the green wedges and throughout this region. These should explore the markets emerging nationally and globally to provide ecosystem services and generate public benefits, such as carbon sequestration and biodiversity enhancement. These markets could make some environmentally beneficial land uses, such as farm forestry, more attractive to landholders, governments and other investors, and may accelerate sustainable land management practices. An example is the Bush Tender system that has been trialed in parts of Victoria and could be adapted to meet the opportunities presented in this region's green wedges and the particular challenges faced by landholders here.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA8 Capitalise on opportunities within greenhouse gas abatement programs to create carbon dioxide sinks and modify production systems	LT1, LT7, LT8	Ongoing	CMA	DSE, DPI, Local government, Landcare groups	Low

At present we have limited understanding of the risks associated with climate change, so it is important that the region stays informed of continuing research and can adjust catchment management programs accordingly.

An important first step in Action LA8 should be the development of a regional greenhouse gas emissions inventory that builds on the International Council of Local Environmental Initiatives' "Cities for Climate Protection" program that many of the urban municipalities have already joined. This inventory would assist natural resource managers to identify emission sources and potential adaptive responses.

We should also capitalise on emerging opportunities for investment in greenhouse gas abatement programs that increase carbon sequestration or reduce carbon emissions, especially where they contribute to improved catchment management. Farm forestry programs are one mechanism where multiple public and private benefits can be achieved. Improved management of methane and nitrous oxide emissions must also be pursued.

### Addressing water quality issues

Note: There is an important link between the health of our waterways, estuaries, bays, seas and the activities that take place in the catchments. The way farms, rural roads and lifestyle properties are managed has substantial impacts on the waterways, wetlands and bays. Practices that can impact on our assets include erosion, drainage management, excessive or ill-timed fertiliser application, overgrazing, excessive stocking rates and the management of riparian areas and vegetation areas.

A specific action (WA6) to map the land-based sources of nutrients, sediments and other pollutants across the region, and develop and implement a Regional Water Quality Improvement Plan to address the major sources is included in Section 5.6 – Surface Waters, Rivers and Streams.

While WA6 is being progressed, the reduction of nitrogen into Port Phillip Bay is already recognised as a priority. Similarly, the reduction of sediment entering Western Port from its catchments and waterways is recognised as a priority requiring immediate action. Actions WA44 and WA46 are included in Section 5.10 – Estuaries, Bays and Seas to specifically address these water quality issues. They will involve substantial extension programs with land managers to identify alternative practices and encourage adoption of new ones and to establish programs to monitor and measure the effectiveness of reductions in pollutants.

### Pest plants and animals

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA9 Implement the regional Weed and Rabbit Action Plans	LT4, LT5	2008	DPI	Landholders CMA, PV, Local Government	High

Pest plants and animals, including rabbits and foxes, are a risk to environmental and economic values, and a strategic approach is needed to address them. The region has developed action plans that identify the roles and responsibilities of land managers and priorities for government investment to help land managers minimise the impact of pest plants and rabbits.

The Regional Weed Action Plan seeks, as a priority, to prevent the establishment of any new and emerging weed species. It includes actions dealing specifically with the commercial distribution of prohibited plants by working cooperatively with the nursery industry and supports a range of early intervention measures, existing examples of which include the "Sustainable Gardening Australia" scheme which several local governments are supporting, the "Wash Down" project in the Surf Coast Shire and the "Weed Stop" partnership project with industry groups. The plan also seeks to prevent the spread of some established priority weed species including Serrated Tussock and Paterson's Curse. This requires major on-going extension and compliance programs coordinated across Victoria. The community-based Serrated Tussock Working Party coordinates the implementation of a Serrated Tussock Action Plan for this purpose. Often, local partnerships between government agencies, councils and communities are effective ways to implement weed management activities, but agreement on cost-sharing for these programs is an important first step. Future reviews of the Regional Weed Action Plan priorities need to specifically consider environmental weeds and alignment is needed with noxious weed lists.

The regional Rabbit Action Plan seeks to increase the area of this region for which rabbits are under long-term control from 190,000 hectares to 400,000 hectares.

The Victorian Government and local government provide a mix of regulatory, advisory and incentive mechanisms to assist landholders to collectively meet these targets.

### Farm management

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA10 Design and deliver programs to achieve adoption of environmental management systems across 25 per cent of the region's commercial horticulture, viticulture, dairying and intensive animal enterprises	LT1, LT7	2010	DPI	VFF, Agricultural industries, Landcare groups, EPA	Medium

The State Government and the Victorian Farmers Federation share the goal of widespread adoption by the state's farmers of voluntary and industry-driven environmental management systems. These systems would explore practical ways for individual properties to adopt environmentally-responsible practices, for example the adoption of a hierarchy of weed control practices with herbicide use being a lower option due to the potential impacts on biodiversity values.

The RCS supports this goal because it will contribute to profitable and ecologically sustainable agriculture in the region. In the next five years, with the support of industry, we propose to focus on some of the region's key intensive agricultural industries, with the aim of having at least 25 per cent of farms adopt these systems. This target is envisaged to be a forerunner to future targets that seek higher adoption levels, expansion into other agricultural industries and adoption by small properties such as lifestyle properties on the urban-rural fringe.

Opportunities to leverage premium returns in the future for participating farms, through 'green marketing', should also be explored in partnership with organisations such as the agribusiness forums in the region and the Mornington Peninsula and Western Port Biosphere Reserve Foundation.

### Farm forestry

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA11 Implement a regional Farm Forestry Action Plan to increase the area of farm forestry in the region by 25 per cent	LT1, LT2, LT4, LT7	Plan implemented by 2009	DPI	Landholders CMA	Medium

Farm forestry can provide multiple economic and environmental benefits including greenhouse gas abatement, salinity amelioration, increasing biodiversity and farm income. The region has a strategic plan that identifies priority areas in the region where farm forestry can maximise outcomes by integrating plantations within agricultural systems, and is developing an action plan to pursue those opportunities.

### Parks and open space

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA12 Increase and extend the park system in the region, and implement best management practices for parks and other public land	LT9, LT10	2008	Parks Vic	DSE, Kulin people, Local government, VicRoads	High

Well-managed parks and public lands provide numerous benefits in environmental quality, tourism, protection of aboriginal heritage and community satisfaction. Linking People and Spaces, a strategy prepared by Parks Victoria, proposes a range of initiatives for the open space in the region. Melbourne 2030 also includes three initiatives directly relevant to parks in the region. These relate to reserving land for new metropolitan parks, continuing open space links and trails, and providing long-term planning protection to meet demand for future open space. Ongoing investment is required to maintain a high level of benefit from these important public assets.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
LA13 Ensure that urban design considers landscape and catchment values through the development of performance standards for planning applications and building permits that include water sensitive design and other environmental and catchment parameters	LT6, LT9	2007	DSE	Local Government, EPA	Medium

The design of new urban areas, and areas of redevelopment, should preserve and enhance existing links including native vegetation and waterways, and include open space that is well-planned, scenic and functional and that has minimal on-site and off-site impacts on catchment assets.

### Major landscape change projects

Note: Catchment management projects of major scale and landscape impact, such as Grow West in the Werribee catchment which is already under way, and the Mornington Peninsula Western Port Biosphere Reserve Project, which is in its early stages, can generate a shared vision and ownership across many groups. These conditions are essential for achieving landscape change. These projects also provide opportunities to attract funds from a wide range of stakeholders and interest groups including the corporate sector. They are important to enhance landscape values and to increase links between public land assets and across private land.

A specific action (PA10) to develop and begin implementing major projects in the catchments of the region is included in Section 8 – People and Organisations.

## 6.8 Summary table

The following table summarises the translation of the goal for land through the steps of objectives and targets to actions.

Healthy land used appropriately and productively

Objectives

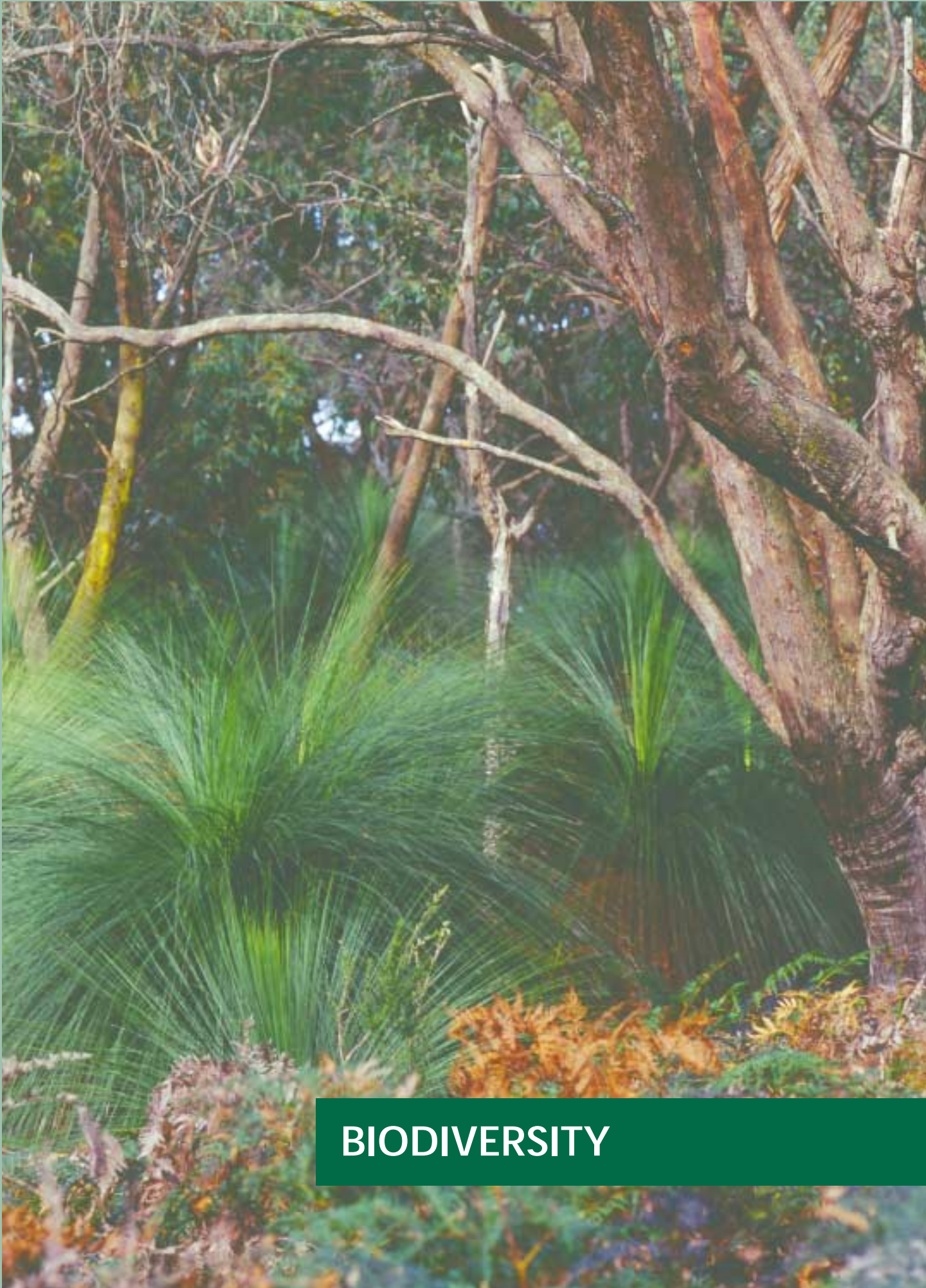
- LO1. Achieve prosperous and sustainable primary production systems
- LO2. Protect and improve the health of land
- LO3. Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the region's biodiversity, water resources and heritage values
- LO4. Match rural land-use, development and management to land capability and minimise impacts on the region's biodiversity, water resources and heritage values
- LO5. Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit

Targets (pre-existing targets in Bold)

- LT1. Increase the overall real net farm income per hectare and increase the proportion of rural land being used for profitable and sustainable agriculture
- LT2. No more than a 10 per cent increase (from 2004 levels) in the area with shallow water tables (<2m) and the area of saline discharge
- LT3. The structure and biological health of the region's soils maintained
- LT4. **No establishment of 'new and emerging' weed species and no further spread of 'high-priority established' weeds**
- LT5. **'Long-term' rabbit control achieved on 400,000 ha of rural land by 2008**
- LT6. **All new development kept within urban growth and township boundaries**
- LT7. Increase the area for which rural land use matches land capability
- LT8. All designated water supply catchments delivering water of the required quality
- LT9. Increase the ratio of urban open space to total urban area and the connectivity between regional open space and habitat assets
- LT10. Increase the environmental quality of parks and other public land, and community satisfaction with these features

Actions (pre-existing actions in Bold)

- LA1. Develop a comprehensive profile and understanding of rural land ownership and regional demographics as a basis for determining appropriate land use and management.
- LA2. Develop a comprehensive risk assessment of rural and urban-rural land use compared to land capability
- LA3. Develop and apply a methodology for comprehensive risk assessment of soil health, as a basis for development of a Regional Soil Health Plan
- LA4. Undertake detailed mapping and modelling of salinity hotspots as a basis for completing and implementing the regional Salinity Management Plan
- LA5. Develop and implement a strategic plan to promote productive and sustainable agriculture in the region
- LA6. **Develop and implement urban growth area and green wedge action plans, as identified in Melbourne 2030, and major transport planning, in line with the principles, objectives and targets of the RCS**
- LA7. Investigate and promote market-based mechanisms that reward landholders providing environmental services
- LA8. Capitalise on opportunities within greenhouse gas abatement programs to create carbon dioxide sinks and modify production systems
- LA9. **Implement the regional Weed and Rabbit Action Plans**
- LA10. Design and deliver programs to achieve adoption of environmental management systems across 25 per cent of the region's commercial horticulture, viticulture, dairying and intensive animal enterprises
- LA11. **Implement a regional Farm Forestry Action Plan to increase the area of farm forestry in the region by 25 per cent**
- LA12. **Increase and extend the park system in the region, and implement best management practices for parks and other public land**
- LA13. Ensure that urban design considers landscape and catchment values through the development of performance standards for planning applications and building permits that include water sensitive design and other environmental and catchment parameters



## **BIODIVERSITY**



## 7. BIODIVERSITY

### 7.1 Overview

Biodiversity refers to the variety of life forms that exist in an area: the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form<sup>81</sup>.

Ecosystems in the region have changed over time in terms of diversity, quantity, quality and range, particularly since European settlement around 200 years ago.

*The ecology of the region has changed and will continue to do so*

Parts of the region are now modified extensively, such as urban areas and those developed for agriculture, while other areas

remain in a relatively 'natural' condition. A complex and inter-dependent mix of species occurs in a variety of terrestrial, aquatic, marine, urban and rural environments. Some species are highly valued and others are regarded as pests or weeds. Some existed prior to European settlement while many have been introduced from other parts of Australia and from overseas.

The ecology of the region has changed and will continue to do so, though our lifestyles, landscapes and livelihoods remain dependent on having healthy ecosystems. An important feature of this region is the continuing rapid urbanisation that is decreasing both the quantity and quality of native flora and fauna habitat.

There is a need to monitor the type and rate of change to maintain and enhance the benefits from our native and modified ecosystems. It is particularly important to ensure that natural ecosystems are well represented, maintained in good condition and protected because of their significant social, environmental and economic value. The use of introduced plants and animals in the region must be intelligent and well managed, with a strong emphasis on managing their impact on native biodiversity.

#### Natural biodiversity

The Port Phillip and Western Port region is at the confluence of seven state-defined bioregions and it contains indigenous vegetation categorised into around 100 ecological vegetation classes.

Human activity, especially in the last 200 years, has led to a significant decline in native vegetation. The loss of native

vegetation has been particularly severe in the Victorian Volcanic Plains, Gippsland Plains, Strzelecki Ranges and Otway Plains bioregions, as shown in Figure 26. Of the ecological vegetation classes, 14 have been depleted to below 10 per cent of their original extent (prior to European settlement) as shown in Table 7<sup>82</sup>.

A preliminary estimate of native vegetation quality across the region suggests that 25 per cent is in poor condition, 25 per cent in medium condition and 50 per cent in good condition. However, this broad assessment is not often reflected at a local level and the quality of native vegetation varies markedly between ecological vegetation classes and bioregions. While the Highlands–Southern Fall and Victorian Alps bioregions generally have high quality vegetation, the remaining bioregions contain mainly low quality remnants.

Further information and analysis of the existing native vegetation is being compiled in the regional Native Vegetation Plan.

*Our lifestyles, landscapes and livelihoods remain dependent on having healthy ecosystems*



<sup>81</sup> National Strategy for the Conservation of Australia's Biological Diversity  
<sup>82</sup> Draft Port Phillip and Westernport Native Vegetation Plan

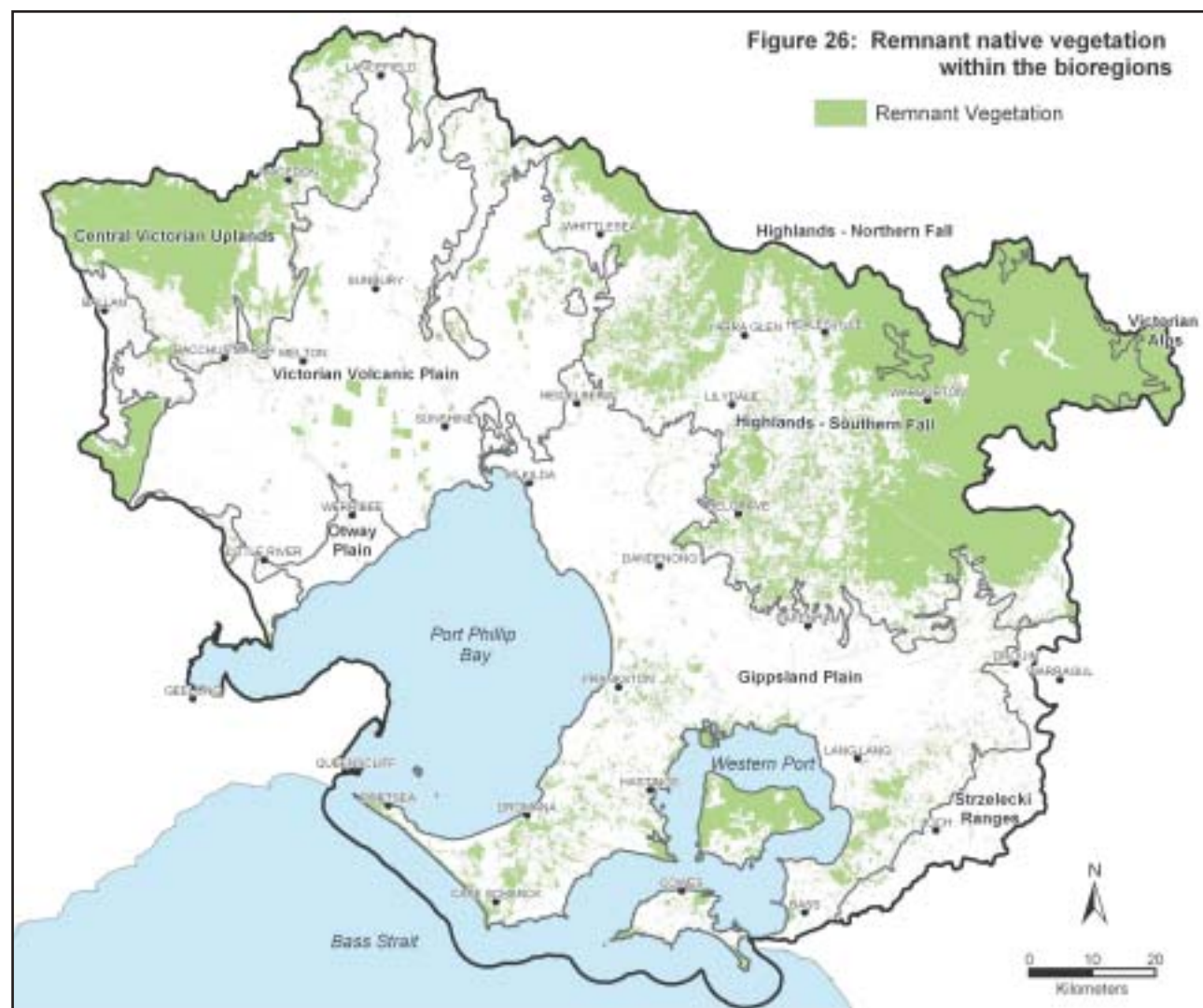


Figure 26: Remnant native vegetation within the bioregions

Native vegetation exists on land with a variety of ownerships and management regimes, and the level of protection of different classes of vegetation varies markedly. Around 40 per cent of the region's native vegetation is located in parks or reserves managed for conservation purposes, another 30 per cent is on other publicly owned land and 30 per cent is on private property<sup>83</sup>. Management agreements or covenants protect some 1,700 hectares or just over one per cent of the remnants on private land<sup>84</sup>.

While the extent and condition of native vegetation has changed markedly over recent centuries, changes have also taken place with individual flora and fauna species. While a number of species that were present 200 years ago are now extinct, the region still contains 1,860 indigenous vascular and non-vascular plant species<sup>85</sup>, 616 indigenous vertebrate fauna species<sup>86</sup> and many invertebrate fauna species. This high number of species makes the region one of the most biodiverse in Victoria.

Of these species, 296 flora species and 128 fauna species are threatened, including some that occur nowhere else in the world such as the helmeted honeyeater, Dandenong freshwater amphipod, Kilsyth South spider-orchid and the Sunshine diuris. Ninety-five of these are listed under the Flora and Fauna Guarantee Act 1988 and 49 are listed for priority attention at a national level under the Environment Protection and Biodiversity Conservation Act 1999.

The region also has important riparian and aquatic environments. Sections of the Yarra and Lerderderg rivers are listed as heritage rivers due to their natural and cultural significance. Major wetlands at Western Port, Port Phillip Bay and Edithvale are internationally recognised with Ramsar status. Similarly, Victorian bays and estuaries contain a diverse range of biotic assemblages depending on their morphological and hydrological characteristics. The marine environment contains its own habitat classes, broadly being seagrass beds, reef systems, seafloor, unvegetated mud and sand, and the water column.

Port Phillip Bay is a marine embayment fringed by seagrass beds, rocky beaches and sandy beaches. The benthic assemblages in the muddy central region are different to those in the sand to the east and west. The turbid water in Western Port allows many deeper water animals to occur in relatively shallow water. Western Port is recognised as one of the world's most valuable areas for international migratory wader birds. Along with resident waders, many species of birds migrate from northern and central Asia to Western Port every year. Eight sites in Port Phillip Bay, Western Port and Bass Strait have been proclaimed as representative marine protected areas due to their environmental importance<sup>87</sup>.

The waters off Australia's southern coast are very special and unique. Over 90% of the plants and animals living here are found nowhere else on earth.

Ecological Vegetation Class	Original extent (Ha)	Remaining extent		Revegetation to reach 10% of original extent (ha)
		(ha)	(%)	
Brackish grassland	850	1	0.1	84
Brackish wetland	330	4	1.2	29
Plains grassy wetland	7,220	98	1.4	624
Valley heathy forest	19,480	529	2.7	1,419
Plains grassland	129,810	4,363	3.4	8,618
Warm temperate rainforest	50	2	3.6	3
Plains sedgy wetland	460	19	4.2	27
Plains grassy woodland	162,910	6,943	4.3	9,348
Swamp scrub	76,470	3,962	5.2	3,684
Grassy woodland	83,960	4,397	5.2	3,999
Creekline grassy woodland	3,690	250	6.8	119
Hills herb-rich woodland	4,980	410	8.2	88
Scoria cone woodland	1,430	133	9.3	10
Reed swamp	70	6	9.4	1
<b>TOTAL</b>	<b>491,710</b>	<b>21,117</b>		<b>28,054</b>

Table 7: Ecological vegetation classes with less than 10 per cent of their original extent.

<sup>83</sup> Draft Port Phillip and Westernport Native Vegetation Plan  
<sup>84</sup> Estimate from Trust For Nature  
<sup>85</sup> Flora Information System  
<sup>86</sup> Atlas of Victorian Wildlife  
<sup>87</sup> Victoria's system of Marine Parks and Marine Sanctuaries: Management Strategy 2003 – 2004

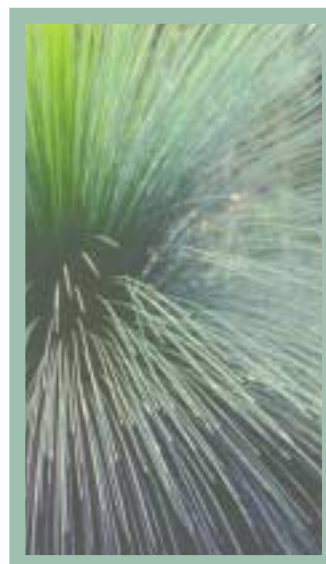
### Introduced biodiversity

Management of the region's biodiversity is made more complex by having Victoria's capital city at its heart with the surrounding rural areas used for diverse urban and agricultural systems on both private and public land.

It is estimated that more than 10,000 non-indigenous flora species<sup>88</sup> and a range of fauna species have been introduced to the region since European settlement, mainly for food production, aesthetic purposes and to provide social and recreation values. Certain areas and industries of the region now value introduced species and modified ecosystems and depend on them for economic or social reasons. For example, many agricultural systems rely on introduced crops and grasses that continue to be modified for greater production. Similarly, many gardens and streetscapes use introduced species to create visual appeal that is highly valued by residents and visitors. Of the introduced plant species, around 1,100 have become naturalised and established viable populations<sup>89</sup>.

Many introduced species have brought significant problems. Around 80 introduced flora species are now listed as noxious weeds<sup>90</sup> with significant impacts on the environment and productive systems. Plants that 'escape' from gardens or agricultural enterprises, for example bridal creeper and alligator weed, infest and degrade native vegetation and waterways, respectively. Similarly, animal species including foxes, rabbits, cats, Indian mynahs and blackbirds have had

substantial impacts on native habitats and species in both urban and rural areas, causing widespread degradation of natural ecosystems, food chains and agricultural systems. Legal and illegal importation of exotic species needs to be effectively managed to ensure minimum impacts on native ecosystems. More than 250 marine species are known to have been introduced to Australia's marine waters, of which 99 are known to have been introduced to Port Phillip Bay. Some of these, such as the Northern Pacific seastar, Japanese kelp and European fan worm, have become pests, posing a threat to habitats, food chains, marine industries and our enjoyment of the marine environment. Prevention, rather than cure, is the best approach when it comes to managing marine pests. Stopping pests being introduced to Australia and then spreading from one location to another is far more effective than trying to deal with them after they have established. Eradication attempts are only feasible under specific circumstances and should therefore not be relied on as the solution for marine pest management.



### Natural and introduced biodiversity in today's urban and rural settings

The changes of the last 200 years have challenged the region's native flora and fauna. The extent of native habitat has decreased significantly, but even in urban areas many remnants of native vegetation still exist, providing important breeding habitats for native birds<sup>91</sup>. The interspersing of native remnants and new patterns of vegetation (native and introduced) provide new mosaics of vegetation and habitat opportunities.

Native species have responded in a variety of ways. Some native species are now extinct in the region and others are threatened. Many, such as the striped legless lizard, are limited to the relatively small and often-fragmented patches of habitat that can still support them, which bring risks from isolation and a limited gene pool. Other species survive only in the larger parks.

On the other hand, populations of some native species have remained constant, have adapted to change or even thrive in particular areas. Many native species now share the variety of urban and rural settings of this region with introduced species. While these modified ecosystems have evolved, and continue to do so, there are situations when active intervention and species management is necessary to achieve or maintain an appropriate balance. For example, some native species can at times be over-abundant and populations may need to be managed so that they are viable and

sustainable. In some urban settings excessive possum and silver gull populations can become pests. Similarly the grey-headed flying fox, a nationally threatened species, has found a niche in urban Melbourne and has, in recent times, been the subject of intense management programs. In rural areas, kangaroo populations can reach unsustainable levels, causing overgrazing on both farms and public land. Koala populations can also become unsustainable in some areas and must be managed.

*Some native species can at times be over-abundant and populations may need to be managed so that they are viable*



<sup>88</sup> Estimate from Department of Primary Industries

<sup>89</sup> A census of vascular plants of Victoria

<sup>90</sup> Declared noxious weeds – Landcare Notes

<sup>91</sup> Bird communities of some urban bushland fragments: Implications for conservation

## 7.2 Policy context for the protection and management of biodiversity

A range of legislation and supporting policies applies to the protection and management of biodiversity and supports integrated catchment management.

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and the Victorian Flora and Fauna Guarantee Act 1988 are the main statutory frameworks for protecting biodiversity including native plants and animals and ecological communities. Threatened species and communities, and threatening processes, can be listed under each Act. Threatened Species and Communities Recovery Plans and Threat Abatement Plans are developed under the Commonwealth Act. Action Statements for listed threatened species, communities and potentially threatening processes are developed under the Victorian Act.

The Wildlife Act 1975 provides for the protection and conservation of wildlife. It aims to prevent species becoming extinct and provides for the sustainable use of and access to wildlife. In addition, it provides for the establishment and management of State wildlife and nature reserves. National and other types of parks are provided for by the National Parks Act 1975.

The Crown Land (Reserves) Act 1978 provides for reservation of Crown land for a variety of public purposes, and the management, leasing and licensing of reserves, primarily for grazing. The Land Act 1958 makes provision for the leasing, occupation and sale of unreserved Crown land.

The Fisheries Act 1995 provides for the management, protection and ecologically sustainable development of the State's fisheries, aquaculture industries and associated aquatic resources and relates to the Commonwealth Fisheries Management Act 1991. The Forests Act 1958 specifies Forest Management Areas for Victoria's forests, and schedules to the Act provide sustainable yield rates for forest production.

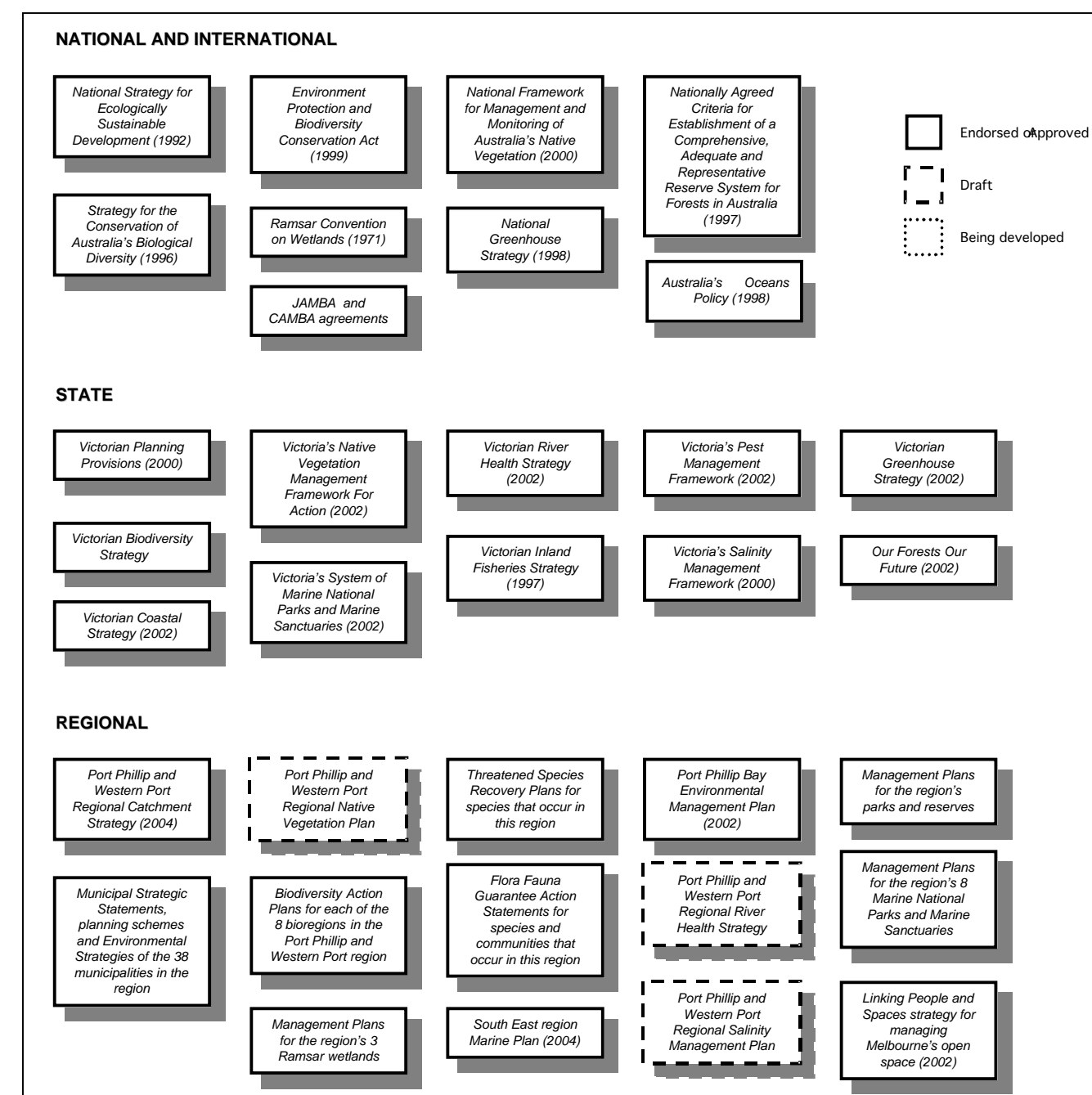
Victoria's strategic plan for the protection and enhancement of native vegetation, Victoria's Native Vegetation - A Framework for Action, establishes a policy to achieve "net gain" in the extent and quality of native vegetation. Sitting underneath the statewide framework and the Regional Catchment Strategies are Regional Native Vegetation Plans.

Operational guidelines are being developed to implement the statewide framework and the regional plans.

While the national and State legislation provides a comprehensive set of rules and standards for the maintenance of biodiversity, there are few requirements for biodiversity protection to be integrated into other catchment activities. In response, this RCS seeks ways to better link biodiversity protection with land and water management. As an example, it seeks to assist local government planning and decision-making to contribute to net gain for native vegetation.

Figure 27 depicts some of the national, State and regional policies, strategies and plans that are relevant to the protection and management of biodiversity in the Port Phillip and Western Port region.

Figure 27: Some of the important policies, strategies and plans relating to the protection and management of biodiversity



## 7.3 Regional goal

Having regard to both the natural biodiversity of the region and the circumstances of today, the long-term goal is to have:

### Healthy and enduring ecosystems with a diversity of habitats and native species

This goal encompasses:

- understanding that ecological health underpins natural asset and resources management
- understanding the relationships between species, communities and ecosystems in this complex and diverse region
- understanding that incremental long-term detrimental changes are occurring
- the need to manage the threats to natural and modified ecosystems to safeguard the remaining native and marine vegetation and wildlife habitats and sustain the ecological health of the catchments, waterways, bays, estuaries and seas
- ensuring that management interventions are based on a good understanding of ecological processes and relationships
- the need for integrated approaches to biodiversity management with multiple social, economic and environmental benefits
- recognition that private land in this region makes an important contribution to the protection and maintenance of biodiversity.



## 7.4 Asset-risk assessment

### 7.4.1 Values of biodiversity

The natural and modified ecosystems and their inter-relationships are the building blocks of many important processes that are crucial to maintaining the environment on which we depend.

Examples of important and valuable processes driven by rich and healthy biodiversity include:

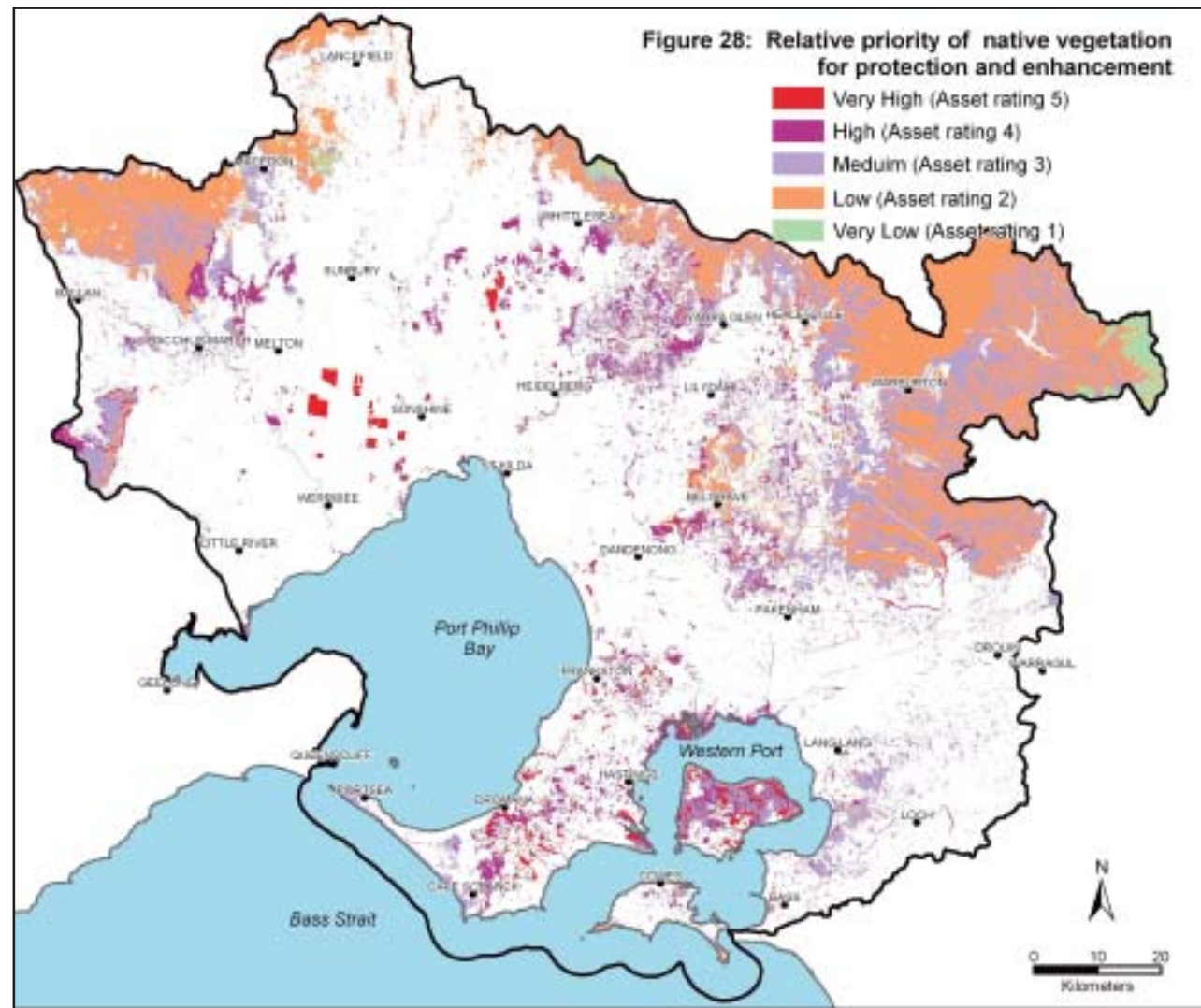
- recycling of nutrients in natural ecosystems, on farms and in gardens undertaken by a myriad of micro-organisms
- absorption and assimilation of urban and rural runoff by the region's waterways and bays
- treatment through natural processes of huge volumes of waste produced by the region's concentrated human population
- maintenance of the complex food chains that support native and beneficial introduced species
- stabilisation of land, protection of water quality and absorption of carbon dioxide by vegetation
- maintenance of stores of genetic material, much of which may yet to be discovered or researched
- production of valuable resources such as timber.

A diversity of ecosystems and species in healthy, viable and sustainable condition is also the important basis for economically important industries such as agriculture and tourism, and provides natural, scenic and serene areas highly valued by urban and rural residents.

The region includes many species and ecosystems whose current populations and range we should protect and increase, such as native species and communities and especially those that are rare and threatened. Other species are managed for consumption, recreation and aesthetics. Still others, including pest animals and weeds, should be decreased.

The extent, health and connectivity of native vegetation is an important indicator of biodiversity. Mapping of ecological vegetation classes has been undertaken across most of the region at 1:25,000 scale and has identified more than 33,000 individual fragments of native vegetation. Proximal fragments of the same ecological vegetation class have been grouped into 550 'vegetation management units' and each unit assessed for its relative value against various criteria including fragmentation, depletion, rarity, abundance and habitat for threatened species. This information is contained in the draft Regional Native Vegetation Plan and a combined assessment of the priority of these units is shown in Figure 28.

*A diversity of ecosystems and species in healthy, viable and sustainable condition is the important basis for economically important industries*



## 7.4.2 Key risks

Key Biodiversity Risks (BR1 – BR4) must be addressed in order to protect and enhance biodiversity, including incremental and cumulative impacts of various day-to-day practices. The key risks to the health and values of the region’s flora, fauna and ecosystems are described below.

### BR1 - Loss and degradation of native vegetation through clearing and urban development

Less than one third of pre-European vegetation remains in the region as a result of land-use change that includes clearing for urban development, agriculture, extractive industries and infrastructure. The reduction in large tracts of linked vegetation and a loss of diversity has resulted in the extinction of some species and threats to others. The opportunity exists to manage further development by retaining and benefiting from the existing remnants. The habitat remaining, particularly the significant amount that exists on the region’s private land, is under significant pressure from human activity including from urban development and rural practices. Vegetation on public land and in parks is threatened by certain intensive recreation activities, in particular along foreshores, rivers and streams.

The following risk assessment methodology has been used to assess the level of risk to the environmental values of native vegetation from clearing, with the results shown in Figure 29.

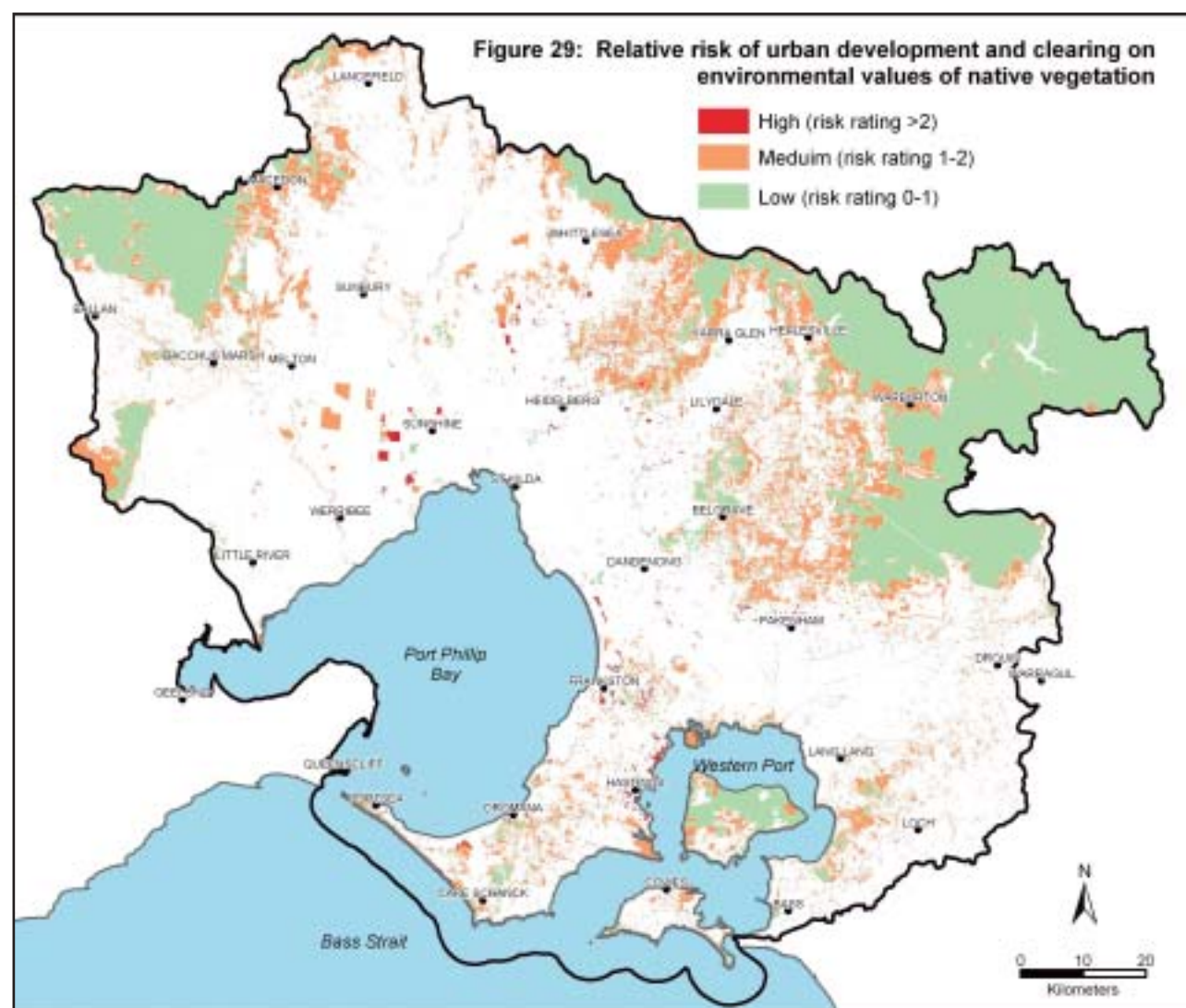
Asset rating	x	Severity of threat	x	Sensitivity	= Risk
5 Very high		0.8 Areas, except parks, within the urban growth boundary		1 All ecological vegetation classes	
4 High		0.4 Areas, except parks, outside the urban growth boundary			
3 Medium					
2 Low					
1 Very low					

For example, a high priority vegetation management unit within the urban growth boundary is at risk of having all of its environmental values lost as a result of major urban development. In such a case, the asset rating of 4 is multiplied by the severity rating of 0.8 and the sensitivity rating of 1, resulting in a relatively high risk score of 3.2.

Figure 29 indicates that urban development and vegetation clearing pose a medium-to-high risk to some areas of native vegetation in all catchments of the region. At particular risk are the remnants in urban growth areas and the many high-value but fragmented remnant patches scattered around the lowland areas.

This is a preliminary risk assessment. The methodology will be substantially refined in the coming years as a better understanding and level of data is accumulated about vegetation quality, clearing practices and the varying sensitivity of ecological vegetation classes to disturbance and clearing.

Associated with the high population and intensity of land use of this region is a high level of various social and recreational activities in valuable environmental areas. The risk to biodiversity from this suite of activities needs to be assessed in the future to assist identification of priority sites and management actions.



**Figure 29: Relative risk of urban development and clearing on environmental values of native vegetation**

■ High (risk rating >2)  
■ Medium (risk rating 1-2)  
■ Low (risk rating 0-1)

### BR2 - Pest plants and animals

Various pest plant species have considerable impact on the biodiversity of the region. A number of established weed species thrive in areas of environmental value. These infestations can begin from garden escapes, poor choice of species planted in rural and adjacent areas, or inappropriate dumping of garden refuse in bush settings. Of particular concern are infestations of bridal creeper in bushland, serrated tussock and Chilean needle grass in grasslands, and salvinia, spartina and alligator weed in waterways and aquatic systems.

A number of introduced animal species are also impacting on native fauna and flora habitat and populations. Terrestrial species of particular concern, both in urban and rural areas, are foxes, rabbits, cats and deer. Aquatic and marine species of concern include the Northern Pacific seastar and a number of foreign fish species including mosquito fish and carp.

There is also a constant threat of new introductions of species that could have substantial impacts at a regional and state level. This is particularly so in this region with its large urban population, major sea ports and airports and important overland transport routes from interstate.

Plant diseases are also a serious concern. For example, *Phytophthora cinnamomi*, known as Cinnamon Fungus, is a serious root disease that can destroy native plants and habitat. It is a microscopic pathogen that lives in the soil and in plant roots. The pathogen can be spread into a new area by the introduction of infested soil and/or infected plants, or movement of water containing zoospores from nearby infested areas. *Phytophthora cinnamomi* already occurs at numerous sites in this region, including at Green's Bush, and there is a threat of continued spread of this and other plant diseases.

### BR3 - Land and water management issues

Risks to the region's biodiversity can arise from the ways we manage land and water. For example, poor soil condition, erosion and land use practices such as ineffective stormwater management, poor dairy effluent control and excessive fertiliser usage can move sediments and nutrients to waterways and affect aquatic ecosystems. Wetland vegetation is also at risk from drainage and developments that lower water tables.

In areas where native vegetation remains, such as parks and Crown land, recreational pressure can degrade native vegetation. When activities such as horse riding, four-wheel driving, motorbike riding, camping and firewood collection are undertaken intensively in an area, vegetation and habitat can be damaged and destroyed. Human activities can also import harmful organisms such as *Phytophthora*.

The management of fire regimes is also a complex matter but is important for native species that are affected by altered frequency and intensity of fire.

### BR4 - Salinity

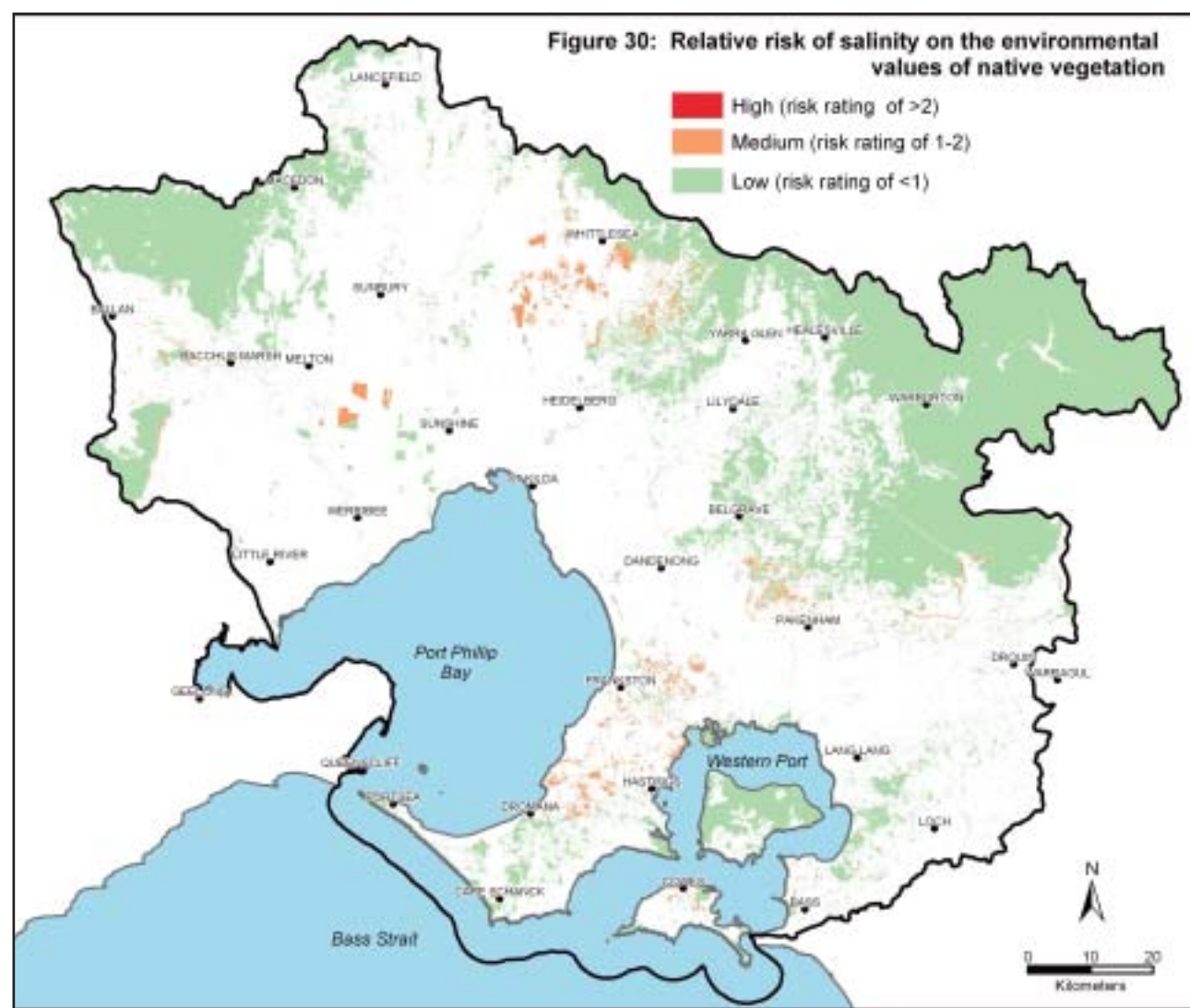
Vegetation dieback is occurring incrementally across the region, affecting important areas of native vegetation and consequently, biodiversity. Some is due to salinity. The identified salinity hotspots are a particular concern as widespread salinisation is a possibility in the future. Localised salinity impacts are also likely on the plains and lowland areas of the region. The following risk assessment methodology has been used to assess the level of risk to the environmental values of native vegetation from salinity, with the results shown in Figure 30.

Asset rating		x	Severity of threat		x	Sensitivity		= Risk
5	Very high		0.8	Salinity hotspots		0.4	All ecological vegetation classes	
4	High		0.1	Other lowland areas				
3	Medium							
2	Low							
1	Very low							

For example, a medium priority vegetation management unit within a salinity hotspot is at risk of having its environmental values degraded by salinity. In such a case, the asset rating of 3 is multiplied by the severity rating of 0.8 and the sensitivity rating of 0.4, resulting in a relatively low risk score of 0.96.

Figure 30 indicates that salinity poses a medium risk to areas of native vegetation in many of the region's identified 'salinity hotspots' including those at Balliang, Rowsley, Rockbank, Whittlesea, Pakenham/Bunyip, the Mornington Peninsula and Phillip Island.

This is a preliminary risk assessment. The methodology will be refined in the coming years, particularly acknowledging that the susceptibility of certain areas to salinity needs a greater level of scientific assessment and that the sensitivity of different ecological vegetation classes to salinity will vary.



### BR5 – Climate change

Many of Victoria's ecosystems have a limited ability to adapt to climate change. Those restricted to small geographic areas or unable to migrate fast enough to keep pace with moving climate zones are particularly vulnerable. The extent of habitat fragmentation and the prevalence and emergence of pests also affect their capacity to adapt.

Preliminary research studying the potential effect of climate change on the distribution of 42 fauna species in south eastern Australia indicated 41 are likely to suffer reduced bioclimatic ranges with 57% predicted to lose between 90% and 100% of their range if a 3 degree Celsius average temperature rise occurs<sup>92</sup>.

The nature and rate of climate change will mean some ecosystems and species are advantaged or unaffected while others suffer negative impacts. The interaction between species in changing climates will also have unpredictable effects on ecosystems.

Other potential climate change impacts which could effect ecosystems include:

- Changes in soil characteristics, water and nutrient cycling, plant productivity, species interaction, ecosystem composition and function. An increase in the frequency and intensity of bushfires and insect outbreaks may exacerbate these changes.
- The rising of sea levels which could heighten wetland vulnerability.
- Changes in water runoff and water flow could increase loads of nutrients, wastes and sediments throughout aquatic systems.

## 7.5 Objectives

These Biodiversity Objectives (BO1 - BO5) are designed to reflect the principles of sustainability and deal with the key risks outlined above.

Objective	Sustainability Principles	Risks
BO1 Achieve a net gain in the quantity and quality of indigenous vegetation	P2,P3, P4	BR1, BR4

Objective BO1 responds to the loss and degradation of native vegetation occurring in urban and rural areas. It promotes the need to retain as much existing vegetation as possible, and to increase quality of locally indigenous species in order to create habitat and replace some elements of vegetation communities lost or reduced in the past. This objective applies to both public land and private land, though it is recognised that its application to the management of private land is particularly important because of the contribution that private land vegetation makes to our regional biodiversity and the inherent threats to some of that vegetation. The objective includes the idea of habitat protection and creation in new subdivisions, on urban open space, rural land, waterways and foreshores. The objective is consistent with the principle of biodiversity protection. Safeguarding the health of our ecosystems is also important in achieving the principles of inter-generational equity and sustainable economic prosperity.

Objective	Sustainability Principles	Risks
BO2 Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments	P1, P2, P3, P4	BR1, BR2, BR3, BR4, BR5

Not only do different species require different habitats, but also the habitat requirements of individual species vary with seasonal demands and life-cycle stages. Objective BO2 addresses the need for a range of habitats that support the principles of natural resource conservation and ecological diversity.

Objective	Sustainability Principles	Risks
BO3 Achieve sustainable populations of indigenous flora and fauna species	P1, P2, P3, P4	BR1, BR3, BR4

Objective BO3 addresses the issues associated with maintaining wild, sustainable populations of the region's indigenous flora and fauna. This objective contributes to the principle of maintaining ecological diversity.

<sup>92</sup> *Adapting to Climate Change: Enhancing Victoria's Capacity*



Objective	Sustainability Principles	Risks
BO4 Improve the connectivity and long-term security of indigenous habitats and species	P1, P2, P3, P4	BR1

Increasing the security of habitats and ensuring that they are connected is an important way of managing some threats and improving the long-term viability of natural biodiversity. Protection of vegetation in parks and reserves and through schemes such as covenants and Land for Wildlife is important, as is building more links between patches of vegetation. Inadequate protection and lack of connectivity threaten the long-term survival of plant communities and animal habitat as well as the long-term availability of some products we use and consume such as water, wood and fish. This objective addresses the principles of social cohesion, future economic prosperity and equity.

Objective	Sustainability Principles	Risks
BO5 Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species	P3, P4, P5, P6	BR3, BR4

Objective BO5 recognises the important benefits for the region of introduced flora and fauna species, particularly from economic and social perspectives. However, it also recognises that modified ecosystems should be managed in ways that ensure they have the least possible impact on indigenous habitats and species. It responds to the principles of ecological diversity, sustainable economic prosperity and community engagement.

## 7.6 Targets

These Biodiversity Targets (BT1 – BT10) are proposed to achieve the objectives and enhance the health of habitats and species in the region:

Targets BT1 to BT4 have been developed in concert with the development of the regional Native Vegetation Plan.

Target	Relevant objectives
BT1 The total extent of indigenous vegetation increased to at least 35% of the region by 2030	BO1, BO2

Target BT1 seeks an overall increase in native vegetation in the region from its existing 32 per cent; an increase of at least 39,000 hectares. To achieve this we will have to support revegetation projects, as well as being stringent in our protection of existing native vegetation.

Target	Relevant objectives
BT2 At least 95% of the region's ecological vegetation classes (EVC) represented to at least 10% of their pre-1750 extent by 2030	BO2

Currently, 14 of the EVCs in the region are represented by 10 per cent or less of their estimated pre-1750 extent. This target ensures that the remnant protection and revegetation effort is directed where possible towards those EVCs that are severely depleted.

Target	Relevant objectives
BT3 A net gain in the quality and extent of native vegetation in the region, with the total "habitat hectares" increased by 10% by 2030	BO1

Target BT3 places emphasis on gaining an overall improvement in the quality of our vegetation as well as increasing the extent of the vegetation. A focus is particularly needed on the enhancement and management of remnant vegetation and associated threats. Habitat hectares is a measurement of both the quality and extent of vegetation and, when further developed and applied extensively, will provide us with data to assess whether we are making gains at a site, local, regional and statewide level.

Target	Relevant objectives
BT4 All ecological vegetation classes in the region to have at least 15% of their current extent protected by 2030	BO2, BO3

This target aims to ensure that there is strong protection in place for a proportion of all of the ecological vegetation classes in the region. Vegetation can be protected by the reserve system, covenants or various long-term management agreements. The 15 per cent is a minimum baseline and should be much higher for heavily depleted ecological vegetation classes. For the vegetation types of which only a small amount remains, the target should be much closer to 100 per cent. More detail on the particular targets for each ecological vegetation class will be provided in the regional Native Vegetation Plan.

Target	Relevant objectives
<b>BT5</b> Reduce the number of threatened flora species to less than 250 by 2030, and reduce the number of threatened fauna species to less than 100 by 2030, with no further regional extinctions	BO2, BO3

Currently, 296 flora species and 128 fauna species in this region are threatened. Target BT5 sets the task of improving on this situation and achieving viable populations of individual flora and fauna species across the region's terrestrial, aquatic and marine environments.

Target	Relevant objectives
<b>BT6</b> Increase the connections between the region's fragments of native vegetation	BO4

Connections, links and proximity of habitat are important for the sustainability of flora and fauna populations. This target highlights this aspect of our revegetation and habitat protection efforts. This connectivity is being lost in many areas, particularly due to the urbanisation and densification of rural townships. We will need a methodology for measurement and this may build on a 'fragmentation index' that has been piloted within the draft Port Phillip and Westernport Native Vegetation Plan.

Target	Relevant objectives
<b>BT7</b> Increase the diversity of native species in modified landscapes and aquatic systems	BO4, BO5

Humans have extensively modified this region's natural environments. Within these modified ecosystems, some species, both indigenous and introduced, have flourished while others have become threatened. Target BT7 encourages the exploration of opportunities for highly modified landscapes, including farmland and urban areas, to contribute to the provision of habitat for native species, particularly those species at high risk. Improving the connectivity of vegetation in these landscapes is a very important consideration. This target also applies to the region's freshwater and marine systems. A methodology for measuring this target needs to be developed, and a benchmark established, to enable it to be better quantified and to set dates towards which to work.

Target	Relevant objectives
<b>BT8</b> Achieve a net gain in the extent and quality of seagrass communities by 2020, and retain the extent of all other broad marine habitat classes in the region at 2004 levels	BO2

The health and diversity of the marine environment depends on the retention of its various habitats. Target BT8 commits the region to managing the threats to marine systems to ensure no further losses whilst achieving a net gain in the region's affected seagrass communities.

Target	Relevant objectives
<b>BT9</b> No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region	BO2

The Victorian freshwater and marine environments support a diversity of temperate fauna and flora species that are largely endemic to southern Australia. Target BT9 commits the region to ensuring that ecologically viable populations of native freshwater, estuarine and marine species survive and flourish in the region. It recognises the importance of the diversity of species in these environments as an indicator of the health of these assets, whilst also recognising natural variation. Annual fish stock surveys will provide important information in assessing progress towards this target, but additional data may be required to better quantify it and monitor progress.

Target	Relevant objectives
<b>BT10</b> Total annual seafood catch, by both commercial and recreational fisheries, to be maintained at ecologically sustainable levels	BO2, BO3, BO5

Commercial and recreational fishing is a significant economic and social value of the marine environment, however their combined impacts on marine ecosystems can be significant if not appropriately managed. Fisheries and associated ecosystems need to be maintained at ecologically sustainable levels, though further work is required to continually refine these levels.

## 7.7 Actions

A suite of Biodiversity Actions (BA1 to BA15) is required to collectively fulfil government requirements and meet the targets. The actions cover various aspects of the management of biodiversity assets, including the need for policy development, strategic planning, research, community education, on-ground works programs, monitoring, evaluation and reporting.

### Native vegetation

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA1	Finalise and implement the regional Native Vegetation Plan including programs to protect, maintain and enhance existing high quality vegetation, increase connectivity and revegetate heavily-depleted native vegetation types	BT1, BT2, BT3, BT4, BT6	Ongoing	CMA, DSE	MW, Parks Victoria, Local government, Environmental organisations, Community groups, Trust For Nature	High

Protection and maintenance of existing native vegetation on both public land and private land is a priority for the region and there are various programs and incentive schemes managed by government and private bodies that contribute to this. These include creation and management of parks, covenant schemes, bush tender and rate rebates.

To guide the management of our regional native vegetation assets for best effect, the draft Native Vegetation Plan identifies the following hierarchy of action:

1. Protection of remnant vegetation
2. Management of existing remnants
3. Enhancement of degraded remnants
4. Enhancement of connectivity and integrity through re-creation of habitat
5. Revegetation for the mitigation of land degradation
6. Re-creation of isolated areas of habitat
7. Revegetation works of a lower order than those outlined above.

Though the protection and enhancement of our remnant vegetation is a priority, many of the region's ecological vegetation classes will benefit from revegetation programs to increase their quality, extent and links. Of particular importance are a number of heavily-depleted ecological vegetation classes, which need to be augmented through major revegetation programs. Revegetation programs will be most effectively undertaken as part of major integrated catchment management projects at a landscape scale. They need to be integrated with efforts to establish corridors of vegetation across the landscape to link fragments of vegetation and enable corridors for wildlife and, potentially, recreational activities. For example, better connections are needed between parks, reserves, coasts, open space, roadside vegetation and waterways. Highlighting contributions to the protection of focal species, such as the swift parrot, Leadbeaters possum, orange bellied parrot, striped legless lizard and the powerful owl should be considered to generate community involvement and potential corporate sponsorship.

Examples of important projects in the region are the Grow West project near Bacchus Marsh in the upper Werribee catchment, Warrandyte to Kinglake wildlife corridor, the biolinks project in the Cardinia catchment and the Dandenong Living Links program that seeks to link natural features in the urban and rural areas throughout the Dandenong Valley.

While contributions to the native vegetation targets will be achieved mainly in rural and semi-rural areas, it should be recognised that native vegetation in urban areas is also very important. Urban native vegetation provides various benefits in education for the region's residents, biodiversity refuges, open space, recreation, health and protection of cultural values.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA2	Strengthen the controls on the clearing of native vegetation and ensure adequate implementation and enforcement	BT1, BT2, BT3, BT4	2006	DSE	Local government	Low

Native biodiversity conservation and management is an integral part of the Victorian Government's policy and is recognised as an essential component of responsible natural resource management. With the release of Victoria's native vegetation framework, there has been an emphasis on strengthening the controls on the clearing of native vegetation and ensuring adequate implementation and enforcement, particularly through the preparation of guides for local government. This work needs to be continued and finalised to achieve strong protection for important native vegetation.

This action is important to protect native vegetation in rural and urban-rural fringe areas, and is also important in moving to higher density development in urban areas including consideration of ways that urban design can minimise impacts on natural biodiversity.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA3	Undertake a program of education, training and support for local government and other organisations to achieve consistency in the understanding and application of operational guidelines for vegetation protection and other mechanisms to achieve net gain	BT1, BT2, BT3, BT4, BT6	2006	DSE	Local government, CMA	Medium

Action BA3 highlights the importance of Victoria's Native Vegetation Framework and recognises the complexity inherent in its implementation, particularly in applying new operational guidelines for vegetation protection and management of offsets when clearing is necessary. It also recognises the need to improve protection through other measures such as planning scheme overlays, rate rebates, land management programs and other incentive schemes.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA4	Undertake further mapping of native vegetation extent at an appropriate scale to assist vegetation protection measures by State government, local government and community groups	BT1, BT2, BT3, BT4, BT6	2007	DSE	Local government, community groups	Medium

The mapping of ecological vegetation classes across the region has provided extensive new data and understanding of the extent of vegetation. This has enabled sound planning to be undertaken at a regional scale for the first time, and provides a basis for future monitoring of trends in clearing, revegetation and connectivity.

The 1:25,000 mapping of native vegetation needs to be completed, and further mapping at a scale that is appropriate for detailed planning, ie. 1:5,000 scale, is desirable. A number of municipalities have been leading the way in undertaking this work as a sound basis for planning scheme overlays and local planning decisions. This action includes the mapping of native grasslands in the region which is a difficult but important task. Continued advances in the mapping are needed and strong coordination is required between State Government agencies and local government to ensure consistency, a complementary approach, and effective use of data in planning schemes to guide day-to-day planning decisions.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA5	Assess and map the habitat hectare values of native vegetation in the region	BT3	2006	DSE	Local government, CMA	Medium

In addition to the mapping and assessment of extent of vegetation, there is a need to assess and map the quality of native vegetation in the region using the habitat hectare methodology or a simplified version. Implementation of this action will require a significant level of training to ensure that the assessment methodology is consistently understood and applied.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA6	Increase the area and quality of heavily depleted vegetation types that are protected in parks/reserves or under covenant programs	BT4, BT6	Targets for vegetation types to be specified in the Native Vegetation	DSE	Parks Victoria, Trust for Nature, CMA, MW, some Local governments	High

The network of parks and public land in the region provides significant areas of protected native vegetation, but the amount needs to be increased in order to protect more of the heavily-depleted ecological vegetation classes. Similarly, programs that enable protection of native vegetation on private land, such as the Trust for Nature and Land for Wildlife programs, should be continued and expanded.

To achieve this action, there will be a need to think, plan and act laterally. It will not be sufficient to reserve or protect high quality remnant vegetation and ecosystems because, for some ecological vegetation classes, there is simply not enough of these areas. It will therefore be important to protect some degraded areas and focus efforts into restoring their quality, and/or to reserve some sites that are suitable for re-establishing locally indigenous vegetation

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA7	Develop and implement mechanisms to offset native vegetation clearance and achieve a net gain in habitat hectares	BT1, BT2, BT3, BT4, BT6	2005	DSE	CMA, Local government	Low

In deciding upon applications to clear native vegetation, the value of the remnant vegetation is assessed. In many instances, clearing will not be permitted in this region due to the depleted state of many of our ecological vegetation classes. However, given the high rate of urban development in the region, there will be some situations where clearing is permitted under certain conditions. The conditions will include the need to offset the clearance by making gains in the extent and quality of similar native vegetation elsewhere. For these situations, there is a need to develop and implement effective mechanisms to offset vegetation clearance so that net gain can be achieved at various scales. This should be undertaken with a view to achieving multiple benefits, for example salinity mitigation, development of vegetation corridors and enhancement of vegetation types that are heavily depleted.

Mechanisms to monitor the offsets are also required. A database should be developed to identify potential offset sites and to list and map offsets already undertaken.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA8	Assess the risks to biodiversity from pest plants and animals, and establish integrated management programs to reduce the impact of environmental weeds and pest animals on native vegetation and fauna.	BT3, BT5	Risk assessment method developed by 2007	DSE	CMA, DPI, Parks Victoria, Local government	High

A robust methodology needs to be developed to assess the risks posed by pest plants and animals on our region's native biodiversity. This must include consideration of the impacts that weeds can have on certain vulnerable and depleted ecological vegetation classes such as grasslands.

At the same time, large-scale, coordinated programs are needed to deal with the impacts of environmental weed, pest animal and plant disease infestations on native flora and fauna on both public and private land. These programs must include a range of early intervention measures to prevent the introduction and establishment of new and emerging weed species. These large-scale programs must also enable cooperation and consistency between Government organisations, councils, the nursery industry and private landholders.

In addition, future reviews of the Regional Weed Action Plan priorities need to specifically consider environmental weeds and alignment is needed with noxious weed lists.

### Threatened species

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA9	Develop and implement Biodiversity Action Plans, Flora and Fauna Guarantee Action Statements and recovery programs for threatened species and communities in the region's terrestrial and aquatic systems	BT5, BT7, BT8, BT9	2009	DSE	Parks Victoria, Local Government	High

Inherent in this action is the application of a rigorous methodology to assess whether species, communities and ecosystems are threatened and then to list and prioritise them.

There is a need for both a landscape-scale approach and an individual species approach for the protection and recovery of threatened species and their habitat. Existing programs that contribute to this include Biodiversity Action Plans that address areas of high biodiversity values, and flora and fauna action statements and recovery plans for individual species and communities. There is a need to expand and accelerate these programs which include on-ground actions and directions for further research.

Priority setting and decision making will benefit from improved data on the location, condition and status of threatened species and communities. Increased focus is therefore required on data collection and data management including its availability to land managers and decision-makers. Cooperation is also required between government and community monitoring programs undertaken by organisations such as the Field Naturalists, Birds Australia, the Bird Observers Club of Australia and Native Fish Australia.

## Fire management

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
BA10 Implement safe and environmentally beneficial fire management regimes in high risk areas	WT3, WT5, WT8, LT3, LT8, BT5	2005	DSE	Parks Victoria, CFA, Local government, EPA	Medium

This action recognises the complexity of fire management due to the occurrence of both risks and benefits associated with fire. Environmentally-beneficial fire regimes are very important for particular ecosystems and flora species. However, wildfire is a risk to ecosystems, water quality, agriculture, soil health, infrastructure, tourism, recreation and public safety, particularly in the large areas of forested uplands. Municipal planning schemes have a key role in ensuring land use is appropriate and considers the risks of fire. Prescribed fire regimes are used to manage fuel loads whilst community education campaigns can be effective in encouraging landholders to be prepared for fire and be able to take responsibility for their own safety.

## Aquatic and marine biodiversity

Past research regarding the ecosystem processes of Port Phillip Bay, Western Port and the open ocean has highlighted key issues associated with maintaining their health. Some of the region's marine and estuarine waters have been the focus of significant research projects, such as the Port Phillip Bay Environmental Study, while other areas have had much less research attention.

There is a need to progressively improve our understanding of these environments and the links with processes that threaten them (such as the relationship between seagrass health and turbidity in Western Port).

A specific action (WA41) to continue investigations regarding marine ecosystems and the links with key threatening processes is included in Section 5.10 – Estuaries, Bays and Seas. Action WA41 reinforces the importance of continuing to improve our understanding of the key risks to the region's marine and estuarine waters, and continuing to improve our adaptive management of these risks in a timely and appropriate manner.

Additional actions (WA43, WA44, WA46, WA47, WA49, WA51, WA52) regarding coordination forums, water quality, nutrient and sediment management, stormwater management, dredging and marine pollution contingency plans are also included in Section 5.10 – Estuaries, Bays and Seas. All of these actions support the protection and enhancement of marine and aquatic biodiversity.

There are also two specific actions (WA42, WA53) regarding monitoring, evaluation and reporting on the health of the estuarine and marine assets in Section 5.10 – Estuaries, Bays and Seas. These actions seek to build on current monitoring and evaluation programs to establish a system to better identify key changes, indicate the health of our estuaries, bays and open seas, enable assessment of trends, gauge the effectiveness of our actions and determine future priorities.

All the actions mentioned above are complemented by the following actions that contribute directly to protecting and enhancing marine and aquatic biodiversity.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
BA11 Develop and implement action plans for the region's eight marine protected areas and other areas with special values	BT8	2008	PV and DSE	EPA, DPI, CCB, MW, CMA, Local government	High

The Government's establishment of Marine National Parks and Marine Sanctuaries provides strong protection for representative and unique elements of the region's marine ecosystems. The development and implementation of action plans associated with the eight sites in this region is now an important action. These plans must include consideration of the threats to the marine protected areas from the adjacent catchments.

In addition to the marine protected areas, nine "special management areas" have been identified in this region with particular values<sup>93</sup>. An example is the seagrass at Clifton Springs in Port Phillip Bay which is an important area for the settlement of larval fish, including King George whiting, and shark but is threatened by declining water quality, introduced pests and physical damage from propeller scour and anchoring. The specific values in these nine areas, such as those at Clifton Springs, need to be protected. Some of the areas already have management regimes in place to do this, but this action aims to address those where adequate arrangements are not yet in place.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
BA12 Develop and implement Fishery Management Plans for the region	BT9, BT10	2009	DPI	EPA, DSE, Fisheries Co-Management Council, Victorian Aquaculture Council	Medium

The development of comprehensive Fishery Management Plans for all of the major fisheries in the region, including the bays and the region's rivers, is an important task. The plans will provide the over-arching policy and strategic planning framework to guide operations to ensure the fisheries are ecologically sustainable.

Allocation of fish stocks between the commercial and recreational sectors will be a key issue to resolve in order for these Fishery Management Plans to be developed and successfully implemented.

Complementing the development of the Fishery Management Plans and contributing to achieving sustainable fish stocks in this region, a number of other important actions are also required including:

- Encouragement for adoption of the voluntary Recreational Fishing Code of Conduct that has been recently developed through the peak body for Victorian recreational fishing VRFish
- Development of Best Practice Environmental Management Guidelines for key aquaculture sectors (guidelines for Salmonids and recirculated aquaculture systems have already been developed and guidelines for coastal abalone farming have been proposed).

<sup>93</sup> Marine, Coastal and Estuarine Investigation, Final Report, Environment Conservation Council, 2000

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA13	Develop and implement programs to prevent the introduction and spread of marine pests in the region	BT7, BT8	Develop and begin to implement by 2008	DSE	Parks Victoria, DPI, EPA, Local government, CCB	Medium

This action recognises exotic species as a key threat to the health and diversity of marine ecosystems, and seeks to minimise the introduction and spread of pest species.

The programs to prevent the introduction and spread of marine pests should include:

- implementation of measures to reduce the risks of marine pests being transported by small boats, as identified in the Boating Action Plan
- adoption of shipping practices to minimise the risks of pests being transported in ballast water and by hull fouling
- the adoption of best practices for the sterilisation of aquaculture farming equipment.

It is acknowledged that these environments and the species involved are inherently difficult to manage, and that initial monitoring will focus on 'response' indicators related to prevention arrangements.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA14	Investigate and record the diversity of native freshwater fish species in the region and the extent and health of the populations, and establish links between this data and planning approval processes	BT5, BT7, BT9	2008	DPI, DSE	EPA, CCB, MW, CMA, Local government	High

A systematic research program is required to develop an improved understanding of native fish species populations, particularly in the freshwater environments of this region, including the extent of their habitat. The outcome of research and monitoring activities needs to be the progressive development of a central databank that brings together and makes accessible information from government agencies and other sources such as Native Fish Australia. Similar databanks already exist for native vegetation, birds and threatened species data. A further step will be to ensure the data can be linked to planning approval processes of local government to directly guide decisions that impact on waterways and biodiversity.

## Urban biodiversity

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
BA15	Develop an inventory of urban biodiversity and undertake , research, community education and involvement campaigns to promote and pilot urban practices that contribute to the health of natural ecosystems	BT1, BT2, BT3, BT6, BT7	2008	CMA	Local Govt, DSE, Parks Victoria, Australian Research Centre for Urban Ecology	Medium

While the protection and enhancement of native biodiversity is critical, it is also important to encourage the intelligent use and management of introduced species, especially in this region that includes metropolitan Melbourne and important agricultural industries. There are existing programs of research into Melbourne's urban ecology, which could be expanded and integrated with catchment management programs for the region.

Community education and involvement campaigns must be developed to increase the understanding and awareness of urban communities and to minimise the impacts of urban practices on the natural biodiversity of the region. These programs could focus on the use of native species in gardens, pet management and weed management.

This action seeks to research and pilot ways for our region's substantial urban population including urban households, schools and businesses to get more in touch with our natural biodiversity and contribute to its protection and enhancement. Examples of innovative ideas might include:

- the involvement of urban residents in on-ground catchment projects in rural, urban and coastal areas
- the establishment of a "Friends of urban wildlife" network across Melbourne with the aim of helping urban families create habitat in their gardens for native fauna including birds butterflies and frogs
- policies and programs to reduce the impacts of pets on native biodiversity, such as for the management of domestic cats
- the availability of native animals as part of school education programs regarding our natural heritage.

This action, and the preliminary ideas that have been outlined, is acknowledged as a first step in a long-term program to better link catchment management with the diverse and populous urban community of this region.

## 7.8 Summary table

The following table summarises the translation of the goal for biodiversity through the steps of objectives and targets to actions.

Goal

Healthy and enduring ecosystems with a diversity of habitats and native species

Objectives

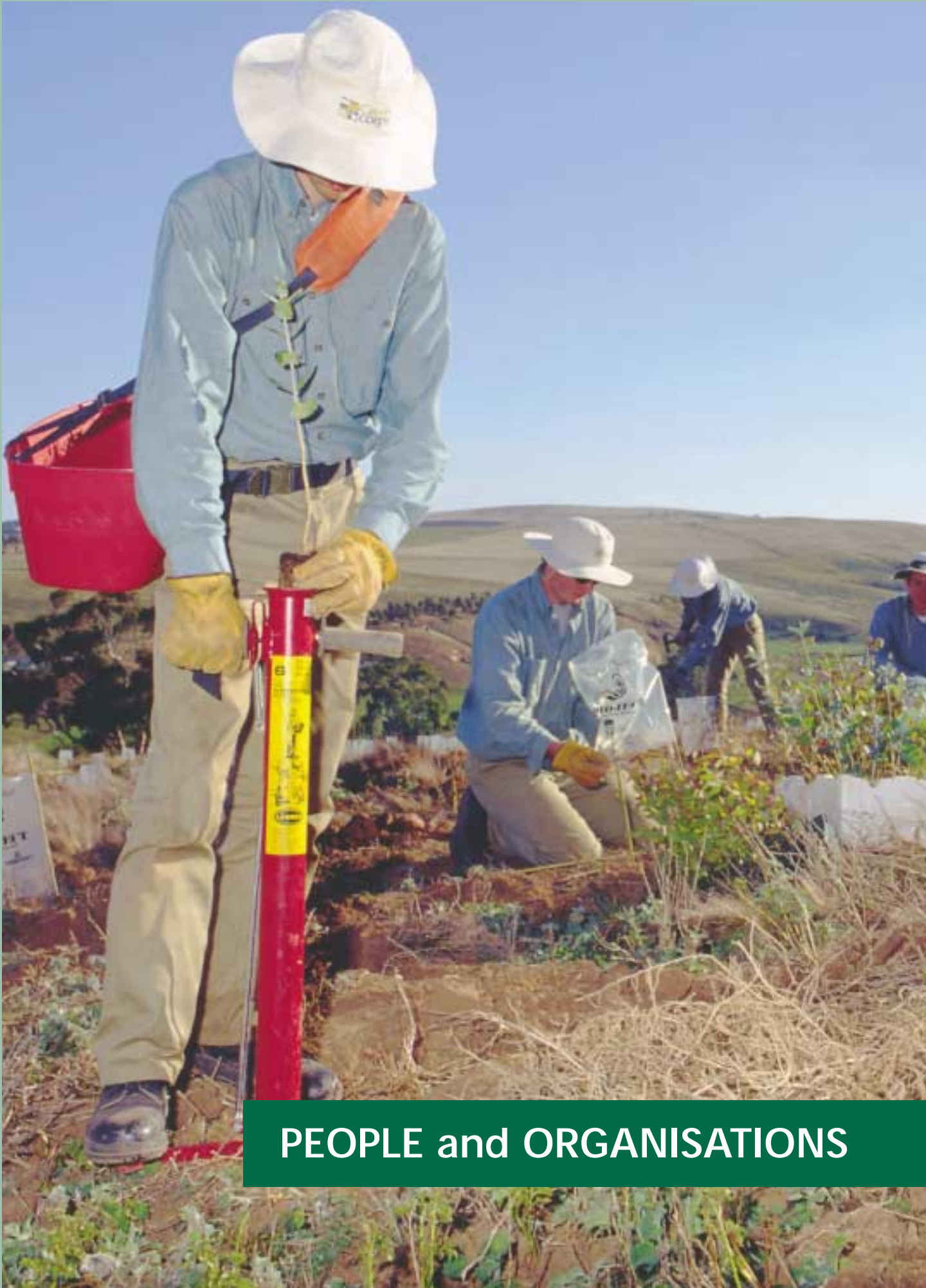
- BO1. Achieve a net gain in the quantity and quality of indigenous vegetation
- BO2. Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments
- BO3. Achieve sustainable populations of indigenous flora and fauna species
- BO4. Improve the connectivity and long-term security of indigenous habitats and species
- BO5. Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species

Targets (pre-existing targets in Bold)

- BT1. The total extent of indigenous vegetation increased to at least 35% of the region by 2030
- BT2. At least 95% of the region's ecological vegetation classes (EVC) represented to at least 10% of their pre-1750 extent by 2030
- BT3. **A net gain in the quality and extent of native vegetation in the region**, with the total "habitat hectares" increased by 10% by 2030
- BT4. All ecological vegetation classes in the region to have at least 15% of their current extent protected by 2030
- BT5. Reduce the number of threatened flora species to less than 250 by 2030 and reduce the number of threatened fauna species to less than 100 by 2030, with no further regional extinctions
- BT6. Increase the connections between the region's fragments of native vegetation
- BT7. Increase the diversity of native species in modified landscapes and aquatic systems
- BT8. Achieve a net gain in the extent and quality of seagrass communities by 2020 and retain the extent of all other broad marine habitat classes in the region at 2004 levels
- BT9. No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region
- BT10. Total annual seafood catch by both commercial and recreational fisheries to be maintained at ecologically sustainable levels

Actions (pre-existing actions in Bold)

- BA1. **Finalise and implement the regional Native Vegetation Plan including programs to protect, maintain or enhance existing high quality vegetation, increase connectivity and revegetate heavily-depleted native vegetation types**
- BA2. **Strengthen the controls on the clearing of native vegetation and ensure adequate implementation and enforcement**
- BA3. Undertake a program of education, training and support for local government and other organisations to achieve consistency in the understanding and application of operational guidelines for vegetation protection and other mechanisms to achieve net gain
- BA4. **Undertake further mapping of native vegetation extent at an appropriate scale to assist vegetation protection measures by State government, local government and community groups**
- BA5. Assess and map the habitat hectare values of native vegetation in the region
- BA7. Develop and implement mechanisms to offset native vegetation clearance and achieve a net gain in habitat hectares
- BA9. **Develop and implement Biodiversity Action Plans, Flora and Fauna Guarantee Action Statements and recovery programs for threatened species and communities in the region's terrestrial and aquatic systems**
- BA11. **Develop and implement Action Plans for the region's 8 Marine Protected Areas and other areas with special values**
- BA14. Investigate and record the diversity of native freshwater fish species in the region and the extent and health of the populations, and establish links between this data and planning approval processes
- BA6. **Increase the area and quality of heavily depleted vegetation types that are protected in parks/reserves or under covenant programs**
- BA8. Assess the risks to biodiversity from pest plants and animals, and establish integrated management programs to reduce the impact of environmental weeds and pest animals on native vegetation and fauna
- BA12. **Develop and implement Fishery Management Plans for the region**
- BA10. Implement safe and environmentally-beneficial fire management regimes in high risk areas
- BA13. Develop and implement programs to prevent the introduction and spread of marine pests in the region
- BA15. Develop an inventory of urban biodiversity and undertake research, community education and involvement campaigns to promote and pilot urban practices that contribute to the health of natural ecosystems



## PEOPLE and ORGANISATIONS



## 8. PEOPLE and Organisations

### 8.1 Overview

#### Role and importance

As individuals, and collectively through a variety of organisations, the people of the Port Phillip and Western Port region provide an immense pool of knowledge, skills, services and funds that can be applied to sustainable catchment management.

Therefore, one of the region's most important catchment assets is its community – all its people and organisations – and their current and potential capacity to successfully address catchment management issues.

The goals, objectives, targets and actions proposed in this RCS will only be achieved with community action by these people and organisations. Every individual has opportunities to behave in ways that minimise his or her impact on our catchment assets. The ways in which each of us use energy and water, manage our litter and waste and travel to work all contribute to the size of our individual and collective ecological footprint.

As well as acting individually, the people of our regional community also come together in all sorts of forums and groups that can directly or indirectly affect the health and sustainability of our catchment assets. These organisations are many and varied in terms of purpose, size, structure and formality. They provide everyone with opportunities to act responsibly, to influence others, to develop new skills, knowledge and employment, and to provide leadership in improving our catchments, coasts and seas.

Catchment management organisations in this region include Landcare and other environmental community groups, Indigenous communities, local governments, private enterprise and Victorian and Australian government agencies and authorities.

Figure 31 depicts some of the national, State and regional policies, strategies and plans that are important in guiding and supporting the involvement of people and organisations in integrated catchment management.

#### Statistics

The Port Phillip and Western Port region is the most populous of Victoria's ten regions. Its population of around 3.4 million is diverse in terms of economic status, age structure, education, religion and ethnic background.

Almost half (48 per cent) of Victoria's 25,000 Indigenous people live in the region<sup>94</sup>, with a number representing the traditional owners whose cultural connections to this land go back 40,000 years<sup>95</sup>.

*One of the region's most important catchment assets is its community – all its people and organisations*



<sup>94</sup> Strategy for Aboriginal Managed Lands in Victoria.

<sup>95</sup> The lost land of the Kulin Nation.

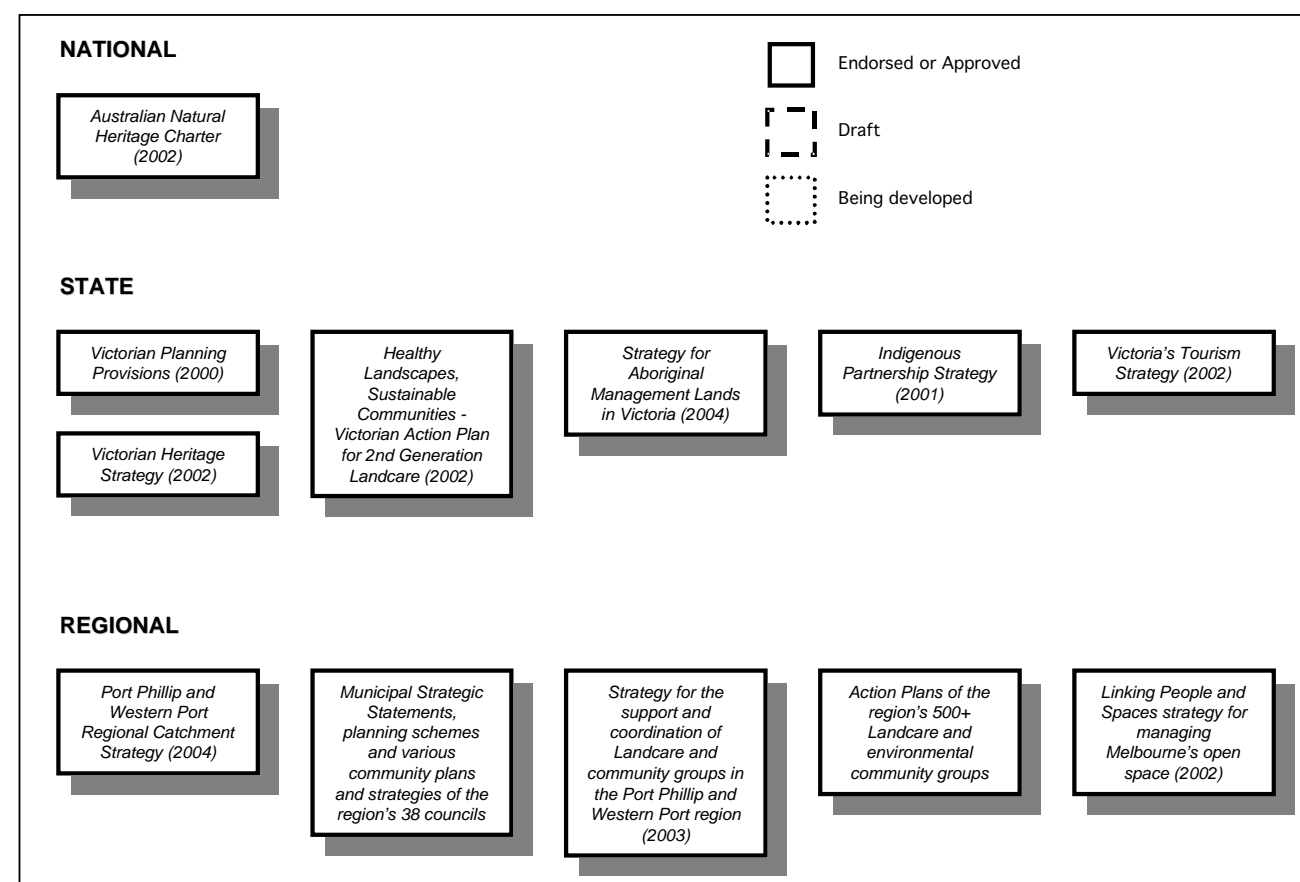
More than 28 per cent of our residents were born overseas, including many from the United Kingdom, Italy, Vietnam, Greece, New Zealand and China<sup>96</sup>. Around 26 per cent of residents speak languages in addition to English at home.

The population structure varies across the region and changes with time. Melbourne 2030 suggests that the population will grow by around one million in the next 30 years though the average household is expected to contain fewer people and the population's average age will continue to increase. Despite changing requirements, however, the continued effect of people living in the region on the use and management of catchment assets is inevitable and essential, as is their involvement with these assets.

*The population will grow by around one million in the next 30 years though the average household is expected to contain fewer people*

Current estimates indicate that people living and working in the Port Phillip and Western Port region, and visiting it, use relatively large quantities of natural resources every day. This is illustrated by the size of the theoretical "ecological footprint" of each resident – an average of 4.7 hectares – which is considered high by world standards<sup>97</sup>. The impact of this high level of consumption is felt far beyond the region (it is equivalent to 16 million hectares or 12 times larger than the land mass of the region).

Figure 31: Some of the important policies, strategies and plans relating to the participation of the region's people and organisations in integrated catchment management



## 8.2 Regional goal

Within the region, it is vital to ensure a strong relationship between the community and sustainable catchment management. Our long-term goal is to have:

**The community valuing, understanding and celebrating the region's catchment assets and acting to achieve sustainability.**

This goal encompasses:

- a community that understands and embraces the concept of stewardship – that is, our catchment assets are in our care only temporarily and should be passed on to future generations in as good or better condition than they have been received
- an understanding of the region's Indigenous and European cultural heritage, an agreed vision for the future and a shared commitment to doing what is required to achieve that vision
- a community that has the willingness and capacity to achieve the necessary changes in behaviour that will lead to sustainable use of our catchment assets
- a community that is engaged and empowered in local and regional decision-making processes on catchment management
- a community where all sectors clearly understand, accept and act on their respective roles and responsibilities for catchment management
- relationships between individuals, community groups, businesses and government that are well-managed, coordinated and equitable where issues of catchment management are addressed
- a community that has ready access to funding for sustainable catchment management, and to information about it.

Appropriate actions will be required to achieve this regional goal. Generally, people and organisations can only take such actions if they have the resources and capacity to do so.

In this context, capacity includes the awareness, knowledge, skills, motivation, commitment and confidence of individuals and organisations to mobilise, harness and direct the available community resources. It can be built through the establishment of partnerships and networks that facilitate the sharing of resources, experiences and expertise to build upon existing capabilities within an operating framework of trust, inclusiveness and mutual benefit.

<sup>96</sup> Census of population and housing

<sup>97</sup> 1998-99 Ecological Footprint of the population within the Port Phillip and Western Port region

## 8.3 Asset-risk assessment

### 8.3.1. Values

The resources and capacity, existing and potential, inherent in our community of the Port Phillip and Western Port region make up a major asset. There are many opportunities to turn the potential into reality. Beyond landholders and households, stakeholders in catchment management in the region include Landcare and other community environmental groups, Indigenous communities, local governments, business and industry, and government agencies and authorities at State and Federal level.

This section examines in more detail the values inherent in the community in terms of its key people and organisations.

#### Landholders and householders

As indicated, the population of the region includes a wide range of people with differing attitudes and understanding of catchment health. Many of the people who have come to live here from other parts of the world have established their own cultural connections with the land, and share land stewardship responsibilities.

The urban population is around 3.4 million, who live on some 215,000 hectares, or 17 per cent of the region. The rural and forested area of the region comprises around 83 per cent. This area supports some 4,500 agricultural properties and a major network of parks and forests. Numerous rural lifestyle properties are distributed through the urban-rural fringe and the green wedges.

Because everyone in the region has an influence on the health of the catchment through their household, recreation, travel, business or land management practices, each person is able to contribute to a healthier catchment through his or her decisions and actions.



#### Community groups

In the region there are an estimated 500 volunteer-based community groups undertaking activities aimed at improving catchment management. Some 18,000 people are involved in these groups.

The groups include:

- Landcare groups – generally with a focus on privately-owned rural land
- Coast Action/Coastcare groups – with a focus on coastal natural assets
- ‘Friends’ groups – generally with a focus on publicly-owned urban land such as a park or stretch of waterway
- Traditional owners and their Indigenous community networks;
- groups associated with the ‘adopt a highway’ program run by VicRoads.
- Melbourne Waterwatch groups – with a focus on monitoring and addressing water quality issues
- committees of management and advisory committees for local reserves or waterways
- community-run native plant nurseries
- branches of organisations like the Bird Observers Club of Australia, Field Naturalists Club of Victoria and the Australian Plant Society,
- groups with a marine focus – with an interest in the recently established marine reserves and the ‘Victorian Reefwatch’ program.

Community groups are valuable. They provide networking opportunities for individuals to share experiences and knowledge, and to access, develop and practice sustainable catchment management skills and techniques, thus leading to increased confidence, motivation and commitment.

*Everyone in the region has an influence on the health of the catchment*

They also act as innovators and drivers of change in local communities by raising awareness of catchment management issues, establishing new standards, and providing an important community resource of knowledge and expertise. Importantly, groups also deliver a significant amount of on-ground works to address local and regional issues. Thus, effective community groups play a key role in implementing practical solutions to local problems and developing an ethic of stewardship for catchment assets in their local communities.

Farmers who are landcare group members are, on average, 50 per cent more likely to adopt a sustainable agricultural practice than other farmers<sup>98</sup>. This suggests that, in general, people who belong to community groups have a greater capacity to undertake sustainable catchment management practices than those who do not.

Many community groups in the region are members of one or more networks that play an important role in maintaining and building the capacity and effectiveness of such groups. Active networks include:

- statewide and nationwide networks such as the Victorian Farmers Federation, Victorian Friends Network and Australian Forest Growers
- local Landcare group networks such as the Bunyip and Bass and South Gippsland Landcare Network
- municipality-based networks such as the Moorabool Landcare Advisory Committee and Nillumbik Landcare Network
- multi-stakeholder management committees such as the Merri Creek Management Committee
- themed networks such as the Threatened Species Network and the Western Port Seagrass Partnership
- multi-partner, community-based organisations such as the Mornington Peninsula and Western Port Biosphere Reserve Foundation
- Landcare and industry / business partnerships (eg. GMH).

Groups in the region are supported by people and organisations that help with capacity building, technical advice, training and access to resources.

Commonwealth, state and regional authorities recognise the importance of effective community groups in achieving sustainable catchment management. Key documents include the Victorian Government’s Action Plan for Second Generation Landcare: Healthy Landscapes Sustainable Communities, and the Port Phillip and Westernport CMA’s Strategy for Support and Coordination of Landcare and Community Groups in the Port Phillip and Western Port Region.

Mechanisms for assisting groups include investment in group support positions as well as monetary grants to groups through Commonwealth initiatives such as Envirofund and the National Landcare Program, state initiatives such as the Second Generation Landcare Program and regional initiatives such as the CMA-devolved grants and Melbourne Water’s Stream Frontage Management program.

Most of the region’s 38 local governments provide support to groups through an Environment Officer position (or similar), and many also offer community grants within their municipality, including some directed towards catchment management. Some group networks have secured funding to directly employ one or more people. As well, some groups utilise support positions at catchment and regional levels to provide strategic development and coordination, capacity building and/or technical advice services. These include Landcare, Bushcare, Coast Action/Coastcare, Farm Forestry, Fishcare and advisory officers employed through DPI and DSE and Melbourne Water.

Non-government organisations also provide services that directly support or complement the voluntary efforts of groups and individuals. These include Greening Australia Victoria, Environment Victoria, Victorian Farmers Federation, Victorian National Parks Association, Conservation Volunteers Australia, Trust for Nature, Australian Conservation Foundation and Our Community Pty Ltd.

This existing support structure plays an essential role in maintaining and developing the effectiveness and capacity of community groups – a capacity that has been built over many years with considerable investment of time and money from volunteers, non-government organisations and all tiers of government. Although the value of this structure is difficult to measure, it is considered to be substantial and very important in helping groups to fulfil their potential.

*Effective community groups play a key role in implementing practical solutions to local problems*

<sup>98</sup> Landcare Farming: Securing the future for Australian Agriculture

<sup>99</sup> Strategy for the Support and Coordination of Landcare and Community Groups in the Port Phillip and Western Port Region

## Indigenous communities

The Port Phillip and Western Port region is the country of the Wurundjeri, Boonerwung, Wathaurong and Taungorong language groups. These groups are part of the Kulin Nation and have strong cultural connections with this land. Aboriginal culture holds an inherent ethic of land stewardship incorporating a belief system that places Traditional Owners as both custodians of and belonging to the land.

The Indigenous communities of the region are its Traditional Owners - the Kulin people and the people of other Indigenous nations who were displaced from their own country to this region's missions in the 19th Century or who arrived more recently for economic and family reasons. Although relatively small in population and in the area of land they own and manage, Indigenous people bring a unique perspective and an unprecedented history of land stewardship to our approach to catchment management. There are legal as well as ethical imperatives attached to protecting the heritage of the region's Indigenous people and the Indigenous communities of the region are best placed to advise on land and waterway management practices to retain these values.

More than 4,000 sites and places of cultural heritage significance in the region are registered with Aboriginal Affairs Victoria. These sites, and others that are not yet registered, are valuable to the community as a record of the region's heritage. Whether registered or not, all sites, objects, places and folklore of aboriginal cultural significance are afforded legal protection under relevant Victorian and/or Commonwealth legislation. For example, the provisions of the Aboriginal and Torres Strait Islander Heritage Protection Act [1984] need to be taken into account in much of the decision making and action that can affect land, water and biodiversity by all land managers, organisations and tiers of government.

In addition, eight properties in the region, covering around 200 hectares, are owned and managed by Indigenous communities. The Strategy for Aboriginal Managed Land in Victoria outlines issues involved in managing such properties and makes recommendations on catchment management policies and programs as they relate to Indigenous people. The development of this strategy is an example of the opportunities for collaborative and effective relationships between Indigenous and non-Indigenous people to achieve mutually beneficial catchment management.

## Local government

The Port Phillip and Western Port region includes all or part of 38 local government areas. This is almost half the local governments in Victoria. Twenty three of these local

government areas are predominantly urban and 15 are predominantly rural or urban-rural fringe.

Each local government already provides a wide variety of catchment management services to its local communities. These include local land-use planning, determination of permits for vegetation clearance, stormwater management planning and works, management of some publicly owned land such as bushland reserves, wetlands, coastlines, creeks and associated riparian areas, waste management services, local law establishment and enforcement, rate rebate schemes and other incentives for good land management, community education, community grants and support for volunteer groups.

Because local governments have well-established connections with their communities, they are positioned well for raising awareness, providing advice and coordinating the activities of their local communities, and for investigating and mapping local issues and planning responses.

Sometimes local governments collaborate to address catchment management issues beyond their individual boundaries, through associations such as the Association of Bayside Municipalities, Interface Councils group and the Middle Yarra Land Management Group. There are also many examples of contributions to cross-municipal organisations or

*Local governments have well-established connections with their communities*

programs such as the Merri Creek Management Committee, the Urban-Rural Links program, the Melbourne Waterwatch facilitators and less formal project-based partnerships. Local governments also form statewide networks through organisations such as the Municipal Association of Victoria, Victorian Local Governance Association, Australian Local Government Association and Environs Australia.

## Business and industry

Around 180,000 businesses operate in the region, employing more than two million people<sup>100</sup>. Some directly provide catchment management services and products. Others contribute funds, materials or services to catchment management activities, through activities like sponsorships. All use and rely on our catchment assets in some way.

Many are represented and supported by peak bodies, industry groups and industry-based programs. These are important for leading innovation and change across industries that can promote good catchment management. Agricultural industry groups have important roles in leading sustainable rural land use.

Organisations such as Landcare Australia Limited, Conservation Volunteers Australia and Greening Australia play an important role in securing and directing private sector investment towards catchment management activities.

Increasingly, the private sector is realising the benefits of operating in a more sustainable manner, and businesses and industries are adopting tools such as quality assurance systems and triple bottom line reporting to assist with this. Some enterprises are also taking a leadership role in the way they contribute to the community, and are active participants in catchment management initiatives and activities.

There are a growing number of examples in this region of businesses making contributions to catchment management projects. Major projects are proving to be attractive when they can deliver multiple outcomes, local benefits relevant to the investor, promotional opportunities, commercial returns, educational value and/or opportunities for staff involvement. Existing examples of projects that are securing corporate sponsorship include the Grow West project near Bacchus Marsh and the Hills to Ocean project in the South Gippsland Landcare Network area. In the future, further corporate partnerships with significant catchment and community benefits may arise through opportunities for carbon trading and large-scale plantation establishment.

## Government agencies and authorities

Government agencies and authorities working directly in catchment management in the region include:

- Port Phillip and Westernport Catchment Management Authority
- Department of Primary Industries
- Department of Sustainability and Environment
- Melbourne Water
- Environment Protection Authority
- Parks Victoria
- Central Coastal Board
- Southern Rural Water

- Retail water authorities (including South East Water, Yarra Valley Water, City West Water, Westernport Water, South Gippsland Water and Western Water)
- VicRoads
- Committees of Management of Foreshores and Coastal Reserves

Individually, these organisations focus on their core business – water supply, coastal management, forests management and so on. However, collectively they contribute to catchment management in the region through providing strategic planning and coordination, policy and legislation, revenue, technical expertise, direct management of catchment assets, research and new knowledge, training, incentives and community awareness-raising.

While all these organisations play a role in the Port Phillip and Western Port region, few have boundaries that are entirely consistent with those of the region. In some cases, these organisations must work across several of Victoria's catchment management regions whilst others only operate in part of the region.

*Increasingly, the private sector is realising the benefits of operating in a more sustainable manner*

<sup>100</sup> Regional Statistics Victoria 2002



### 8.3.2 Key risks

Five key People Risks (PR1 – PR5) will affect whether people and organisations of the region operate effectively to achieve sustainable catchment management.

#### PR1 - Insufficient resources

Substantial inputs of financial, physical and human resources will be needed for the task. A key risk is that these will not be available. Each year the State and Federal governments, local government and landholders invest substantial resources, but even combined these are not enough to fully achieve all of the goals of this RCS. Opportunities exist to increase the level of resourcing from within these sectors, and also to significantly add to it from new sources of funding, particularly from the extensive corporate sector of metropolitan Melbourne.

Sufficient resources need to be directed to important on-ground management actions and to building and maintaining the capacity of key stakeholders. For any stakeholder group, particularly local government and volunteer community groups, a consistent and adequate level of resourcing contributes to maintaining the enthusiasm and commitment to their local tasks that contribute to regional outcomes.

#### PR2 - Inadequate community engagement

The regional community is made up of all its people and organisations, each of which has particular skills and interests. Successful catchment management programs will need to involve relevant sectors of the community in priority setting, decision-making on investment, project planning and implementation, monitoring and evaluation.

A key risk is that there will not be adequate engagement of the community to achieve the goals of the RCS. Ownership and understanding by stakeholders is essential to achieve a high level of participation in catchment management, better quality outcomes, outcomes that last, and increased capacity in the community. Without such ownership, there is a risk of missing important local knowledge, having poor coordination, lack of commitment and low adoption rates.

#### PR3 - Inadequate knowledge and skills

For effective catchment management, people and organisations need to be able to recognise and prioritise catchment management issues, know what can be done about them, and be able to do it.

We must develop and maintain systems and processes that add to and pass on the vast amount of knowledge about catchment management within the region, across regional, state and national boundaries and across generations. Similarly, adequate skills and experience are critical to ensure

that the necessary actions can be undertaken effectively to achieve the goals of the RCS.

#### PR4 - Ineffective support and coordination

Coordinated, integrated effort is critical to achieving efficient use of resources and maximum benefits for catchment assets. This involves agreement on the vision for the regional approach to catchment management, clear understanding of the respective roles and responsibilities of stakeholders, clear communication between stakeholders and partnerships for matters of common interest.

This is a major undertaking in a region with such a large number and variety of stakeholders. The key risk is that poor coordination will result in the inefficient use of resources and lost opportunities for attracting investment. The ability to plan and implement programs for the long term, including long term commitment of resources, is also crucial to maintaining effective coordination.



## PR5 – Unsustainable consumption patterns (a high ecological footprint)

One recent approach to measuring the effect of human activity on the environment is the ecological footprint. The ecological footprint is the theoretical amount of land required to produce resources and process waste to sustain a given person, community or activity<sup>101</sup>. The lower the value of the footprint, the lower the theoretical impact being made on the world's natural resources. Many resources that we use locally are imported from other regions or countries, so the effects of our footprint are felt beyond the immediate boundaries of our region.

Average ecological footprint	
USA	9.7 ha
Australia	7.4 ha
Our region	4.7 ha
Worldwide	2.3 ha
Asia	2.1 ha
Africa	1.4 ha

Australians have an average footprint of 7.4 hectares per person, which is the eighth highest average in the world and reflects a relatively high average consumption of materials and energy<sup>102</sup>. The

average worldwide footprint per person is 2.3 hectares. These figures indicate that the global population is using resources at 1.2 times the rate the planet is able to regenerate these resources. If the rest of the world were to consume resources at the Australian rate, this would increase to 4.1 times.

Recently, a footprint was calculated specifically for the Port Phillip and Western Port region<sup>103</sup>. The study was based on Australian Bureau of Statistics consumption data, calculating the footprint for statistical sub-districts (SSD) in the region and a total for the region. A notable feature was that the region's footprint is 2.7 hectares per person lower than the Australian average.

The footprint varied by three hectares per person from the lowest to highest SSD. The two main factors accounting for these footprint differences were expenditure (the more expenditure, the greater the footprint) and household size (the more household occupants, the less the average footprint per person).

Overall the key drivers of the size of our footprint are:

- consumption patterns
- the different levels of environmental disturbance caused by individual human uses and activities
- productivity gained from the land used
- greenhouse gas emissions.

While the RCS does not specifically address consumption patterns, it is an opportunity to consider what and how much we consume and the implications for the sustainability of our catchment assets. The RCS therefore explicitly examines issues associated with land use and how we might gain multiple benefits from our land with thoughtful farm planning and urban design. Land use productivity is also considered. A sustainable increase in productivity not only provides long-term economic benefits for this region, but may also decrease environmental pressures in this region or from where we import. Farm forestry is an example and actions for reducing greenhouse gas emissions should also be considered.

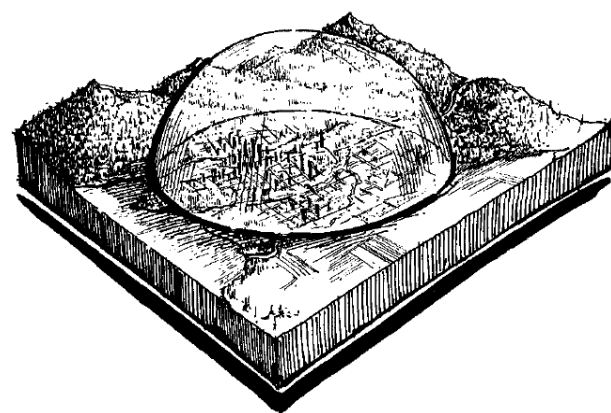


Figure 32: The concept of an ecological footprint explores how much land would be needed to theoretically sustain a regional community<sup>101</sup>

## 8.4 Objectives

The following People Objectives (PO1 – PO3) are designed to reflect sustainability principles and to deal with the key risks that have been identified.

Objective	Sustainability Principles	Risks
PO1 Enhance regional planning, coordination, resource allocation, monitoring and reporting	P7	PR1, PR2, PR4

Objective PO1 addresses the sustainability principle of strengthening community understanding, participation and partnerships. It recognises that as well as providing 'on-ground' resources, significant effort is needed to implement a strategically sound, well-coordinated and well-directed catchment management program. The process is made more challenging by the number and diversity of stakeholders and the range of issues in the region.

The allocation of funding to support planning, coordination, monitoring and reporting is a fundamental component of programs that address catchment management issues. A better-directed allocation and sharing of resources will lead to better results and less duplication.

The diverse array of stakeholders will need to operate in genuine and equitable partnerships with each other. Collaboration between stakeholders on matters of common interest invariably achieves more effective outcomes. The Catchment Management Authority has utilised various mechanisms for engaging the community across the region by bringing people together on a regular basis with a view to improving coordination and cooperation. Such forums can be very effective so it is important to continually assess these and other ways of improving communication and coordination.

Objective	Sustainability Principles	Risks
PO2 Increase the capacity and participation of people and organisations in catchment management	P7	PR2, PR3, PR4

Part of the overall capacity building approach, this objective recognises that without involvement from people and the commitment of individuals and organisations to agreed changes, there can be little improvement in the condition of our catchments. It addresses the sustainability principle of strengthening community understanding, participation and partnerships.

This objective also recognises that our management of the region's land, water and biodiversity may produce inadequate outcomes and trivial change if it does not seek and act on the advice and knowledge of many people and interest groups. For example, the involvement of the region's Indigenous people, especially Traditional Owners, in project design, decision-making and action has been inadequate. Mutual policy and community commitments to fill this gap will better protect heritage sites, help rebuild Indigenous culture in the region and promote its values in society and provide Indigenous people with skills, community development, education and employment opportunities.

To achieve this objective, we need to understand and respond to the barriers that stop people and organisations from participating fully in catchment management. We will also need to understand the gaps in capacity. Methods will have to be established to keep the focus on catchment management issues and the provision of readily accessible training, education and support to carry out the work needed. A quantum increase will be required in the resources available to catchment management priorities. We must reach out to engage and involve many more people and organisations, so that the work is not left to the willing few.

<sup>101</sup> Our ecological footprint

<sup>102</sup> 2002 Living Planet

<sup>103</sup> 1998-1999 Ecological Footprint of population within Port Phillip and Western Port region

Objective	Sustainability Principles	Risks
PO3 Reduce the overall impact of the regional community on catchment assets	P2, P3, P4, P5	PR5

Objective PO3 directly addresses the sustainability principles of conserving natural resources, and ensuring equity between and among generations. It recognises that everyone has a role to play in contributing to the environmental wellbeing of the region, no matter how small that contribution might be.

Community attitudes are changing and developing as we increase our knowledge about the condition of the catchment's waterways, land and biodiversity. New household, business, recreational and land management practices, such as recycling of waste products, need to be adopted by large numbers of people. Other practices, such as excessive watering of gardens, need to be stopped because of the costs to this and succeeding generations.

*Community attitudes are changing and developing as we increase our knowledge about the condition of the catchment's waterways, land and biodiversity.*

Our large population is a significant user of catchment assets both from within the region and outside it. We need to be able to monitor our overall progress towards sustainability, and evaluate the success or otherwise of our actions.

## 8.5 Targets

These inter-related People Targets (PT1 – PT7) are proposed in order to attain the objectives.

Target	Relevant objectives
PT1 All key catchment management stakeholders participating in and agreeing on a 'regional investment planning' process to implement the RCS by 2005	PO1, PO2

Target	Relevant objectives
PT2 All Victorian government agencies with key roles in catchment management to be directly implementing the RCS through their annual works programs by 2006	PO1

A process is evolving in Victoria to develop regional investment plans, with forward planning for a number of years, in order to implement actions proposed in the Regional Catchment Strategies. However, this process is not yet inclusive enough. It needs to be expanded to improve coordination between community stakeholders, state government agencies and local government and use investment planning methods that increase everyone's ownership of the RCS and commitment to its implementation.

Target	Relevant objectives
PT3 At least half the region's 38 councils to have formally adopted the RCS as a reference document by 2008, reflecting relevant sections of it appropriately in their planning schemes and/or implementing relevant actions through their annual programs	PO1, PO2

Local government is one of the major investors in and practitioners of catchment management actions in the Port Phillip and Western Port region – the collective annual financial investment by councils in the region was estimated recently at \$75 million. Effective implementation of the RCS at a municipal level will depend on it becoming a key informing document whose priorities are aligned with the decisions and actions of councils, particularly Municipal Strategic Statements and Local Planning Scheme Provisions. This will require the introduction and acceptance of a formal process.

Target	Relevant objectives
PT4 Each year to 2008, secure an increase in: <ul style="list-style-type: none"> <li>the proportion of available Victorian and Australian government funding for RCS programs in the region</li> <li>the total amount of corporate investment in RCS programs</li> </ul>	PO1

It is vital that the region achieves a higher level of investment in catchment management and ensures that this is targeted to the priorities of the RCS. Key opportunities exist with the Victorian and Australian governments and the corporate sector. Already substantial resources are being invested each year at these levels, but collectively this is not yet enough to achieve the goals of the RCS.

Target	Relevant objectives
PT5 Maintain or increase the number and geographic coverage of community groups participating in catchment management in the region, and increase the active membership of community groups by 20 per cent (from 2001 levels) by 2008	PO2

Some 500 community groups make a significant contribution to catchment management in the region. A survey of their health and active membership has been undertaken (through the Regional Landcare Strategy) which provides a benchmark from 2001. While the number of groups is relatively high, opportunities do exist to establish new groups and revitalise some existing ones.

Target	Relevant objectives
PT6 Increase community awareness and understanding of the condition of catchment assets and associated trends	PO1, PO2

An upwards trend in community awareness and understanding of catchment management issues is important for establishing a strong case for increased investment and participation in important catchment management programs. This is a particular challenge for this region with its large and diverse population, so establishing benchmarks relating to key sectors of the community will be an important initial step.

Target	Relevant objectives
PT7 Maintain the region's total ecological footprint at or below the 2003 level, and reduce the average ecological footprint (per capita) for the region by 25 per cent by 2030	PO3

Due to its consumption patterns and population numbers, the region's ecological footprint is relatively high. Forecast population increases mean we must reduce the average footprint per capita by 25 per cent if we are to stop our collective footprint from growing beyond the current total of 16 million hectares.

## 8.6 Actions

These People Actions (PA1 - PA10) are needed to meet the targets. Some actions will continue and build upon existing programs in the region, while others are new initiatives.

### Coordination and capacity building

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
PA1 Review existing forums and committee structures and identify efficient ways to: <ul style="list-style-type: none"> <li>plan and conduct community involvement in integrated catchment management</li> <li>facilitate coordination and share information</li> <li>identify local issues and develop priority programs</li> </ul>	PT1	2005	CMA	Local government, agencies, community group networks	Low
PA2 Establish a whole-of-region research forum to identify knowledge gaps and the needs for research and development	PT1	2006	CMA	Government agencies, Local government, research organisations, universities	Low
PA3 Establish sub-regional forums that enable local government to help identify, discuss and resolve priority issues relevant to catchment management and to cooperate at a catchment scale	PT1, PT3	2006	CMA	Local government, MAV	Low
PA4 Establish forums that enable rural communities, industries and landholders to identify, discuss and resolve priority issues relevant to catchment management including rural development, land use and land management	PT1, PT5	2006	CMA	DPI, DSE, EPA, Local government, agricultural industries, rural communities	Low

The region needs efficient processes to engage stakeholders in priority setting, build on existing relationships and knowledge and align budgets and works programs to implement the RCS. These processes also need to work in ways that invite and support participation by individuals and interest groups that have not been involved in the past. Projects should create purposeful decision-making roles for different catchment interests including investors and practitioners, they should showcase and report on successes, leverage additional funding from other sources, and establish and maintain good relationships.

Adequate engagement of stakeholders will be effectively engaging institutional stakeholders and businesses, local government, the Indigenous community, community groups, academic and research organisations and landholders in knowledge-building, priority setting, planning and implementation.

Actions PA1-PA4 specifically address the need for efficient community engagement processes in this complex region that has many and varied stakeholder organisations.



Action PA1 will review existing structures and processes as a basis for improvements in the future. The potential for utilising existing multi-stakeholder forums, such as the Mornington Peninsula and Western Port Biosphere Reserve Foundation in the Western Port catchment, should be considered within this action.

Action PA1 should also consider any gaps in structures that need to be filled. For example, there are some gaps in foreshore management in the region, that is, there are areas of our coast without Committees of Management in place. Foreshore management is a complex task and draws significantly on the efforts of volunteers, so sound arrangements and support are required.

Actions PA2-PA4 identify that there are particular community sectors that need to be better engaged in catchment management including research and academic institutions, local government and the rural sector.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
PA5	Develop and implement protocols for the involvement of Indigenous groups and incorporation of Indigenous cultural values in the implementation of this RCS	PT1	2006	CMA	Kulin people, AAV, government agencies, Local government	Medium

The cultural history of the region is recognised as an important value. We need to ensure that agencies and the community with a direct interest in the coasts, waterways and other areas understand and appreciate these values and that the Kulin and all Indigenous people are involved in decision-making and action. An aim of this action will be consideration of how to increase the employment of Indigenous people in the catchment management industry as a strong basis for improved understanding by all organisations of cultural heritage values and Indigenous issues.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
PA6	Develop and deliver education programs for catchment management across the region	PT6	Develop by 2006 Begin to implement by 2007	CMA	Government agencies, Local government, educational institutions	Low

There is substantial potential for the development and coordination of tailored education programs about catchment management in the region that involve specific community and industry sectors, the broader community and schools. For example, there are opportunities to increase the level of involvement of businesses, school children and urban-based volunteers in substantial on-ground projects that are revitalising our landscapes around Melbourne and protecting our catchment assets. Similarly, there are opportunities for community involvement in research and monitoring programs that can generate important information at the same time as raising awareness and understanding amongst the participants. This action will require new and innovative partnerships to be forged with educational institutions and possibly with major media operations.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
PA7	Align the directions and actions of the RCS with Municipal Strategic Statements, planning schemes and other local government processes related to catchment management	PT3, PT6	2008	CMA	Local government	Medium

A particularly important element of the role of local government in catchment management is land-use planning and decision-making on individual developments. The primary tools for this are the Victoria Planning Provisions, Municipal Strategic Statements and the Local Planning Scheme Provisions. To effectively implement the RCS at municipal level, better alignment is needed between the RCS priorities and the decisions and actions of councils such as those related to education programs and the protection of important native vegetation on private land. This will be greatly assisted by developing a schedule of the RCS tailored to each council, and seeking formal adoption by each council of its schedule (or the whole RCS) as an incorporated document or reference document.

Inherent in this action is the need for a skilled and stable statutory planning workforce across the region's councils and other organisations that contribute to planning processes. Regular education programs are also needed for statutory planners regarding the directions and responsibilities outlined in the Planning and Environment Act and Victorian Planning Provisions that aim to protect the environment and support catchment management. Similarly, personnel in referral authorities need to be highly skilled in regard to catchment management issues such as salinity, land management, urban development, intensive industries, etc so they can provide a strong science-focus and assist councils in decision-making.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment	
PA8	Implement the strategy for the support and coordination of Landcare and community groups in the Port Phillip and Western Port region	PT1, PT5, PT6	2006	CMA	Community groups, Local government, Government agencies, environment organisations	Medium

Strong and healthy community groups are effective contributors to catchment management. A study of community groups in the region and major barriers to their effective functioning has led to development of a strategy to address the key issues. This includes actions to establish a structure of positions across the region that will support groups, develop local environment condition reports, assist groups with strategic action planning in line with regional priorities, raise the profile of Landcare, attract new membership and improve access to affordable training and skills development. Implementation of this strategic plan has begun and will support existing networks while increasing the overall number of groups, their vitality, effectiveness and longevity. Reviews of the plan will regularly re-establish key directions and priorities.

## On-ground programs

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
PA9 Pilot and evaluate the use of methodologies including the ecological footprint as an educational and monitoring tool to drive behavioural change in key sectors of the community, and identify opportunities for regional programs to reduce the total footprint	PT6, PT7	Ongoing	EPA	CMA, DSE	Medium

The use of methodologies such as the ecological footprint model and the urban metabolism model is one way of reflecting to the community the effect of its consumption on catchment assets. It stimulates wide-ranging debate and encourages actions that reduce impacts on the environment. However, education will be needed to encourage broad community acceptance and action.

Containing the total regional footprint is a major task covering all types of consumption. It will require new and innovative partnerships with organisations that are not normally closely associated with catchment management, including the energy, transport and retail (food and clothing) industries.

A regional study suggests that we could reduce the footprint if we changed the way in which we live in terms of consumption of energy (electricity, gas, petrol) and goods (high input clothing and foods)<sup>104</sup>. We need to think about how we run our homes and workplaces every day. Further work is needed to ascertain whether the concept could be applied in the region to raise community awareness and generate changes in behaviour.

Because the ecological footprint model is an evolving concept, it is advisable that it be piloted in a specific area – perhaps a particular industry, an individual council area or an established urban area, an area of new urban development or the Mornington Peninsula and Westernport biosphere. Some of this work is already being undertaken by the Environment Protection Authority, CMA, Department of Sustainability and Environment, Melbourne Water, City West Water and the Port Phillip City Council.

We will also need to monitor the footprint, perhaps every five years, using a consistent and agreed methodology.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
PA10 In the catchments in the region, develop and begin implementing major projects that fully engage and involve key stakeholders and that attract major new funding	PT2, PT4, PT6	Develop by 2005 Begin to implement by 2006	CMA	Local government, Govt agencies, Water authorities, community groups, corporate sector	High

Catchment management projects of major scale can generate a shared vision and ownership across many stakeholder groups, which is essential for achieving landscape change. They also provide an opportunity to leverage funds from stakeholders and are effective in engaging the corporate sector and generating additional funding.

<sup>104</sup> 1998-99 Ecological Footprint of the population within the Port Phillip and Westernport region.

Grow West in the Werribee catchment is an example of a large project that is already under way. In addition to Grow West, the Dandenong Living Links project is being initiated for the Dandenong catchment and the Yarra River For Life concept is being developed in the Yarra catchment. A project will also be initiated for the Maribyrnong catchment focussing on major riparian restoration.

In the Western Port catchment, the Mornington Peninsula and Western Port Biosphere concept has captured the imagination of many community people, while various community-based programs including the Cardinia Environment Coalition's biolinks program are working successfully on the ground and setting new standards in outcomes, landholder attitudes and community involvement. An opportunity exists to support and accelerate the biolinks program, plus incorporate into it other local catchment management priorities, so that it is a large-scale, integrated project making a key contribution to meeting the aims of the biosphere.

In addition to the major projects, it is important to pro-actively support community-based programs across the region that benefit catchment assets. Works programs for improving rivers and creeks are traditionally undertaken by the appropriate waterway manager. However, over the past decade landholders and community groups have shown a growing interest in participating in stream rehabilitation works, monitoring and education programs and coastal protection. Community-based activities provide a strong mechanism for coordinating private landholders' efforts on their land with those of neighbouring landholders and other interested parties to achieve catchment wide outcomes. Monitoring and education programs such as Waterwatch, ReefWatch and Frogwatch are well-regarded and provide important data for catchment-wide monitoring. At a broader scale, programs such as those being undertaken by the International Council for Local Environmental Initiatives (ICLEI) are important for coordinating the involvement of local government in the management of catchment assets.

## 8.7 Summary table

The following table summarises the translation of the goal for people and organisations through the steps of objectives and targets to actions.

## Goal

The community valuing, understanding and celebrating the region's catchment assets and acting to achieve sustainability

## Objectives

PO1. Enhance regional planning, coordination, resource allocation, monitoring and reporting

PO2. Increase the capacity and participation of people and organisations in catchment management

PO3. Reduce the overall impact of the regional community on catchment assets

## Targets (pre-existing targets in Bold)

PT1. All key catchment management stakeholders participating in and agreeing on a 'regional investment planning' process to implement the RCS by 2005

PT2. All Victorian government agencies with key roles in catchment management to be directly implementing the RCS through their annual works programs by 2006

PT3. At least half the region's 38 councils to have formally adopted the RCS as a reference document by 2008, reflecting relevant sections of it appropriately in their planning schemes and/or implementing relevant actions through their annual programs

PT4. Each year to 2008, secure an increase in:

- the proportion of available Victorian and Australian government funding for RCS programs in the region
- the total amount of corporate investment in RCS programs

**PT5. Maintain or increase the number and geographic coverage of community groups participating in catchment management in the region, and increase the active membership of community groups by 20 per cent (from 2001 levels) by 2008**

PT6. Increase community awareness and understanding of the condition of catchment assets and associated trends

PT7. Maintain the region's total ecological footprint at or below the 2003 level, and reduce the average ecological footprint (per capita) for the region by 25 per cent by 2030

## Actions (pre-existing actions in Bold)

PA2. Establish a whole-of-region research forum to identify gaps and the needs for research and development

PA3. Establish sub-regional forums that enable local government to help identify, discuss and resolve priority issues relevant to catchment management and to cooperate at a catchment scale

PA6. Develop and deliver education programs for catchment management across the region

**PA7. Align the directions and actions of the RCS with Municipal Strategic Statements, planning schemes and other local government processes related to catchment management**

**PA1. Review existing forums and committee structures and identify efficient ways to:**

- plan and conduct community involvement in integrated catchment management**
- facilitate coordination and share information**
- identify local issues and develop priority programs**

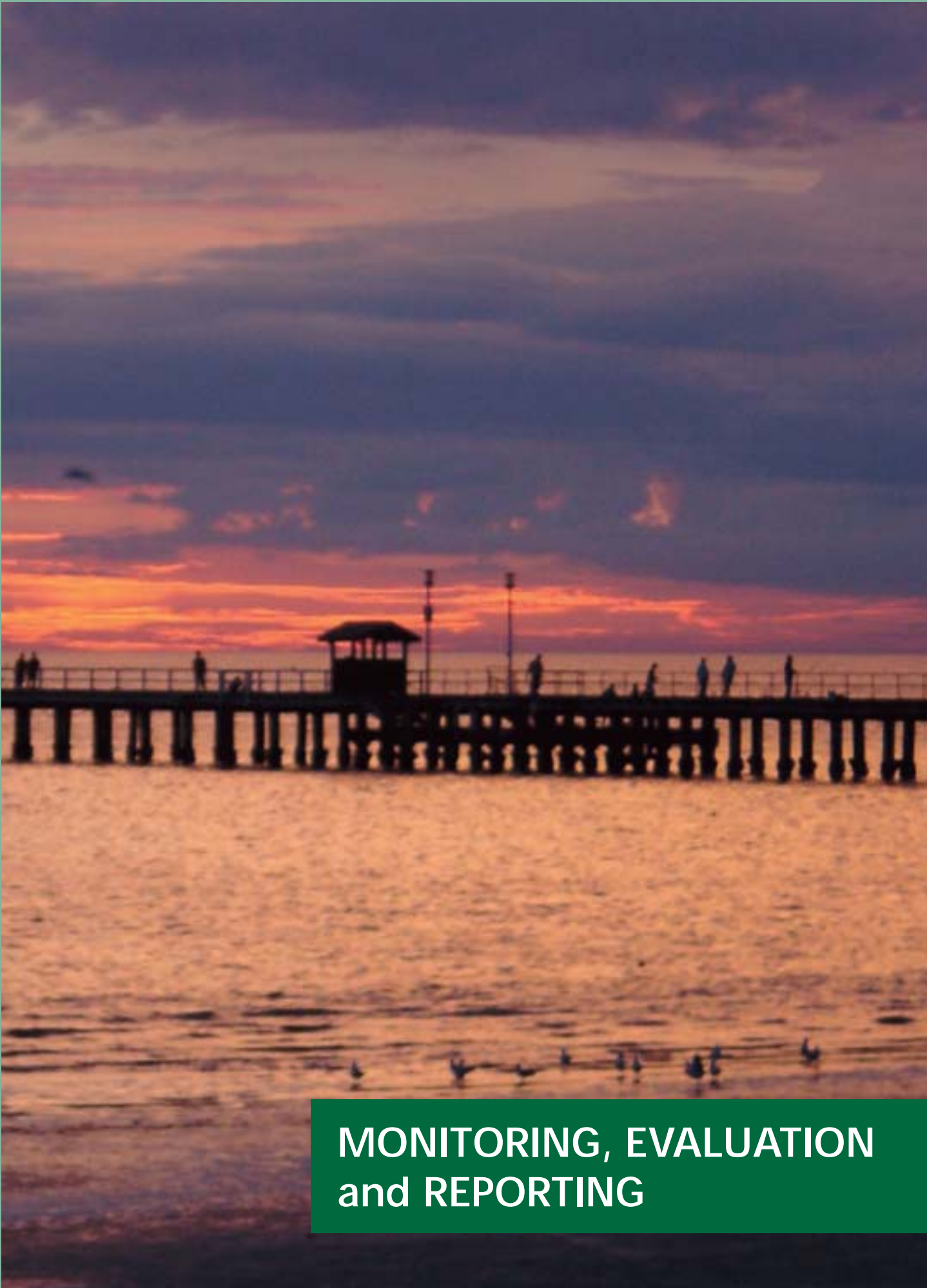
PA4. Establish forums that enable rural communities, industries and landholders to identify, discuss and resolve priority issues relevant to catchment management including rural development, land use and land management

PA5. Develop and implement protocols for the involvement of Indigenous groups and incorporation of Indigenous cultural values in the implementation of this RCS

**PA8. Implement the strategy for the support and coordination of Landcare and community groups in the Port Phillip and Western Port region**

PA9. Pilot and evaluate the use of methodologies including the ecological footprint as an educational and monitoring tool to drive behavioural change in key sectors of the community, and identify opportunities for regional programs to reduce the total footprint

**PA10. In the catchments in the region, develop and begin implementing major projects that fully engage and involve key stakeholders and that attract major new funding**



## **MONITORING, EVALUATION and REPORTING**

## 9. MONITORING, EVALUATION and REPORTING

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### 9.1 Overview

#### Monitoring

Monitoring, in the context of integrated catchment management, is the systematic collection and storage of data. It enables activities, projects, programs, plans, strategies and catchment condition to be evaluated and reported upon.

Baseline monitoring provides environmental, social and economic data that is critical in providing context for evaluation and reporting regarding the health of the catchment and the values it provides.

Additional targeted monitoring enables measurement of activity being undertaken and outcomes achieved. Outcomes may come directly or indirectly from an activity, and the link is tested at the evaluation stage.

Monitoring of a variety of data may be important for integrated catchment management, for example:

- climatic and asset condition data such as rainfall, temperature, evaporation, extent of vegetation, stream flow, water quality in rivers and streams
- project output and on-ground works data such as the number of specific activities completed, the area of saline land treated and the length of stream frontage revegetated
- financial data such as costs of activities
- socio-economic data such as population growth and demographics, community attitudes, regional production, farm incomes and in particular the social and economic benefits derived directly from improving the health of catchment assets.

A key feature of an effective monitoring process is the documentation and storage of data in a manner that enables simple retrieval and exchange of data with other users.

#### Evaluation

Evaluation is conducted to assess the efficiency, effectiveness and appropriateness of actions.

An activity or outcome is best evaluated against a stated goal, objective, target or benchmark. This helps identify whether the level of change in resource condition, for example, is appropriate or adequate, and the strength of the link between the activity and the change that resulted. The need for 'before and after' information is often a key requirement for evaluation. Evaluations might also assess project participants' reactions, changes in knowledge, attitude, skills or behavioural change. Depending on the type of evaluation, quantitative or qualitative data may be required.

Some monitoring and evaluation is costly and time consuming. Therefore, the amount and type of data collected for evaluation should be tailored to the particular purpose such as the decision making that it will inform.

*Some monitoring and evaluation is costly and time consuming. Therefore, the amount and type of data collected for evaluation should be tailored to the particular purpose.*

## Reporting

Reporting is the documentation of results of monitoring and evaluation and the presentation of them to appropriate audiences at specified times.

To help ensure efficiency, the purpose of reporting should be clearly defined. Key purposes may be accounting for funds expended or feeding data directly into a decision-making process.

The timeframe of reporting should also be defined to suit its purpose. While it is reasonable to expect reports on outputs delivered from a given investment regularly, perhaps even quarterly, it may be inappropriate to compile reports on outcomes within this same timeframe.

## Challenges for monitoring, evaluation and reporting in integrated catchment management

Monitoring, evaluation and reporting activities at a regional scale have been performed across the Port Phillip and Western Port catchments and bays for many decades, but often focussed upon particular issues including water quality, waterway health, agricultural production or a geographical component of the region.

Many organisations in the region are already undertaking monitoring and evaluation activities. The coordinated implementation of this RCS is an opportunity to document and refine these activities, to make them more efficient and to give them an integrated catchment management perspective.

Monitoring and evaluation are undertaken at many levels – from global to national to state to regional to local to farm to site. They also vary greatly in their scope and methods from highly complex, integrated issues to single issues, so some duplication and overlap is unavoidable.

*A challenge for this RCS is to help reduce duplication of monitoring, reporting and evaluation activities.*

A challenge for this RCS is to help reduce duplication of monitoring, reporting and evaluation activities by fostering linkages between them and enabling aggregation of data at various levels. To achieve this we need to optimise consistency between plans by using similar language and hierarchies of information.

This consistency is being developed through the establishment of National frameworks for monitoring and evaluation and for target setting.

Another of the greatest challenges for natural resource management in recent years has been to ensure accountability without diverting funds, attention and intellect from achieving change on the ground. An approach used in this RCS is for data collection activities, which can be very expensive, to be designed so they feed directly into decision making.



## 9.2 Policy directions for monitoring, evaluation and reporting

### National monitoring and evaluation framework

The National Natural Resource Management Monitoring and Evaluation Framework that the Australian and State governments have developed, via the Natural Resource Management Ministerial Council, provides a blueprint for monitoring and evaluation for programs, strategies and policies.

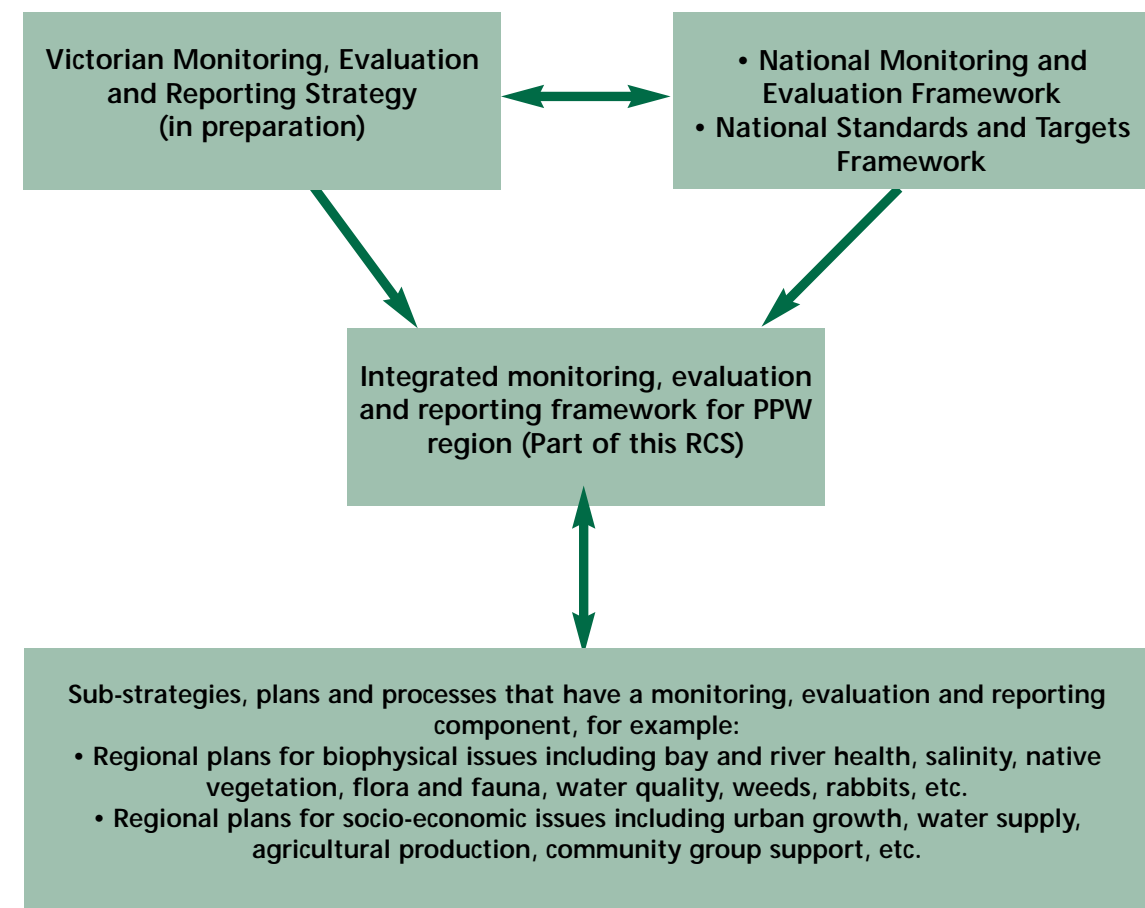
Accompanying this framework is a National Standards and Targets Framework that specifies outcomes that investment in natural resource management should work to achieve (through programs such as the Natural Heritage Trust).

### Catchment condition reporting under the Catchment and Land Protection Act

A coordinated approach to monitoring, evaluation and reporting will help the Catchment Management Authority fulfil its obligation under the Catchment and Land Protection Act (1994) to report on the condition and management of land and water resources in its region. The framework for delivery of this obligation is being developed by the CMAs and the State Government and a generalised model is illustrated in Figure 32. Over recent years the Catchment Management Authority has piloted an integrated reporting style within its Annual Report.

*A coordinated approach to monitoring, evaluation and reporting will help to report on the condition and management of land and water resources in its region*

Figure 32: Generalised hierarchy of monitoring, evaluation and reporting strategies and plans.



## 9.3 Principles

A robust and inclusive monitoring, evaluation and reporting framework is important to:

- monitor the health of catchment assets
- enable continual improvement in the effectiveness of actions
- develop and promote a shared view of catchment health amongst regional stakeholders
- enable identification of new issues
- provide opportunities to incorporate new research
- provide opportunities to test the effectiveness of actions and underlying assumptions
- make available catchment management data to planners, researchers and the community
- enhance knowledge by decision-makers of catchment management issues
- promote adaptive management and a culture of integrated catchment management across the region
- increase confidence among investors that their efforts will produce expected outcomes
- improve targeting and coordination of investments and on-ground actions
- enable improvements to catchment management plans, strategies and programs
- ensure accountability for the actions taking place to the community and government.

Principles advanced nationally<sup>105</sup> and within Victoria<sup>106</sup> have been followed in developing the regional goal, objectives, targets and actions for monitoring, evaluation and reporting in this RCS.

Key principles are that monitoring, evaluation and reporting should:

- be useful for all partners
- be simple, cost-effective, affordable and practical by:
  - avoiding duplication of effort,
  - using data for multiple purposes,
  - ensuring that users can obtain the data, and,
  - ensuring that users can easily find out whether suitable data already exist.
- recognise that catchment management interventions encompass a range of time-scales
- allow meaningful interpretation of data over time
- specify assumptions within strategies and decision making processes.

The regional community has reinforced the following other important points for monitoring, evaluation and reporting activities:

- Information-gathering exercises are appropriate for the scale of decision-making that the information influences. There needs to be a clear reason why information is being gathered. In most cases these reasons will relate specifically to decision-making, although exercises such as some baseline monitoring are often necessary because we simply don't know today what might be important for decision-making in future, and that requires an understanding of change over time.
- Stakeholders may have unique needs that must be recognised. Monitoring, evaluation and reporting protocols need to have sufficient flexibility to ensure that the exercise remains relevant to the stakeholders.
- A demonstration of adequate process can substitute for outcomes where outcomes are very long-term or difficult to measure.
- Catchment management programs are focused on high-level outcomes to be delivered many years in the future and it is generally impossible to accurately assess their overall effectiveness within their funded life. While intermediate outcomes will provide some guide to likely effectiveness, most targets set within the first five years will represent only the earliest stages of progress towards remedying the key problems identified in regional plans.

<sup>105</sup> National Natural Resource Management Monitoring and Evaluation Framework (2002)

<sup>106</sup> Monitoring, Evaluation and Reporting Strategy for the Goulburn Broken Catchment (2004)

## 9.4 Regional goal

Our regional goal for monitoring, evaluation and reporting is that it builds:

**A strong understanding of the health of our catchment assets, ecosystem processes, trends and risks, enabling evidence-based planning and action, coordination of effort and continual improvement.**

This goal encompasses:

- Working towards integration of regional catchment management monitoring, evaluation and reporting processes that currently have dramatically different levels of maturity.
- The development of a strategic approach to monitoring, evaluating and reporting of:
  - the baseline health and condition of the region's catchment assets
  - trends in condition and health of the catchment assets, and the values they provide
  - short-term and long-term threats and risks to the catchment assets
  - the key ecosystem processes at play in the region
  - the effectiveness of actions in achieving goals and targets for the catchment assets and the ecosystem processes
  - the progress in implementation of action.
- Making available information that assists all levels of investors, planners and land/water managers to make sound decisions that contribute to achieving sustainability of our catchment assets and assists coordination and integration of effort.

## 9.5 Objectives

The following Monitoring, evaluation and reporting Objectives (MO1 – MO3) are designed as the basis for achieving the regional goal.

### Objective

**MO1** Adequate, appropriate, efficient and cost effective monitoring of catchment assets, ecosystem processes, trends, risks, implementation of actions and outputs

Objective MO1 recognises that monitoring is required at a minimum of two levels:

- Asset monitoring – including the monitoring of the condition of catchment assets, ecosystem processes, trends, threats and risks
- Action monitoring – including the monitoring of the implementation of actions and the outputs/results that are being achieved.

To be adequate and appropriate, monitoring programs must gather sufficient data on key indicators to enable analysis and understanding. To be efficient and cost effective, monitoring programs must focus on key indicators, avoid duplication and avoid unnecessary or excessive data collection.

Another important consideration in monitoring processes is the storage of data. The number of databases has grown in recent decades as information technology has improved and to cater for demands from different investors. Various databases are currently being managed by many organisations. While it is appropriate that databases continue to be managed by different organisations, it is important to avoid duplication and enable data sharing where it can assist decision making, coordination and integration.

### Objective

**MO2** Timely, rigorous, efficient and cost effective evaluation of catchment management planning and implementation

Over recent decades, improvements have been made in understanding the effects of actions on our catchment assets, such as the impact of increased nitrogen loads on marine systems. However, our understanding of ecosystems and complex relationships at a regional scale is still in its relative infancy as highlighted by a quote from the report of a national forum:

*Standards of monitoring and evaluation for natural resource management programs over the past decade have, in general, been extremely inadequate. There is relatively little accumulated information sufficiently robust to make a clear evaluation of outcomes and of the efficacy of program investment by governments or communities.<sup>107</sup>*

Objective MO2 supports the improvement of evaluation processes for catchment management. It encompasses evaluating the effectiveness of actions, the contribution of actions to outcomes, the validity of assumptions and the need for modifying plans, targets, actions and priorities.

To be timely, evaluation processes must be undertaken at appropriate times and with appropriate regularity in the context of what is being evaluated. For example, at an action level the evaluation of adoption rates for agricultural best practices may be best undertaken on an annual basis, whereas the evaluation of the impacts of revegetation programs on threatened species populations will be more appropriately undertaken over a much longer timeframe. To be rigorous, an evaluation must be a critical assessment that is repeatable and uses an appropriate methodology for whatever is being evaluated. To be efficient and cost effective, an evaluation must be relevant to the range of stakeholders who are investing or are planning and undertaking actions, with an adequate level of detail. It should not go into unnecessary or excessive detail. It should focus on key questions and assumptions, and should directly guide decision making, planning and priority setting.

### Objective

**MO3** Timely, tailored, efficient and cost effective reporting on catchment assets, ecosystem processes, trends, risks, catchment management planning and implementation

The accessibility of data, and the presentation of it in user-friendly ways, provides the crucial feed-back loop into planning, priority setting, decision-making, investment and implementation processes. Without timely and tailored reporting, there is a risk that continual improvement in our understanding and decision making will not occur.

To be timely, reporting must be undertaken within an appropriate timeframe. For example, and as illustrated in Figure 33, project activities may be appropriately reported quarterly, project outputs reported annually and outcomes reported five-yearly or longer. To be tailored, reporting should be designed with specific target audiences in mind. For example, the data and format for a community-awareness raising report should ideally be very different in detail and style of presentation to a technical report informing project planning or investment decisions. To be efficient and cost effective, reporting should focus on the crucial information whilst streamlining processes by, for example, reporting to multiple stakeholders with a single process.

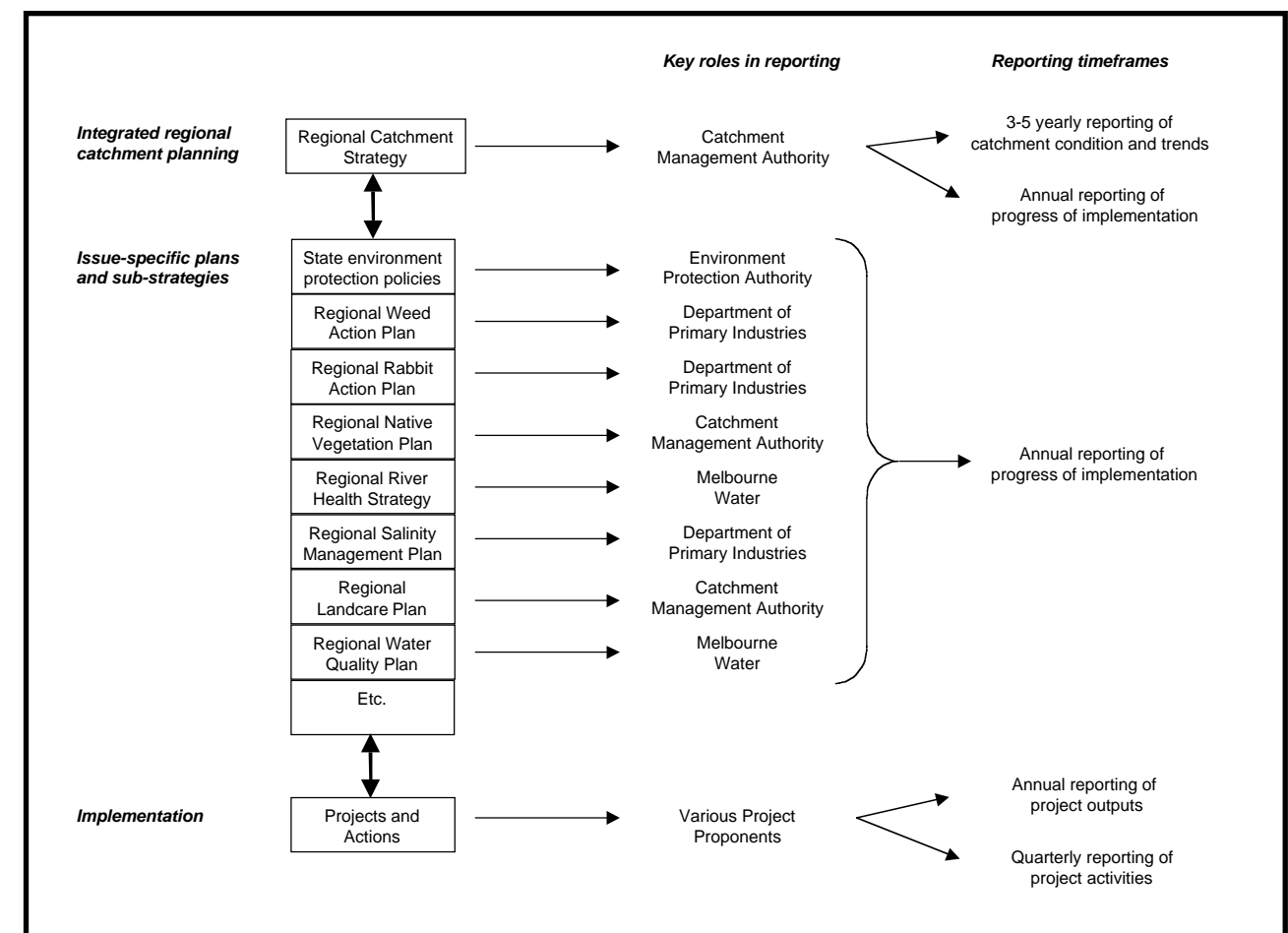


Figure 33: The regional reporting framework

<sup>107</sup> Enhancing Community Participation in Natural Resource Management



## 9.6 Targets

The following inter-related Monitoring, evaluation and reporting Targets (MT1 – MT4) are proposed in order to attain the objectives.

Target	Relevant objectives
MT1 Monitoring programs for key catchment assets agreed and in place by 2007	MO1
MT2 Monitoring programs for all RCS actions and other major actions of key stakeholders agreed and in place by 2006	MO1

Targets MT1 and MT2 focus on collecting data and information at both the “asset” and “action” levels.

At the asset level, gathering an adequate level of relevant information on the condition of key catchment assets and factors related to their management is the first step in the monitoring, evaluation and reporting process.

At the action level, it is important to have a consolidated picture of the major catchment management activities. While a number of these are contained in the RCS itself, many other important activities are being carried out under other programs by the wide range of stakeholders in this region. A consolidated picture will assist in avoiding duplication of monitoring effort and highlighting the interaction between different activities.

Target	Relevant objectives
MT3 Evaluation processes to assist priority setting and assess links between actions and outcomes agreed and in place by 2008	MO2

Currently, there is no agreed and integrated process for evaluating priorities and actions across this region and assessing the links to the health of our catchment assets. Target MT3 recognises the need for evaluation processes at all levels. Evaluation needs to be an integral part of all projects and the results must be continually fed into regional planning and priority setting. Timely, rigorous and efficient evaluation at all levels will improve local and regional catchment management programs and the targeting of investment.

Target	Relevant objectives
MT4 A regional catchment management reporting framework agreed and in place by 2006	MO3

Current reporting of catchment condition is fragmented, not comprehensive and is often not presented in ways that assist key stakeholders in making decisions. Target MT4 recognises the need for a coordinated reporting framework so that the work and learnings of stakeholders can be shared and a full picture of catchment condition, trends and actions is readily available to raise community awareness and assist project planning and decision making.

## 9.7 Actions

Community understanding of catchment condition and trends is important if we are to establish a strong case for achieving greater investment and participation in catchment management. Monitoring, evaluation and reporting Actions MA1 to MA5 will generate scientific and research information, bring it together for debate and distil it to show the whole picture for the region. They involve many stakeholders and, by analysing assets and risks, they will inform future planning, investment and on-ground action.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
MA1 Develop an agreed framework for integrated monitoring of regional catchment condition	MT1	2005	CMA	MW, EPA, PV, SRW, DPI, DSE, Local government	Low

Action MA1 recognises the need for a strategic approach to monitoring the condition of our catchment assets in an integrated manner. The region contains many organisations involved in catchment management, many of which already carry out some monitoring activity in line with their core business and responsibilities. However, an overarching framework is needed to ensure that all important information is collected and that the relevant information can be pulled together regularly.

This action will include:

- design of a framework for integrated catchment monitoring
- involvement of and negotiation with stakeholders to gain agreement
- an analysis of the current monitoring programs in the region and identification of gaps.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
MA2 Develop and implement regional monitoring and reporting programs for key catchment assets including: <ul style="list-style-type: none"> <li>• Surface water, rivers and streams</li> <li>• Groundwater and aquifers</li> <li>• Wetlands</li> <li>• Coasts</li> <li>• Estuaries, bays and seas</li> <li>• Land</li> <li>• Biodiversity</li> <li>• People and organisations</li> </ul>	MT1 MT3	2006	Melb Water DSE DSE DSE DSE DPI DSE PPWCMA	Melb Water, DSE, DPI, PV, PPWCMA, EPA, Local government, SRW, Universities, Community groups	High

Building on the outcomes from Action MA1, this action will deliver the specific monitoring programs for key catchment assets. In line with the regional monitoring framework, this action will identify what needs to be monitored, to what level of detail, how often and by whom. It will also consider how the monitoring will be most efficiently undertaken and how the information from various organisations will be stored, distributed and shared. The design of the specific programs will also consider data required to monitor the implementation of Regional Catchment Strategy actions.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
MA3 Further develop an asset-risk assessment methodology and apply it consistently to catchment assets to assist integrated priority setting	MT3	2009	CMA	MW, DSE, DPI, EPA, SRW, Local Government, CCB	Low

A preliminary asset-risk assessment methodology has been piloted in the development of this RCS. However, a limited number of assets and threats have been assessed at this stage, and even these have been at a broad scale. There is a need to develop and improve methodologies for applying this approach to the diverse types of catchment assets and threats that are important to this region. In many cases there is also a need to generate new data that will underpin the assessments.

This action therefore needs to be advanced on various fronts including:

- Further development of the GIS-based tool that has been piloted in the development of this RCS
- Improvement in the methodologies that have been used for individual assets (such as groundwater, native vegetation and agriculture) and threats (such as overuse of groundwater, salinity and vegetation clearing)
- Generation of methodologies for catchment assets that have not yet been assessed under this approach (such as marine areas, wetlands, estuaries, soil)
- Development of methodologies that can adequately consider environmental, economic and social values
- Data gathering to support application of the methodologies
- Analysis to assess the risks, followed up by testing of the outcomes including some ground truthing
- Achieving agreement with relevant stakeholders during the various stages of this process so that there is widespread support and cooperation in this approach.

This action ties together various other RCS actions that seek analysis of individual assets, values and risks. For example, Action WA20 in Chapter 5 seeks to further develop the regional risk assessment model to identify the level of risk facing groundwater assets, and Action WA30 seeks to develop a Regional Wetland Plan to establish and implement priorities for investment. Similarly, Action LA3 in Chapter 6 seeks to develop a comprehensive risk assessment of soil health as a basis for development of a Soil Health Plan. These and other RCS actions will benefit from a consistent approach in analysis that can be used to guide priority setting and investment across the region's diverse assets and programs.

Implementation of this action is expected to take some years. Melbourne Water have developed the STREAMs model for assessing waterway-related risk, and this work has itself taken approximately 6 years to reach its current level of sophistication. It is therefore expected that a regional, integrated approach covering the diversity of catchment assets will take at least this long.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
MA4 Establish an independent scientific panel to evaluate and report on the condition of catchment assets, ecosystem processes, trends and risks	MT2 MT3	2006	CMA		Low

One of the most difficult tasks in a complex and highly populated region is the evaluation of the overall progress being made in catchment management. Dealing with this task at the regional level, Action MA4 will establish an independent scientific panel to annually analyse information and provide condition ratings of our key catchment assets.

A mechanism similar to this is proving effective in the Moreton Bay catchment around Brisbane, and the independence of the assessment has been highlighted as a feature. In Victoria, the Gippsland Integrated Natural Resource Management Forum has piloted an annual rating system for Gippsland's key catchment assets and presented the results in the style of a report card. These and other approaches will be considered in the establishment of a system that best suits this region.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
MA5 Ensure that all RCS projects include appropriate monitoring, evaluation and reporting processes	MT1 MT2 MT3	2006	CMA	MW, EPA, SRW, Local government, CCB, DSE, DPI, PV, Community groups	Low

This action focuses on achieving sound monitoring, evaluation and reporting at the project and action level. Standard approaches will be developed for inclusion in project planning. Before projects will be considered for funding through the Regional Catchment Investment Plan, they must include monitoring, evaluation and reporting processes that will contribute to the regional processes.

Action	Relevant targets	Completion date	Lead role	Key partners	Level of investment
MA6 Design and establish an RCS Action Tracking Database	MT1 MT2	2005	CMA	MW, EPA, SRW, Local government, CCB, DSE, DPI	Medium

Action MA6 recognises the need to monitor the many activities being undertaken by various stakeholders to implementing the RCS. It involves development of an 'action tracking database' as a central record of progress in implementation of all RCS actions.

For this database to be efficient, up-to-date and accurate, the various organisations will need to regularly provide information and progress reports. Action MA6 will therefore require up-front agreement with and commitment from these organisations to the process.

## 9.8 Summary table

The following table summarises the translation of the goal for monitoring, evaluation and reporting through the steps of objectives and targets to actions.

## Goal

A strong understanding of the health of our catchment assets, ecosystem processes, trends and risks, enabling evidence-based planning and action, coordination of effort and continual improvement

## Objectives

MO1. Adequate, appropriate, efficient and cost effective monitoring of catchment assets, ecosystem processes, trends, risks, implementation of actions and outputs

MO2. Timely, rigorous, efficient and cost effective evaluation of catchment management planning and implementation

MO3. Timely, tailored, efficient and cost effective reporting on catchment assets, ecosystem processes, trends, risks, catchment management planning and implementation

## Targets

MT1. Monitoring programs for key catchment assets agreed and in place by 2007

MT2. Monitoring programs for all RCS actions and other major actions of key stakeholders agreed and in place by 2006

MT3. Evaluation processes to assist priority setting and assess links between actions and outcomes agreed and in place by 2008

MT4. A regional catchment management reporting framework agreed and in place by 2006

## Actions

MA1. Develop an agreed framework for integrated monitoring of regional catchment condition

MA2. Develop and implement regional monitoring and reporting programs for key catchment assets including:

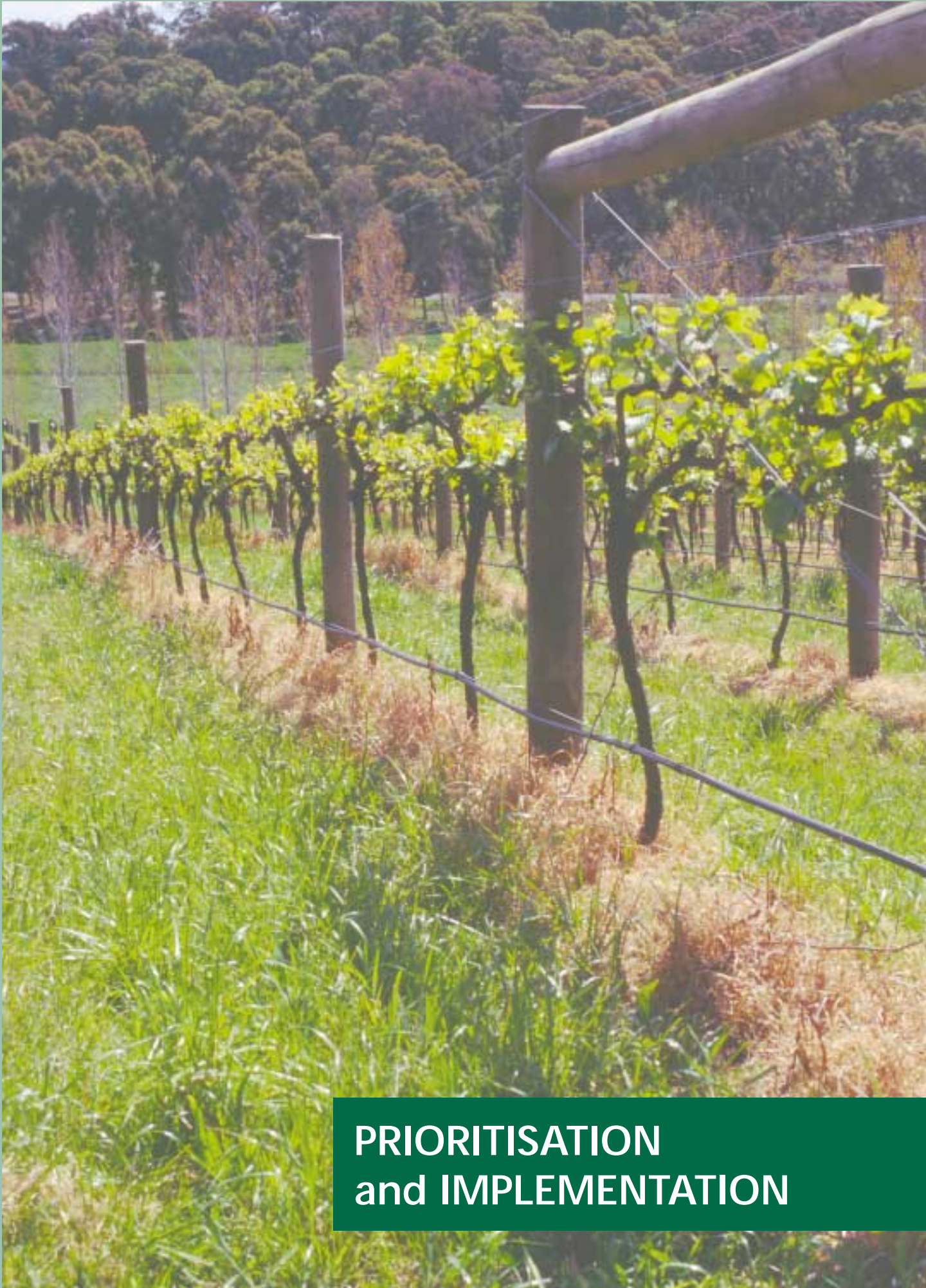
- Surface water, rivers and streams
- Groundwater and aquifers
- Wetlands
- Coasts
- Estuaries, bays and seas
- Land
- Biodiversity
- People and organisations

MA3. Further develop an asset-risk assessment methodology and apply it consistently to catchment assets to assist integrated priority setting

MA6. Design and establish an RCS Action Tracking Database

MA4. Establish an independent scientific panel to evaluate and report on the condition of catchment assets, ecosystem processes, trends and risks

MA5. Ensure that all RCS projects include appropriate monitoring, evaluation and reporting processes



## PRIORITISATION and IMPLEMENTATION

# 10. PRIORITISATION and IMPLEMENTATION

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## 10.1 The need for prioritisation

There are many potential actions that could be included in this RCS and that would make a beneficial contribution to catchment management in our region.

However, some actions and outcomes are needed more urgently than others. Similarly, some actions will produce more economical and assured outcomes than others which is important given that there are insufficient resources to do everything at once.

The RCS therefore needs to identify priorities for implementation over the next five years.

### Identification of RCS actions

In developing this RCS, an initial prioritisation was used to sift through the many possible actions and identify those likely to best address the most pressing risks and support the sustainable use of catchment assets. Identifying the regional vision and objectives, analyses of regional assets, threats and risks and the initial RCS drafting phase all produced many possible actions. These were scrutinised by the multi-organisation RCS Steering Committee and discussed more widely through the committee's network.

This scrutiny tested potential actions against 5 criteria:

1. Is the proposed action likely to achieve one or more of the objectives?
2. Will the proposed action be consistent with the objectives of the RCS project's partner agencies and community organisations?
3. Will the proposed action attract a willing leader responsible for its implementation?
4. Will the proposed action attract partners willing to commit time and other resources?
5. Will the proposed action be attractive to cash-investors?

The extensive community consultation process and discussions with various government and non-government organisations completed this initial prioritisation. Its result is the 97 actions contained in this RCS.

### Prioritisation of RCS actions

A second-stage of prioritisation will be undertaken for each RCS action to guide annual investment. This will involve the following steps:

1. Scoring the value of each RCS action by considering its environmental, social and economic benefits and costs.
2. Scoring the achievability of each RCS action by considering its urgency, funding availability, community support, likelihood of success, technical expertise and synergies.
3. Relating the value and achievability of each RCS action to determine its relative overall priority.

## Prioritisation Panel

In undertaking Steps 1 and 2, the PPWCMA will convene a prioritisation panel (or panels) of experts in the management of our catchment assets. Their task will be to use standard scoring rules to rate actions for value and appropriateness. In many cases, data is not available to objectively determine the scores. In these cases, the panel's task will include reaching agreement on which statement in the scoring rules best applies to each action.

## Regular review of priorities

The validity of the analyses and continuing priority of the RCS actions will be reviewed annually by the PPWCMA and its partners in the development of the Regional Catchment Investment Plan.

Regular review of priorities will also be important to ensure consideration is given to potential investments with perceived higher risks but which may lead to greater innovation or successfully lift standards and expectations for public policy, decision-making and action. The annual review will also ensure that investment responds to changing stakeholder capacity or willingness to innovate or manage greater risks.

## STEP 1: Scoring the value of each RCS action

The value of an action will be established by scoring it for its estimated environmental, social and economic benefits and costs.

Scores between 1 and 5 will be determined for benefits by matching each action with the statement that best describes it in Table 8. The three scores will be summed to give a total benefit score of 3 to 15.

Similarly, scores between 1 and 5 will be determined for costs by matching each action with the statement that best describes it in Table 9. Summing these three scores will give a total cost score of 3 to 15.

The scores for benefit and cost are then related in Table 11 to provide a total value score between 1-7. Actions with value score of 1 have a relatively low benefit and high cost. Conversely, actions with a value score of 7 have a relatively high benefit and low cost.

BENEFIT	5 (Very High)	4 (High)	3 (Medium)	2 (Low)	1 (Very Low)
<b>Environmental</b>	Action is expected to complete or make a major contribution to securing the integrity and quality of high value environmental assets.	Action will almost certainly make a significant contribution to improving the security and/or quality of high value environmental assets.	Action is likely to make a positive contribution to improving the security or quality of relevant environmental assets.	Action might make a minor or incidental contribution to improving the security or quality of relevant environmental assets.	Action is likely to make little difference to the security or quality of environmental assets.
<b>Social</b>	Action is expected to complete or make a major contribution to the security and quality of land, water or related infrastructure assets with high social and heritage value and significantly improve community engagement, education and awareness.	Action will almost certainly make a significant contribution to the security and/or quality of land, water or related infrastructure assets with high social and heritage value and create valuable opportunities for community engagement, education and awareness.	Action is likely to make a positive contribution to improving the security or quality of land, water or related infrastructure assets with identified social and/or heritage value and create some opportunities to improve community engagement and awareness.	Action might make a minor or incidental contribution to the quality of assets with identified social or heritage value and create limited opportunities for community awareness raising.	Action is likely to make little difference to the security of assets with social or heritage value or create new community awareness or engagement opportunities.
<b>Economic</b>	Action is expected to secure or make a major and rapid contribution to the protection of valuable infrastructure and/or improve the quality of natural resources that significantly support the region's prosperity.	Action will almost certainly make a significant, medium term contribution to protecting valuable infrastructure or improving the quality of natural resources that help support the region's prosperity.	Action is likely to make a positive, medium to long-term contribution to protecting infrastructure or the quality of natural resources that help support the regional economy.	Action might make a long-term, minor or incidental contribution to halting the deterioration of infrastructure or the quality of natural resources of regional or local economic significance.	Action is likely to have little effect on the security or quality of infrastructure or natural resources of economic significance. Could actually allow the value or security of assets or infrastructure to diminish over time.

COST	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Very High)
<b>Environmental</b>	Action might possibly cause minor and very isolated losses of environmental values but these values are common locally and across the region.	Action might cause some predictable but minor environmental values to be lost but these are well represented elsewhere in the region.	Action is likely to cause losses in environmental values of local significance but these values are represented at other sites in the region.	Action is very likely to cause the loss of environmental values of regional significance.	Action is expected to cause the loss of environmental values of state or national significance.
<b>Social</b>	Action is very unlikely to affect the security and quality of or access to land, water or related infrastructure assets with social or heritage value or make new demands on the capacity or interests of individuals or community groups.	Action might cause some security, quality or access to land, water or related infrastructure assets with identified social or heritage value to diminish and/or prompt individuals and/or community groups to decide if they need to monitor, manage or adapt to this change.	Action will possibly diminish the security, quality of or access to land, water or related infrastructure assets with social or heritage value of local significance and could place some demands on individuals and/or community groups to help monitor, manage or adapt to these changes.	Action will almost certainly reduce the security, quality, or access to land, water or related infrastructure assets with social or heritage value of local or regional significance and will place demands on the time and expertise of individuals and/or community groups to help manage or adapt to significant change.	Action is expected to significantly reduce the security, quality, or access to, land, water or related infrastructure assets with social or heritage values of regional or state significance and to demand considerable time, effort and expertise from individuals and community groups to help manage or adapt to major change.
<b>Economic</b>	Finance requirements expected to be one-off, under \$3K and can be found in current budgets with little impact on other planned activities.	Finance requirements expected to be under \$20K/year for up to three years and to be available in the short-medium term with minimal impact on other projects.	Finance requirements expected to be less than \$250K/year for up to five years and likely to be available but by placing some restrictions on other projects.	Finance requirements expected to be up to \$500K/year for up to 3 years, likely to be difficult [but not impossible] to sustain and to draw significant funds away from other priority projects.	Finance requirements expected to be over \$500K/year for more than 3 years, likely to be difficult to sustain and to preclude other important projects.

Table 8: Rules for scoring the environmental, social and economic benefits of each RCS action

Table 9: Guide for scoring the environmental, social and economic costs of each RCS action

**Table 10: Worked example**

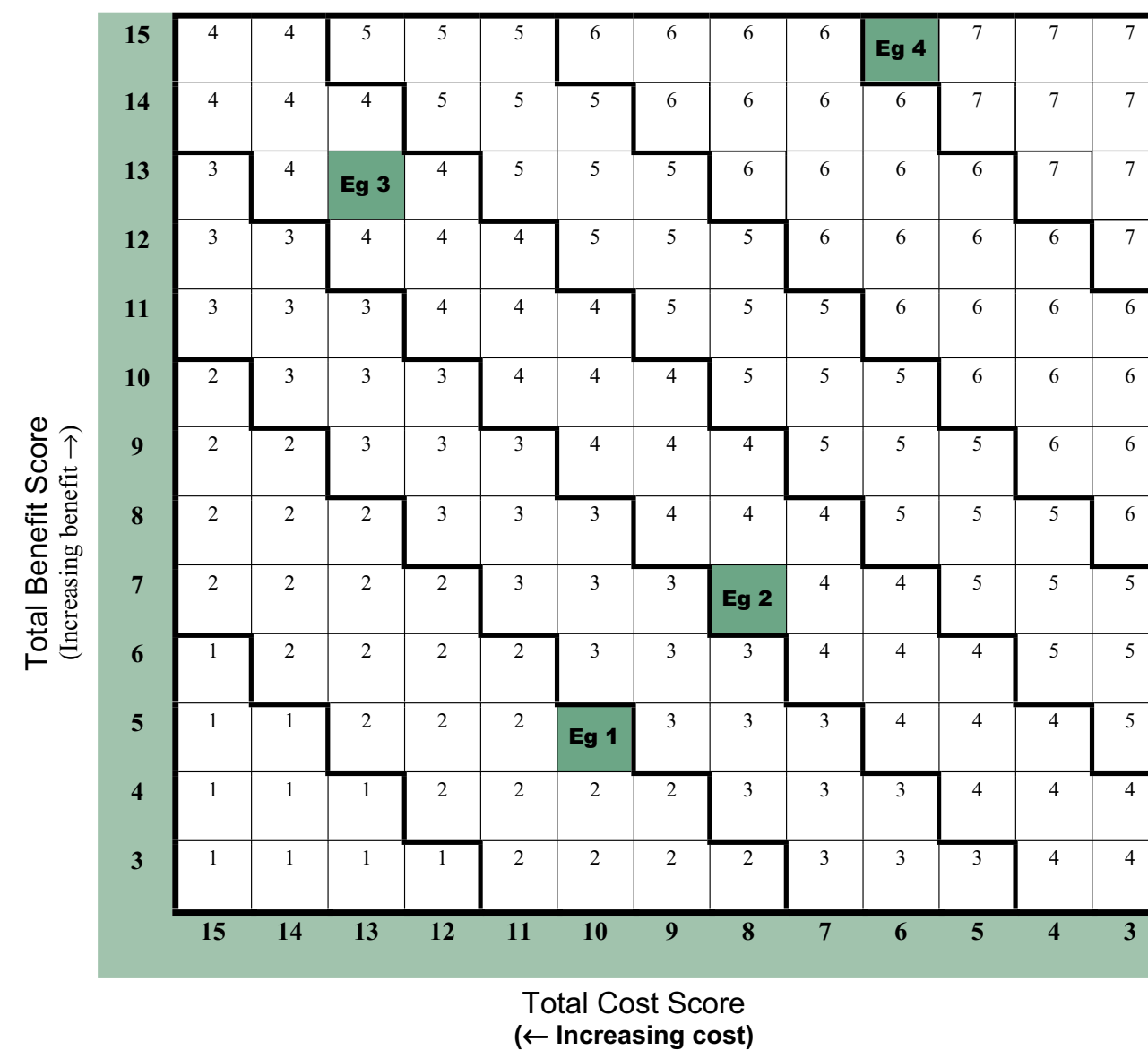
Four hypothetical projects have been scored below for their environmental, social and economic benefits and costs. Their overall value scores are derived from Table 11 where their benefit and cost scores are plotted on a graph to show value scores between 1 and 7.

	Example project 1	Example project 2	Example project 3	Example project 4
Environmental benefit	1	2	5	5
Social benefit	1	3	4	5
Economic benefit	3	2	4	5
<b>Total benefit</b>	<b>5</b>	<b>7</b>	<b>13</b>	<b>15</b>
Environmental cost	4	4	4	2
Social cost	3	2	5	2
Economic cost	3	2	4	2
<b>Total cost</b>	<b>10</b>	<b>8</b>	<b>13</b>	<b>6</b>
<b>Value scores</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>7</b>

**Table 11: Relating total benefit and total cost to establish a Value Score for RCS actions**

The example projects in Table 10 have been plotted here to show their relative value. Example 4, with a value score of 7, is estimated to offer the greatest benefit at lowest cost. Examples 3 and 2, both with value scores of 4, are of similar value but for different combinations of benefit and cost. Example 1 is expected to produce relatively little benefit at moderate cost.

Step 2 of the prioritisation process will assess the achievability of these projects.



## STEP 2: Scoring the achievability of each RCS action

The estimated achievability of an action will be established by scoring it for each of six criteria:

<b>Urgency</b>	The urgency of the action;
<b>Support</b>	The level of community and partner support for, and commitment to, the action;
<b>Confidence</b>	The confidence that the action will be successful in achieving the desired outcomes;
<b>Funding</b>	The likelihood of funding being available for the action and the likelihood of negotiating agreed cost-sharing arrangements;
<b>Expertise</b>	The adequacy of technical knowledge and expertise to implement, monitor and evaluate the action;
<b>Integration</b>	The opportunities for integration, synergies and multiple benefits from the action.

Scores of 1-5 will be determined for each of these five criteria by matching each action with the statement that best describes it. These statements are shown in Table 12. The statements are not intended to be prescriptive or to describe every circumstance or proposal. Rather, they aim to suggest degrees of difference and provide analogies against which a real action proposal can be compared.

Summing the five scores will give a total of between 6 and 30 for each action. This score will be converted, in Table 13, into an achievability grade between A and G.

The conversion to seven grades allows the seven value sets to be compared against the same number of achievability sets. Aggregating the achievability scores also helps prevent the final prioritisations from 'clumping' in the middle of the priority range. This would defeat the purpose of the process.

Letter grades have been adopted to make the double-digit coordinates for value and achievability easier to remember and prevent the risk of plotting them in the wrong order.

Table 12: Rules for scoring the achievability of RCS actions

	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Very High)
<b>Urgency</b>	Action is desirable but not implementing it will pose little risk to known catchment assets or programs.	Action will be needed in the next 5-10 years, especially to secure the gains made by earlier activities or to monitor changes to resource conditions.	Action will be needed in the next five years to prevent loss of assets and/or to provide support for other long-term programs.	Action is needed in the next 2-3 years to prevent loss of valuable assets and/or to take advantage of opportunities for multiple outcomes.	Action is urgently needed to prevent almost certain loss of valuable assets and/or to take advantage of immediate opportunities for multiple outcomes.
<b>Level of community and partner support and commitment to the action</b>	The action could conflict with other stakeholder interests and/or attract opposition from the local or regional community.	There is little or no known community interest in this action. Community might judge implementation to be a waste of resources.	There is documented or measurable support for the action among informed and/or affected individuals and groups	Support for the action and commitment to help implement it can be readily identified in local media and among local or regional interest groups and agencies.	Community demand for this action has been strident and persistent. Not implementing is likely to undermine the reputation of the CMA and its partners
<b>Confidence that actions will be successful</b>	There is a very high risk that the action will not meet any of its important objectives.	Failure to meet some major objectives is a strong possibility due to a lack of information, expertise, resources, support or interest.	The action is likely to produce mixed results. The less challenging objectives can probably be met; the success of others is difficult to predict.	There are threats that might limit total success but the action is expected to be largely successful and worthwhile.	There is almost no risk that the action will fail to meet its agreed objectives.
<b>Likely availability of funding and ability to negotiate cost-sharing</b>	The action is expected to be extremely difficult to fund and negotiations for cost-sharing are not likely to be fruitful.	Some funding might be available but this might not be sufficient to fully realise the action's potential. Cost sharing for the long-term is likely to be difficult to secure.	Funding might be sufficient to give the action the momentum it needs and cost sharing for longer-term action might be possible to negotiate.	At least one investor will adequately fund the action to establish it and there is confidence that others will join. Other parties are willing to discuss at least medium term cost-sharing.	The action is expected to be relatively easy to fund for at least the first five years and all parties have indicated their willingness to cost-share into the future.
<b>Knowledge and expertise are in hand to implement and monitor etc</b>	There is little or no successful experience to draw on to undertake this action and the required information and techniques are not readily available	There is some experience in the techniques required for this action but some difficult problems remain and more investment in communications and training will be required.	The basic techniques for this action are well understood but some will need to be learned and modified for this region. Some important information remains to be collected.	There is probably enough regional experience to successfully complete this action and other information and techniques can be found.	There is considerable regional experience in this action and all the required information and techniques are readily available.
<b>Opportunities for ICM and multiple outcomes</b>	The action is very likely to remain isolated and find little connection with other activities or programs	The action has potential to be linked with other programs for multiple outcomes but some factors will make this difficult to achieve.	The action has evident potential to support other programs and produce multiple outcomes but more work will be needed to test this with existing project managers and stakeholders.	The proposal for this action has found ready support among existing project managers and stakeholders who recognise its potential to improve the success, quality and/or scope of their work.	Demand for this action has been growing for some time among existing project managers and stakeholders who agree that it will significantly improve the success, quality and/or scope of their work.

Table 13: Determining the achievability grade of RCS actions

Total of the six scores	Achievability Grade
27, 28, 29 or 30	<b>A</b>
23, 24, 25 or 26	<b>B</b>
20, 21 or 22	<b>C</b>
17, 18 or 19	<b>D</b>
14, 15 or 16	<b>E</b>
10, 11, 12, or 13	<b>F</b>
6, 7, 8, or 9	<b>G</b>



The four example projects from Step 1 are shown in Table 14, scored out of 5 for their estimated achievability. Project 1 is regarded as more urgent than Project 3 but rates relatively poorly for confidence, funding and expertise. They both achieve a grade 'F'. They are finally compared for priority when weighed against value in step 3.

**Table 14: Worked example**

	Example project 1	Example project 2	Example project 3	Example project 4
Urgency	3	4	1	5
Partner support	2	4	1	5
Confidence of success	1	3	2	4
Likelihood of funding	1	4	2	5
Expertise	1	3	2	4
Integration opportunities	3	4	2	3
<b>Total</b>	<b>11</b>	<b>22</b>	<b>10</b>	<b>26</b>
<b>Achievability score</b>	<b>F</b>	<b>C</b>	<b>F</b>	<b>B</b>

**Table 15: Worked example**

The value score and achievability grade for the four example projects are shown together. Project 3 has a stronger value score. The four examples are plotted together on Figure 35 to show their estimated relative priority.

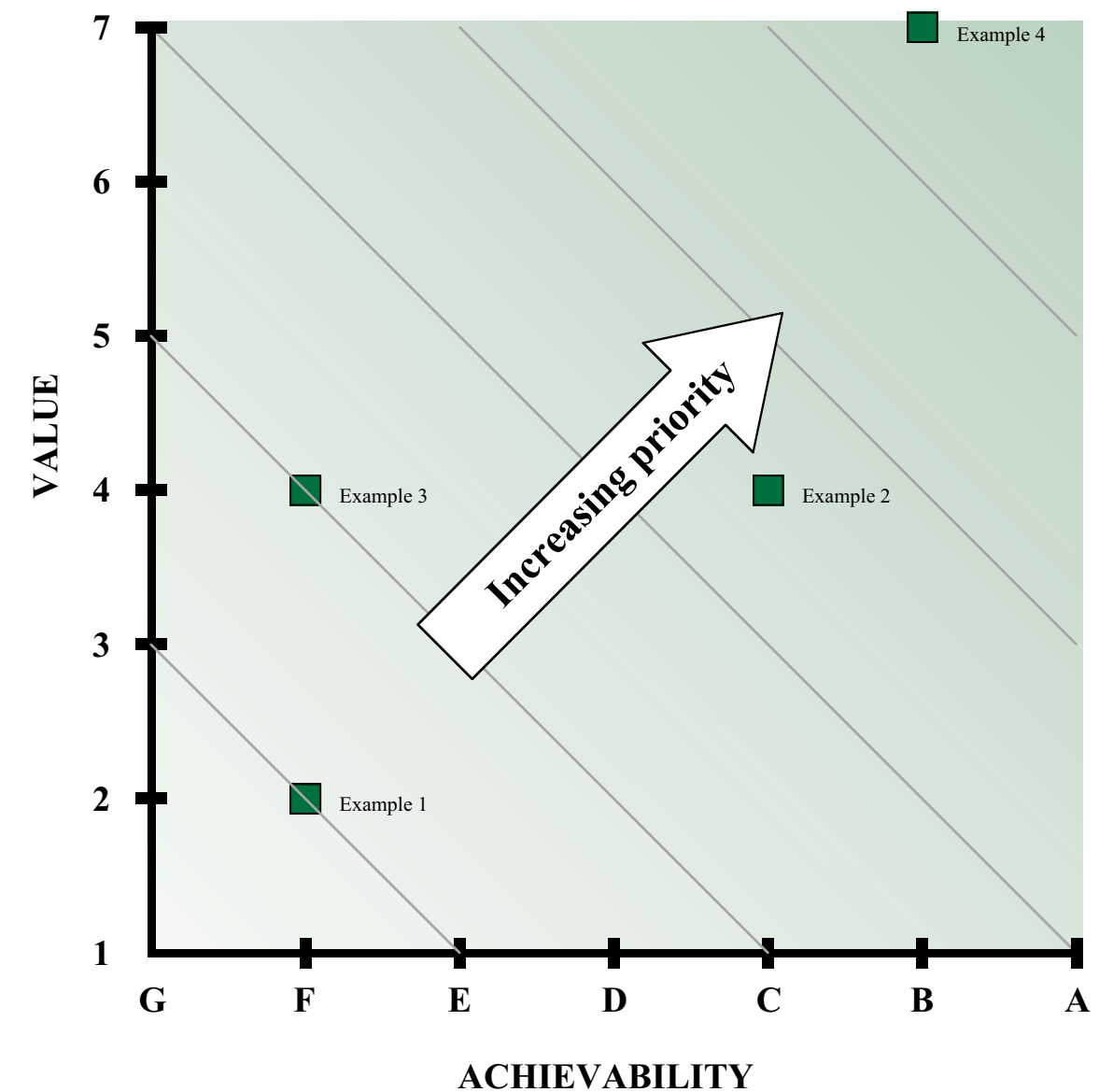
	Example 1	Example 2	Example 3	Example 4
Value score	2	4	4	7
Achievability score	F	C	F	B

### STEP 3: Relating the value and achievability of each RCS action to determine overall priority

The relative priority of each action will be expressed by relating the value and achievability scores on the chart shown in Figure 1 below.

Figure 35 shows how example project 3 is of greater estimated priority than example project 1. The actual determination of whether to invest in one or both these actions might be the subject of discussion through the annual Regional Catchment Investment Plan process. This prioritisation process provides that discussion with a systematic analysis as a starting point.

**Figure 35: Determining the overall priority of RCS actions**



## The future: Assessing the combined effect of multiple risks and actions

While the above prioritisation method provides a way of comparing the relative worth of individual actions, it is not a spatial approach; it does not examine the options for change across whole landscapes where multiple and overlapping risks and remedial actions could affect many assets.

Integrated catchment management aims to consider how multiple actions can combine to improve the quality of natural resources. Some actions can apply to region-wide problems that cross catchment boundaries such as weeds, institutional arrangements or landholder expertise.

Hence, in a large area, where there may be many threats to various assets, the current prioritisation method may underestimate the severity of risks and the worth of actions, which, in combination across a landscape, could have greater effect than is suggested by their individual assessment.

This aspect of the prioritisation method will require further development.

## 10.2 Likely immediate priorities

The community consultations for this review, the Regional Catchment Investment Planning [RCIP] process and the development of other sub-regional plans, such as the Regional Weed Action Plan, have revealed a number of issues as being highly important to address in the region. Ten of these significant regional issues, and the most relevant RCS action designed to address each issue, are listed below and have been assessed for relative priority using the method described in Section 10.1.

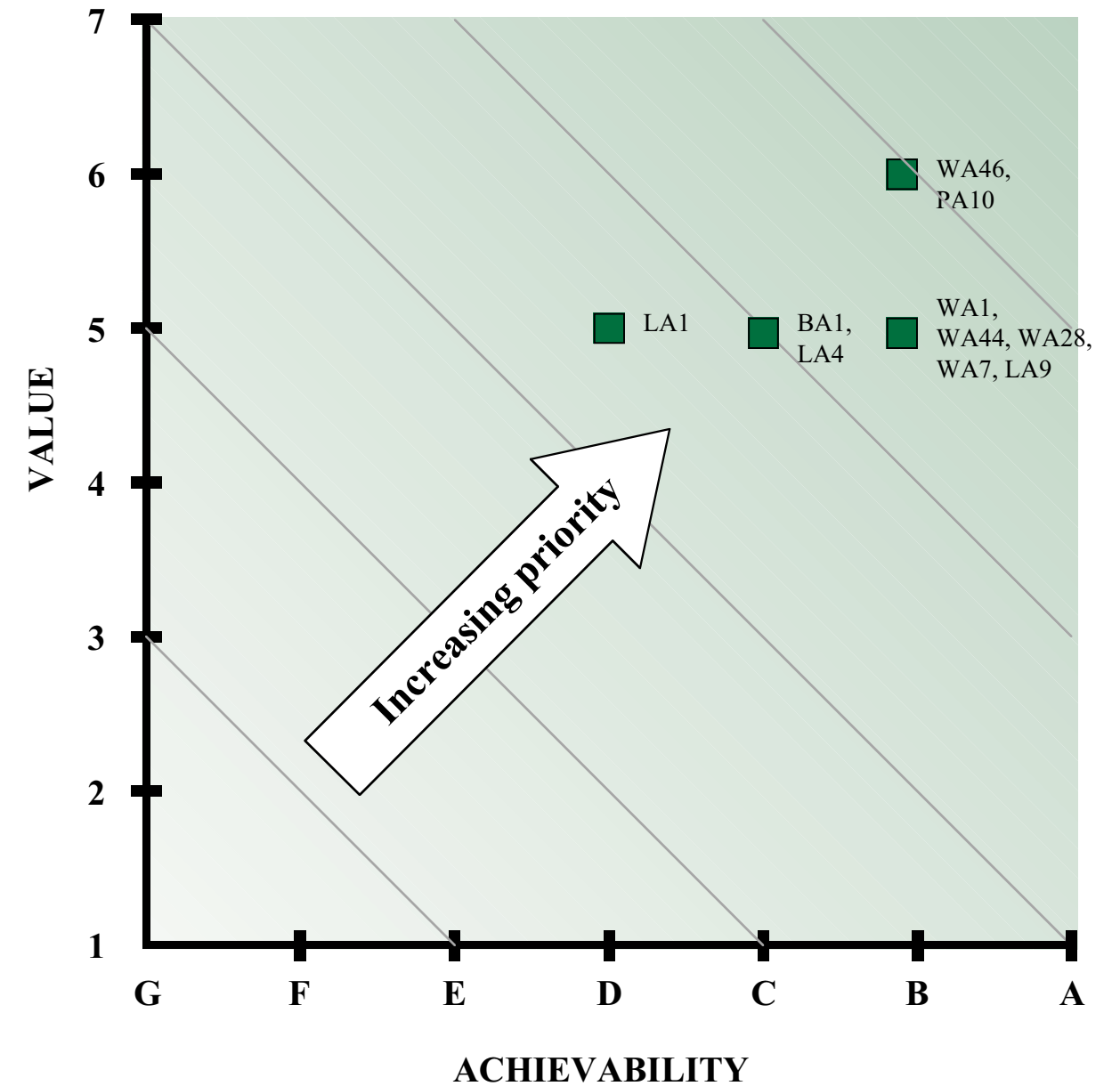
Issue	RCS Action
• Lack of a waterway manager for 40% of the region's rivers and streams (including sections in public land)	WA1
• Loss of biodiversity through native vegetation removal	BA1
• Nitrogen loads entering Port Phillip Bay	WA44
• Sediments entering Western Port	WA46
• Declining or unknown condition of wetlands across the region	WA28
• Condition of waterways across the region	WA7
• Increased incidence of salinity throughout the region, including urban areas	LA4
• Many new landholders with little land management expertise moving into the region's rural areas.	LA1
• Major infestations of serrated tussock	LA9
• Land, water and biodiversity assets in urban and rural areas subject to complex mixes of urban and intensive agriculture pressures.	PA10

Table 16 lists the results of an interim application of the method described in Section 10.1 for these ten actions. The results are shown graphically on Figure 36.

Table 16: Results of the interim application of the prioritisation method for 10 RCS actions

Action	Benefit scores	Cost scores	Overall value score	Achievability scores	Overall achievability grade	Priority chart coordinates
WA1: Implement the relevant directions of the 'White Paper – Securing our Water Future Together'	4 4 4	1 3 4	5	4+5+4+ 3+4+5 = 25	B	5B
BA1: Finalise and implement the regional Native Vegetation Plan including programs to protect, maintain and enhance existing high quality vegetation, increase connectivity and revegetate heavily-depleted native vegetation types	4 4 3	2 3 3	5	4+4+3+ 3+3+4 = 21	C	5C
WA44: Implement the Port Phillip Bay Environmental Management Plan to reduce the average annual nitrogen input into Port Phillip Bay by 1,000 tonnes, and review and extend the plan to address additional risks to the Bay	4 4 3	1 1 5	5	4+4+3+ 3+4+5 = 23	B	5B
WA46: Initiate research and major integrated programs to identify the specific sources, and reduce the inputs of, sediment and other pollutants to Western Port	4 4 4	1 1 5	6	4+5+3+ 3+4+5 = 24	B	6B
WA28: Develop and apply an Index of Wetland Condition method to determine the overall health of wetlands in the region and establish a benchmark to measure change into the future	5 4 2	3 3 3	5	4+3+3+ 3+5+5 = 23	B	5B
WA7: Implement the Port Phillip and Westernport Regional River Health Strategy	4 4 4	1 3 5	5	3+4+3+ 4+5+5 = 24	B	5B
LA4: Undertake detailed mapping and modelling of salinity hotspots as a basis for completing and implementing the regional Salinity Management Plan	4 4 4	1 3 4	5	5+3+3+ 3+4+4 = 22	C	5C
LA1: Develop a comprehensive profile and understanding of rural land ownership and regional demographics as a basis for determining appropriate land use and management	3 4 3	1 2 3	5	3+2+3+ 3+3+3 = 17	D	5D
LA9: Implement the regional Weed and Rabbit Action Plans	4 4 5	2 2 5	5	5+5+2+ 3+3+5 = 23	B	5B
PA10: In the catchments in the region, develop and begin implementing major projects that fully engage and involve key stakeholders and that attract major new funding	4 5 4	1 3 5	6	4+3+4+ 3+4+5 = 23	B	6B

Figure 36: Results of the interim application of the method prioritisation method for 10 RCS actions



## 10.3 Preparation for implementation

For each RCS action, an organisation is listed that could reasonably take the lead role in seeing that the action is implemented. Depending on the nature of the action, this may involve directly planning and undertaking the action, or it might involve facilitating and coordinating others to undertake the action in a partnership.

The key partners listed in the tabular description of each action are included as a preliminary guide to some of the organisations that are envisaged to be crucial in the planning and implementation of each action. The list of key partners is not exhaustive.

The initial task of the lead organisation for each action is the preparation of an Action Implementation Brief. An initial description of the expectations for each action has been included in this RCS, but the Action Implementation Briefs will scope this in more detail. The briefs will describe the scale of work required, the steps and timing involved, links to other actions, potential sources of funding and cost sharing requirements, roles of key partners, delivery mechanisms, methodologies and potential project management arrangements.

A consistent format for the Action Implementation Briefs will be developed, and the key details will be incorporated into a central RCS Action Tracking Database, as referred to in Action MA5 in Chapter 9 on monitoring, evaluation and reporting. This database will be a key mechanism for monitoring and reporting on progress in implementation of the RCS.

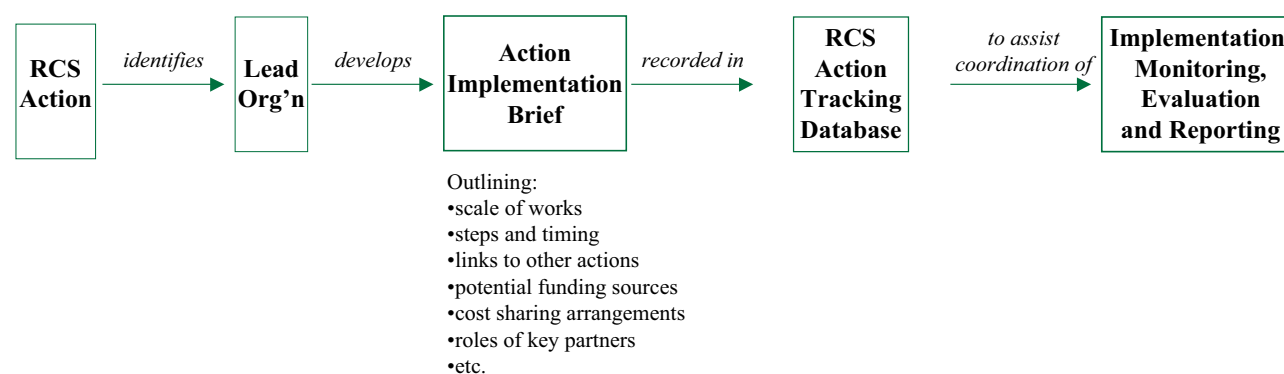


Figure 37: Flowchart of key steps in preparing for RCS implementation

## 10.4 Funding

It is recognised that the capacity of organisations to meet the RCS targets and implement actions will be dependent on the availability of resources. However, it is envisaged that the RCS will be used by organisations as a sound basis for seeking and securing funding for the delivery of actions.

It is also recognised that there would need to be a substantial increase in investment in the region for all of the RCS actions to be fully implemented. To make best use of the available funds, it is important to generate and coordinate investment from various public and private sector sources. The key sources of funding and other resources to implement the RCS and its actions include the following.

### Core business operations of key organisations in the region

Many organisations contribute to catchment management in this region through the annual development and delivery of their own programs. Key organisations include water authorities, local government, government agencies and research institutions.

For example, Melbourne Water is a major operational organisation responsible for the management of bulk water supply, sewerage, waterways, environmental water reserves, regional drainage and floodplains. The organisation has annual business operations worth hundreds of millions of dollars, of which a proportion is directed to planning, research and on-ground works to implement the Regional River Health Strategy and making a major contribution to the health of the region's catchment assets.

Similarly, the collective of local governments is one of the major investors in and practitioners of catchment management actions in the Port Phillip and Western Port region – the collective financial investment by councils in direct catchment management activities in the region was estimated recently at \$75 million per annum.

While major organisations are very important, the collective works and expenditure of individual landowners, land managers and householders probably significantly surpass their contributions. These people constantly expend funds and other resources on the management of their privately-owned assets, but simultaneously provide public benefits by contributing to the health of the region's catchment assets.

Annual investment decisions will continue to be made by organisations and individuals but there will be opportunities to discuss with them the priorities of the RCS, to raise awareness of regional issues and to influence their planning and expenditure to generate partnerships and enhance coordination and cooperation.

### Regional Catchment Investment Plan

Important State and Commonwealth Government funds are directed annually through a Regional Catchment Investment Plan (RCIP) process. This process has evolved in Victoria over recent years to allocate Natural Heritage Trust funds and components of State Government funds in this region, aimed specifically at implementation of the RCS.

However, this process does not yet include some key funding sources and particularly needs to include other sources of State Government funding through its key departments. This would enhance cooperation and coordination between key stakeholders such as State Government agencies and local government, and would increase ownership of the RCS and commitment to its implementation.

While the funding inputs to this process are currently limited to a few key sources, the funding that flows out of the process is allocated to many organisations including agencies, water authorities, local government and community groups.

In recent years, these organisations have developed project bids for the funding. However, when the RCS is accredited, the Regional Catchment Investment Plan process will be streamlined and focussed. The Port Phillip and Western Port Catchment Management Authority will lead the commissioning of specific projects for the Regional Catchment Investment Plan in line with the priority RCS actions.

*It is envisaged that the RCS will be used by organisations as a sound basis for seeking and securing funding for the delivery of actions*

This will include exploration of structures and partnerships that can:

- Effectively design and deliver priority projects with multiple partners
- Generate collaboration and empowerment of key stakeholders
- Enhance coordination
- Leverage new funds for catchment management
- Enhance integration of works and programs.

### Other State and Commonwealth Government initiatives

Other initiatives can at times be appropriate sources of funds for particular RCS actions.

Examples of existing Commonwealth Government initiatives include the National Landcare Program and the Envirofund. Examples of State Government initiatives that will be important in coming years include the Water Trust and the environmental contribution from water pricing as outlined in the recently released Victorian Government Water White Paper “Securing Our Water Future Together”.

### Private sector

There are increasing contributions by the private sector to catchment management projects, particularly through investment in major projects. These offer significant opportunities for securing new funds that can be directed to the implementation of priority RCS actions.

Major projects are proving to be attractive to companies, philanthropists and other private investors when they can deliver multiple outcomes, local benefits relevant to the investor, promotional opportunities, commercial returns, educational value and/or opportunities for staff involvement. Existing examples of projects that are securing corporate sponsorship include the Grow West project near Bacchus Marsh and the Hills to Ocean project in the South Gippsland Landcare Network area.

## 10.5 Coordination and integration

The RCS sets many actions to be implemented. Some are existing actions that need to continue while others are new initiatives.

Individual actions often have multiple linkages and benefits. This means that actions can be grouped in various ways to highlight linkages between:

- types of actions (eg. research actions, monitoring actions, on-ground works, planning actions)
- actions to be coordinated locally for certain geographic areas (eg. Yarra Valley, Western Port catchment, urban area)
- actions to address certain threats and risks (eg. actions related to the management of salinity or nitrogen)
- actions relevant to particular stakeholder groups (eg. local government).

For example, there are a number of objectives, targets and actions relating to monitoring, evaluation and reporting which have been grouped in Chapter 9 of the RCS. While the actions are important to implement individually, each of the monitoring, evaluation and reporting actions should also be planned and undertaken within a regional program aimed at better understanding catchment condition and processes.

The summary table in Section 11.2 groups relevant objectives, targets and actions to highlight some of the other synergies and inter-relationships that exist. An individual objective, target or action can appear in a number of these groups.

For example, there are various objectives, targets and actions related to issues such as the management of nitrogen, the future of agriculture and the role of local government. These groupings are highlighted in the table in Section 11.2. In some cases, especially for a key stakeholder group such as local government, a special tailored schedule of the RCS will be developed once the RCS is accredited and used as the basis for communication and negotiation with the relevant organisations on the implementation of the RCS.

The links highlighted in Section 11.2, and the links within the management of catchment assets discussed through Chapters 5-8, will need to be considered whenever any individual action is being planned or implemented. This will ensure there is cooperation between the organisations responsible for implementing the actions and coordination at a regional scale. In some situations, there will be a need for partnerships, formal arrangements and/or governance structures that can ensure an adequate level of coordination and cooperation is achieved.



## LINKAGES

# 11. LINKAGES across Objectives, Targets and Actions

## 11.1 Relationship to the National framework for targets

Through the Natural Resource Management Ministerial Council, there is a national framework of targets for which regions need to set their own regional targets. The national framework contains three broad types of targets:

- Aspirational targets - aspirational statements about the desired condition of the natural resources in the longer term, used to guide regional planning and set a context for more measurable short-term targets.
- Resource condition targets - specific and measurable targets for the condition of catchment assets and their values, often with a timeframe in the range of 10-20 years.
- Management action targets - short term targets relating mainly to actions or capacity-building, which contribute to achievement of the resource condition targets and aspirational targets.

In this RCS, we have developed a framework of objectives (comparable to aspirational targets), targets (comparable to resource condition targets) and actions (comparable to management action targets).

Within the national framework, there is also an identified minimum set of “matters for targets” for which all regions must set targets in order to gain accreditation. These matters for targets have been addressed in this RCS as shown in the table in Section 11.2.



## 11.2 Summary of RCS objectives, targets and actions in the National framework

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Land salinity (National matter for target)	LO2 - Protect and improve the health of land	LT2 - No more than a 10 per cent increase (from 2004 levels) in the area with shallow water tables (<2m) and the area of saline discharge	LA4 - Undertake detailed mapping and modelling of salinity hotspots as a basis for completing and implementing the regional Salinity Management Plan
Soil condition (National matter for target)	LO2 - Protect and improve the health of land	LT2 - No more than a 10 per cent increase (from 2004 levels) in the area with shallow water tables (<2m) and the area of saline discharge LT3 - The structure and biological health of the region's soils maintained LT5 - 'Long-term' rabbit control achieved on 400,000 ha of rural land by 2008 LT7 - Increase the area for which rural land use matches land capability	WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources LA2 - Develop a comprehensive risk assessment of rural and urban-rural land use compared to land capability LA3 - Develop and apply a comprehensive risk assessment of soil health as a basis for development of a Regional Soil Health Plan LA4 - Undertake detailed mapping and modelling of salinity hotspots as a basis for completing and implementing the regional Salinity Management Plan LA10 - Design and deliver programs to achieve adoption of environmental management systems across 25 per cent of the region's commercial horticulture, viticulture, dairying and intensive animal enterprises LA9 - Implement the regional weed and rabbit action plans
Ecologically significant invasive species (National matter for target)	WO5 - Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety LO5 - Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit BO5 - Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species	LT4 - No establishment of 'new and emerging' weed species, and no further spread of 'high-priority established' weeds LT5 - 'Long-term' rabbit control across 400,000 ha of rural land by 2008 BT9 - No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region	BA8 - Assess the risks to biodiversity from pest plants and animals, and establish integrated management programs to reduce the impact of environmental weeds and pest animals on native vegetation and fauna BA13 - Develop and implement programs to prevent the introduction and spread of marine pests in the region

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Significant native species and ecological communities (National matter for target)	WO5 - Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety LO3 - Ensure sensitively located and functional urban areas with minimal impacts on the region's biodiversity, water resources and heritage values LO4 - Match rural land-use, development and management to land capability and minimise impacts on the region's biodiversity, water resources and heritage values BO1 - Achieve a net gain in the quantity and quality of indigenous vegetation BO2 - Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments BO3 - Achieve sustainable populations of indigenous flora and fauna species BO4 - Improve connectivity and long-term security of indigenous habitats and species BO5 - Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species	WT15 - No net loss in the extent and health of wetlands of each existing type WT18 - A net gain in the extent and quality of native coastal vegetation, as measured by habitat hectares LT10 - Increase the environmental quality of parks and other public land, and the community satisfaction with these features BT1 - The total extent of indigenous vegetation increased to at least 35% of the region by 2030 BT2 - At least 95% of the region's ecological vegetation classes (EVC) represented to at least 10% of their pre-1750 extent by 2030 BT3 - A net gain in the quality and extent of native vegetation in the region, with the total "habitat hectares" increased by 10% by 2030 BT4 - All ecological vegetation classes in the region to have at least 15% of their current extent protected by 2030 BT5 - Reduce the number of threatened flora species to less than 250 by 2030, and reduce the number of threatened fauna species to less than 100 by 2030, with no further regional extinctions BT7 - Increase the diversity of native species in modified landscapes and aquatic systems BT8 - Achieve a net gain in the extent and quality of seagrass communities by 2020 and retain the extent of all other broad marine habitat classes in the region at 2004 levels BT9 - No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region	WA32 - Implement Wetland Management Plans for all three Ramsar wetland areas in the region (Port Phillip – Western Shoreline, Western Port and Edithvale-Seafood) WA37 - Develop and implement plans to increase the extent and quality of coastal ecological vegetation classes BA1 - Finalise and implement the regional Native Vegetation Plan including programs to protect, maintain or enhance existing high quality vegetation, increase connectivity and revegetate heavily-depleted native vegetation types BA2 - Strengthen the controls on the clearing of native vegetation and ensure adequate implementation and enforcement BA3 - Undertake a program of education, training and support for local government and other organisations to achieve consistency in the understanding and application of operational guidelines for vegetation protection and other mechanisms to achieve net gain BA4 - Undertake further mapping of native vegetation extent to assist vegetation protection measures by State government, local government and community groups BA5 - Assess and map the habitat hectare values of native vegetation in the region BA6 - Increase the area and quality of heavily depleted vegetation types protected in parks/reserves or under covenant programs BA7 - Develop and implement mechanisms to offset native vegetation clearance and achieve a net gain in habitat hectares BA8 - Assess the risks to biodiversity from pest plants and animals, and establish integrated management programs to reduce the impact of environmental weeds and pest animals on native vegetation and fauna BA9 - Develop and implement Biodiversity Action Plans, Flora and Fauna Guarantee Action Statements and recovery programs for threatened species and communities in the region's terrestrial and aquatic systems



Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Inland aquatic ecosystem integrity – rivers (National matter for target)	<p>WO1 – Ensure efficient management of water resources with minimal new impact on natural hydrological processes</p> <p>WO2 - Protect and improve the environmental health and social and economic values of waterways and wetlands</p> <p>WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas</p> <p>WO5 - Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety</p> <p>LO3 - Ensure sensitively located and functional urban areas with minimal impacts on the region's biodiversity, water resources and heritage values</p> <p>LO4 - Match rural land-use, development and management to land capability and minimise impacts on the region's biodiversity, water resources and heritage values</p> <p>BO2 - Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments</p>	<p>WT1 - Average potable water consumption per person to be reduced by 15% by 2010</p> <p>WT2 - The volume of recycled water used in the region increased to 20% of the total treated volume by 2010</p> <p>WT3 - Diversions from all waterways to be within Sustainable Diversion Limits by 2015</p> <p>WT5 - Maintain the condition of the 13% of the region's rivers that are currently in excellent condition</p> <p>WT6 - Improve the condition of the region's waterways so that:</p> <ul style="list-style-type: none"> <li>At least 50% of all natural waterways will be in good or excellent condition by 2014</li> <li>All natural waterways will be in good or excellent condition by 2025</li> </ul> <p>WT7 - Progressive improvement in the condition of waterways across the region as measured by the Index of Stream Condition, including beds and banks, streamside zone and aquatic life</p> <p>WT8 - Improve the water quality in rivers and streams so that:</p> <ul style="list-style-type: none"> <li>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</li> <li>All monitoring sites attain SEPP objectives or regional targets by 2030</li> </ul> <p>WT10 - No loss of hydraulic capacity and environmental values of flood plains</p> <p>BT7 - Increase the diversity of native species in modified landscapes and aquatic systems</p> <p>BT9 - No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region</p>	<p>WA1 - Implement the relevant directions of the 'White Paper –Securing our water future together'</p> <p>WA2 - Determine, and ensure compliance with Sustainable Diversion Limits and Bulk Water Entitlements for the region.</p> <p>WA3 - Implement the State Government's policy for the establishment of diversion caps and an environmental reserve for the region's rivers</p> <p>WA4 - Complete Stream Flow Management Plans for priority waterways plus additional waterways as required</p> <p>WA5 - Develop local stream flow management rules for waterways where Stream Flow Management Plans are not required</p> <p>WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources</p> <p>WA7 - Implement the Port Phillip and Westernport Regional River Health Strategy.</p> <p>WA15 - Investigate the hydrological and ecological relationships between ground and surface waters and develop catchment-based water budgets</p> <p>WA18 - Continue regular assessment of the Index of Stream Condition across the region.</p> <p>BA12 - Develop and implement Fishery Management Plans for the region</p> <p>BA14 - Investigate and record the diversity of native freshwater fish species in the region and the extent and health of the populations, and establish links between this data and planning approval processes</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Inland aquatic ecosystem integrity – wetlands (National matter for target)	<p>WO1 - Ensure efficient management of water resources with minimal new impact on natural hydrological processes</p> <p>WO2 - Protect and improve the environmental health and social and economic values of waterways and wetlands</p> <p>WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas</p> <p>WO5 - Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety</p> <p>LO3 - Ensure sensitively located and functional urban areas with minimal impacts on the region's biodiversity, water resources and heritage values</p> <p>LO4 - Match rural land-use, development and management to land capability and minimise impacts on the region's biodiversity, water resources and heritage values</p>	<p>WT8 - Improve the water quality in rivers and streams so that:</p> <ul style="list-style-type: none"> <li>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</li> <li>All monitoring sites attain SEPP objectives or regional targets by 2030</li> </ul> <p>WT9 - No loss of hydraulic capacity and environmental values of flood plains</p> <p>WT15 - No net loss in the extent and health of wetlands of each existing type</p> <p>WT16 – Progressively improve the overall health and social value of natural wetlands, including those that are nationally and internationally recognised</p>	<p>WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources</p> <p>WA7 - Implement the Port Phillip and Westernport Regional River Health Strategy.</p> <p>WA28 - Develop and apply an Index of Wetland Condition method to determine the overall health of wetlands in the region and establish a benchmark to measure change into the future.</p> <p>WA29 - Consolidate and distribute data on regional wetlands to relevant stakeholders, including local government, landholders and Kulin people</p> <p>WA30 - Develop a Regional Wetland Plan to establish and implement priorities for investment.</p> <p>WA31 - Develop planning policy and protocols that contribute to the protection of wetlands, and incorporate them in relevant planning schemes</p> <p>WA32 - Implement Wetland Management Plans for all three Ramsar wetland areas in the region (Port Phillip – Western Shoreline, Western Port and Edithvale-Seaford)</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Estuarine and marine habitat integrity (National matter for target)	<p>WO3 - Protect and improve the environmental health and social and economic values of estuarine, coastal and marine systems</p> <p>WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas</p> <p>BO2 - Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments</p>	<p>WT8 - Improve the water quality in rivers and streams so that:</p> <ul style="list-style-type: none"> <li>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</li> <li>All monitoring sites attain SEPP objectives or regional targets by 2030</li> </ul> <p>WT21 - Improve water quality in estuaries, bays and seas so that all monitoring sites attain State environment protection policy objectives or regional targets by 2030</p> <p>WT22 - Reduce the average annual nitrogen levels entering Port Phillip Bay by 1000 tonnes by 2006</p> <p>WT23 - Reduce by 2015 the total sediment load annually entering Western Port, as measured against existing benchmarks</p> <p>WT24 - Reduce the amount of litter and other gross pollutants entering Port Phillip Bay and Western Port by 70% by 2015</p> <p>BT8 - Achieve a net gain in the extent and quality of seagrass communities by 2020 and retain the extent of all other broad marine habitat classes in the region at 2004 levels</p> <p>BT9 - No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region</p> <p>BT10 - Total annual seafood catch by both commercial and recreational fisheries to be maintained at ecologically sustainable levels</p>	<p>WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources</p> <p>WA34 - Communicate the requirements of contingency plans for oil spills to all relevant stakeholders</p> <p>WA41 - Continue to investigate marine ecosystems and the links with key threatening processes and identify an appropriate set of indicators and targets</p> <p>WA42 - Research the health of and risks to estuaries in the region</p> <p>WA44 - Implement the Port Phillip Bay Environmental Management Plan with a focus on reducing the annual nitrogen input into Port Phillip Bay by 1,000 tonnes per year and review and extend the plan to address additional risks to the Bay</p> <p>WA46 - Initiate research and major integrated programs to identify the specific sources and reduce the inputs of sediments, nutrients and other pollutants to Western Port</p> <p>WA47 - Refine and implement key actions in municipal Stormwater Management Plans to reduce inputs of sediments, nutrients, toxicants and litter to the bay</p> <p>WA48 - Implement ammonia reduction work at the Eastern Treatment Plant by 2007</p> <p>WA51 - Ensure adoption of best management practices for marine dredging</p> <p>WA52 - Regularly review the marine pollution contingency plans to ensure world's best practice procedures are incorporated</p> <p>WA53 - Develop and implement a coordinated monitoring, evaluation and reporting framework regarding the condition of the region's marine environment, risk and effectiveness of actions</p> <p>BA11 - Develop and implement Action Plans for the region's 8 Marine Protected Areas and other areas with special values</p> <p>BA12 - Develop and implement Fishery Management Plans for the region</p> <p>BA13 - Develop and implement programs to prevent the introduction and spread of marine pests in the region</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Coastal habitat integrity (National matter for target)	<p>WO3 - Protect and improve the environmental health and economic values of estuarine, coastal and marine systems</p> <p>WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas</p>	<p>WT17 - Reduce the proportion of coast in the region where environmental values, recreational beaches, Indigenous cultural values and public infrastructure are at high risk from accelerated coastal erosion and other degrading processes.</p> <p>WT18 - A net gain in the extent and quality of native coastal vegetation as measured by habitat hectares</p>	<p>WA35 - Map areas susceptible to inundation in Port Phillip Bay, and Western Port.</p> <p>WA36 - Map the occurrence of coastal acid sulphate soils and develop overlays for inclusion in relevant planning schemes</p> <p>WA37 - Develop and implement plans to increase the extent and quality of coastal ecological vegetation classes</p> <p>WA38 - Ensure planning schemes in coastal areas reflect the content of the Victorian Coastal Strategy</p> <p>WA39 - Audit coastal public facilities and develop guidelines for coastal infrastructure that reflect environmental and social values and provide for public access and use</p> <p>WA40 - Identify coastal areas with significant stormwater and sewage effluent discharge directly to the bays and implement programs to manage the quantity and quality of these discharges</p> <p>WA49 - Implement priority litter management programs that include installation of gross pollutant traps at key sites on drainage systems</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
<p>Nutrients in aquatic environments (National matter for target)</p>	<p>WO4 – Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas</p>	<p>WT8 - Improve the water quality in rivers and streams so that:</p> <ul style="list-style-type: none"> <li>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</li> <li>All monitoring sites attain SEPP objectives or regional targets by 2030</li> </ul> <p>WT21 - Improve water quality in estuaries, bays and seas so that all monitoring sites attain State environment protection policy objectives or regional targets by 2030</p> <p>WT22 - Reduce the average annual nitrogen levels entering Port Phillip Bay by 1000 tonnes by 2006</p>	<p>WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources</p> <p>WA9 - Complete an audit of stormwater management plan implementation for all municipalities and design and implement a program to address key gaps</p> <p>WA10 - Meet best practice standards in urban stormwater discharges in new urban areas</p> <p>WA17 - Review and implement a surface and ground water quality monitoring system to ensure adequate and coordinated coverage across the region, including reservoirs, high discharge areas, bays and seas, high rainfall events and nutrient loads</p> <p>WA40 - Identify coastal areas with significant stormwater and sewage effluent discharge directly to the bays and implement programs to manage the quantity and quality of these discharges</p> <p>WA44 - Implement the Port Phillip Bay Environmental Management Plan with a focus on reducing the annual nitrogen input into Port Phillip Bay by 1,000 tonnes per year and review and extend the plan to address additional risks to the Bay</p> <p>WA45 - Investigate and pilot ways for new nitrogen inputs to Port Phillip Bay to be offset by reduced inputs from elsewhere</p> <p>WA46 - Initiate research and major integrated programs to identify the specific sources and reduce the inputs of sediments, nutrients and other pollutants to Western Port</p> <p>WA47 - Refine and implement key actions in municipal Stormwater Management Plans to reduce inputs of sediments, nutrients, toxicants and litter to the bay</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
<p>Turbidity/suspended particulate matter in aquatic environments (National matter for target)</p>	<p>WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas</p>	<p>WT8 - Improve the water quality in rivers and streams so that:</p> <ul style="list-style-type: none"> <li>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</li> <li>All monitoring sites attain SEPP objectives or regional targets by 2030</li> </ul> <p>WT23 - Reduce, by 2015, the total sediment load annually entering Western Port, as measured against existing benchmarks</p>	<p>WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources</p> <p>WA9 - Complete an audit of stormwater management plan implementation for all municipalities and design and implement a program to address key gaps</p> <p>WA10 - Meet best practice standards in urban stormwater discharges in new urban areas</p> <p>WA17 - Review and implement a surface and ground water quality monitoring system to ensure adequate and coordinated coverage across the region, including reservoirs, high discharge areas, bays and seas, high rainfall events and nutrient loads</p> <p>WA18 - Continue regular assessment of the Index of Stream Condition across the region.</p> <p>WA46 - Initiate research and major integrated programs to identify the specific sources and reduce the inputs of sediments, nutrients and other pollutants to Western Port</p> <p>WA47 - Refine and implement key actions in municipal Stormwater Management Plans to reduce inputs of sediments, nutrients, toxicants and litter to the bay</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Surface water salinity in freshwater aquatic environments (National matter for target)	WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas	<p>WT8 - Improve the water quality in rivers and streams so that:</p> <ul style="list-style-type: none"> <li>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</li> <li>All monitoring sites attain SEPP objectives or regional targets by 2030</li> </ul>	<p>WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources</p> <p>WA15 - Investigate the hydrological and ecological relationships between surface waters and groundwater and develop catchment-based water budgets</p> <p>WA17 - Review and implement a surface and ground water quality monitoring system to ensure adequate and coordinated coverage across the region, including reservoirs, high discharge areas, bays and seas, high rainfall events and nutrient loads</p> <p>WA18 - Continue regular assessment of the Index of Stream Condition across the region.</p> <p>LA4 - Undertake detailed mapping and modelling of salinity hotspots as a basis for completing and implementing the regional Salinity Management Plan</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Groundwater (National matter for target)	<p>WO1 - Ensure efficient management of water resources with minimal new impact on natural hydrological processes</p> <p>WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas</p>	<p>WT11 - Levels of extraction from each GMA in the region to be within the permissible annual volume by 2009</p> <p>WT12 - Groundwater levels in key regional aquifers to be stabilised at sustainable levels by 2025</p> <p>WT13 - Progressively increase the average value of production per megalitre of groundwater extracted</p> <p>WT14 - All groundwater monitoring sites to attain State environmental protection policy objectives or regional targets by 2030</p>	<p>WA15 - Investigate the hydrological and ecological relationships between surface waters and groundwater and develop catchment-based water budgets</p> <p>WA16 - Benchmark rural water use efficiency in major agricultural areas and increase water use efficiency by agricultural industries</p> <p>WA19 - Clarify the organisational arrangements for the management of aquifers and groundwater in this region</p> <p>WA20 - Further develop the regional risk assessment model to identify the level of risk facing groundwater assets</p> <p>WA21 - Complete Groundwater Management Plans for all GMAs with allocations that approach or exceed their permissible annual volume</p> <p>WA22 - Assess the practices and efficiency of groundwater use in GMAs and develop strategies to achieve higher efficiency and sustainable use of groundwater</p> <p>WA23 - Develop and implement groundwater quality management plans for GMAs with a high level of risk to groundwater quality</p> <p>WA24 - Develop guidelines and codes of practice for the management of risks to groundwater quality, and undertake programs with relevant land and water managers</p> <p>WA25 - In the local governments that contain GMAs, develop planning scheme guidelines/regulations to protect groundwater quality</p> <p>WA26 - Meter all significant existing groundwater extractions used for commercial and irrigation purposes and all new licenses and monitor groundwater levels within key aquifers to assess trends in relation to sustainable levels</p> <p>WA27 - Develop and implement a comprehensive regional ground water quality monitoring and evaluation program</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Sustainable production	LO1 - Achieve prosperous and sustainable primary production systems	LT1 - Increase the overall real net farm income per hectare and increase the proportion of rural land being used for profitable and sustainable agriculture BT10 - Total annual seafood catch by both commercial and recreational fisheries to be maintained at ecologically sustainable levels	LA1 - Develop a comprehensive profile and understanding of rural land ownership in the region as a basis for determining appropriate land use and management. LA5 - Develop and implement a strategic plan to promote productive and sustainable agriculture in the region LA7 - Investigate and promote market-based mechanisms that reward landholders providing environmental services LA8 - Capitalise on opportunities within greenhouse gas abatement programs to create carbon dioxide sinks and modify production systems LA10 - Design and deliver programs to achieve adoption of environmental management systems across 25 per cent of the region’s commercial horticulture, viticulture, dairy and intensive animal enterprises LA11 - Implement the regional Farm Forestry Action Plan to increase the area of farm forestry in the region by 25 per cent BA12 - Develop and implement Fishery Management Plans for the region
Open space	LO5 - Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit	LT6 - All new urban development kept within urban growth and township boundaries LT9 - Increase the ratio of urban open space to total urban area and the connectivity between regional open space and habitat assets LT10 - Increase the environmental quality of parks and other public land, and the community satisfaction with these features	LA6 - Develop and implement urban growth area and green wedge action plans, as identified in Melbourne 2030, in line with the principles, objectives and targets of the RCS LA12 - Increase and extend the park system in the region, and implement best management practices for parks and other public land LA13 - Ensure that urban design considers landscape and catchment values through the development of performance standards for planning applications and building permits that include water sensitive design and other environmental and catchment parameters

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Public infrastructure protection	WO5 - Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety	WT9 - No loss of hydraulic capacity and environmental values of flood plains WT10 - Timely flood warnings provided for all major waterways and risks to infrastructure minimised WT17 - Reduce the proportion of coast in the region where environmental values, recreational beaches, Indigenous cultural values and public infrastructure are at high risk from accelerated coastal erosion and other degrading processes.	WA11 - Reduce by 500 the number of properties vulnerable to a one in 100 years flood WA12 - All new developments constructed with floor levels at the required safety margin above one in 100 years flood levels WA33 - Investigate, assess and manage accelerated coastal erosion and other degrading processes at high value sites where recreation, heritage, Indigenous culture, environmental values and public infrastructure are at risk WA35 - Map areas susceptible to inundation in Port Phillip Bay, and Western Port
Urban development	LO3 - Ensure sensitively located and functional urban areas with minimal impacts on the region’s biodiversity, water resources and heritage values	LT6 - All new urban development kept within urban growth and township boundaries	WA10 - Meet best practice standards in urban stormwater discharges in new urban areas WA12 - All new developments constructed with floor levels at the required safety margin above one in 100 years flood levels LA6 - Develop and implement urban growth area and green wedge action plans, as identified in Melbourne 2030, in line with the principles, objectives and targets of the RCS LA13 - Ensure that urban design considers landscape and catchment values through the development of performance standards for planning applications and building permits that include water sensitive design and other environmental and catchment parameters

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Rural land management	<p>WO1 - Ensure efficient management of water resources with minimal new impact on natural hydrological processes</p> <p>LO1 – Achieve prosperous and sustainable primary production systems</p> <p>LO2 – Protect and improve the health of land</p> <p>LO3 - Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the region’s biodiversity, water resources and heritage values</p> <p>LO4 - Match rural land-use, development and management to land capability and minimise impacts on the region’s biodiversity, water resources and heritage values</p> <p>BO5 - Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species</p>	<p>WT4 – Improved average value of irrigated agricultural production per megalitre</p> <p>WT13 – Progressively increase the average value of production per megalitre of groundwater extracted</p> <p>L T1 – Increase the overall real net farm income per hectare and increase the proportion of rural land being used for profitable and sustainable agriculture</p> <p>L T3 – The structure and biological health of the region’s soils maintained</p> <p>L T4 – No establishment of ‘new and emerging’ weed species, and no further spread of ‘high-priority established’ weeds</p> <p>L T5 – ‘Long-term’ rabbit control achieved on 400,00[0]0 ha of rural land by 2008</p> <p>L T7 - Increase the area for which rural land use matches land capability</p> <p>L T8 -All designated water supply catchments delivering water of the required quality</p> <p>BT7 - Increase the diversity of native species in modified landscapes</p>	<p>WA14 – Develop and implement Special Area Plans for water supply catchments where appropriate</p> <p>WA16 – Benchmark rural water use efficiency in major agricultural areas and promote greater water use efficiency by agricultural industries</p> <p>LA1 – Develop a comprehensive profile and understanding of rural land ownership and regional demographics as a basis for determining appropriate land use and management</p> <p>LA2 - Develop a comprehensive risk assessment of rural and urban-rural land use compared to land capability</p> <p>LA3 – Develop and apply a methodology for comprehensive risk assessment of soil health, as a basis for development of a Regional Soil Health Plan</p> <p>LA5 – Develop and implement a strategic plan to promote productive and sustainable agriculture in the region</p> <p>LA6 - Develop and implement urban growth area and green wedge action plans, as identified in Melbourne 2030, and major transport planning, in line with the principles, objectives and targets of the RCS</p> <p>LA7 - Investigate and promote market-based mechanisms that reward landholders providing environmental services</p> <p>LA8 - Capitalise on opportunities within greenhouse gas abatement programs to create carbon dioxide sinks and modify production systems</p> <p>LA9 – Implement the regional Weed and Rabbit Action Plans</p> <p>LA10 – Design and deliver programs to achieve adoption of environmental management systems across 25 per cent of the region’s commercial horticulture, viticulture, dairying and intensive animal enterprises</p> <p>LA11 - Implement a regional Farm Forestry Action Plan to increase the area of farm forestry in the region by 25 per cent</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Regional coordination	<p>PO1 - Enhance regional planning, coordination and resource allocation</p>	<p>PT1 - All key catchment management stakeholders participating in and agreeing on an annual ‘regional investment planning’ process to implement the RCS by 2005</p> <p>PT2 - All Victorian government agencies with key roles in catchment management are directly implementing the RCS through their annual works programs by 2006</p> <p>PT3 - At least half the region’s 38 councils to have formally adopted the RCS as a reference document, reflecting relevant sections of it appropriately in their planning schemes and implementing relevant actions through their annual programs</p> <p>PT4 - Each year to 2008, secure an increase in:</p> <ul style="list-style-type: none"> <li>• the proportion of available Victorian and Australian government funding for RCS programs in the region</li> <li>• the total amount of corporate investment in RCS programs</li> </ul> <p>PT5 - Maintain or increase the number and geographic coverage of community groups participating in catchment management in the region, and increase the active membership of community groups by 20 per cent (from 2001 levels) by 2008</p> <p>PT6 - Increase community awareness and understanding of the condition of catchment assets and associated trends</p>	<p>PA1 - Review existing forums and committee structures and identify efficient ways to:</p> <ul style="list-style-type: none"> <li>• plan and conduct community involvement in integrated catchment management</li> <li>• facilitate coordination and share information</li> <li>• identify local issues and develop priority programs</li> </ul> <p>PA2 - Establish a whole-of-region research forum</p> <p>PA3 - Establish sub-regional forums that enable local government to identify, discuss and resolve priority issues relevant to catchment management and to cooperate at a catchment scale</p> <p>PA4 - Establish forums that enable rural communities, industries and landholders to identify, discuss and resolve priority issues relevant to catchment management including rural development, land use and land management</p> <p>PA5 - Develop and implement protocols for the involvement of Indigenous groups and incorporation of Indigenous cultural values in the implementation of this RCS</p> <p>PA6 - Develop and deliver education programs for catchment management across the region</p> <p>PA7 - Align the directions and actions of the RCS with Municipal Strategic Statements and other local government processes related to catchment management</p> <p>PA8 - Implement the strategy for the support and coordination of Landcare and community groups in the Port Phillip and Western Port region</p>

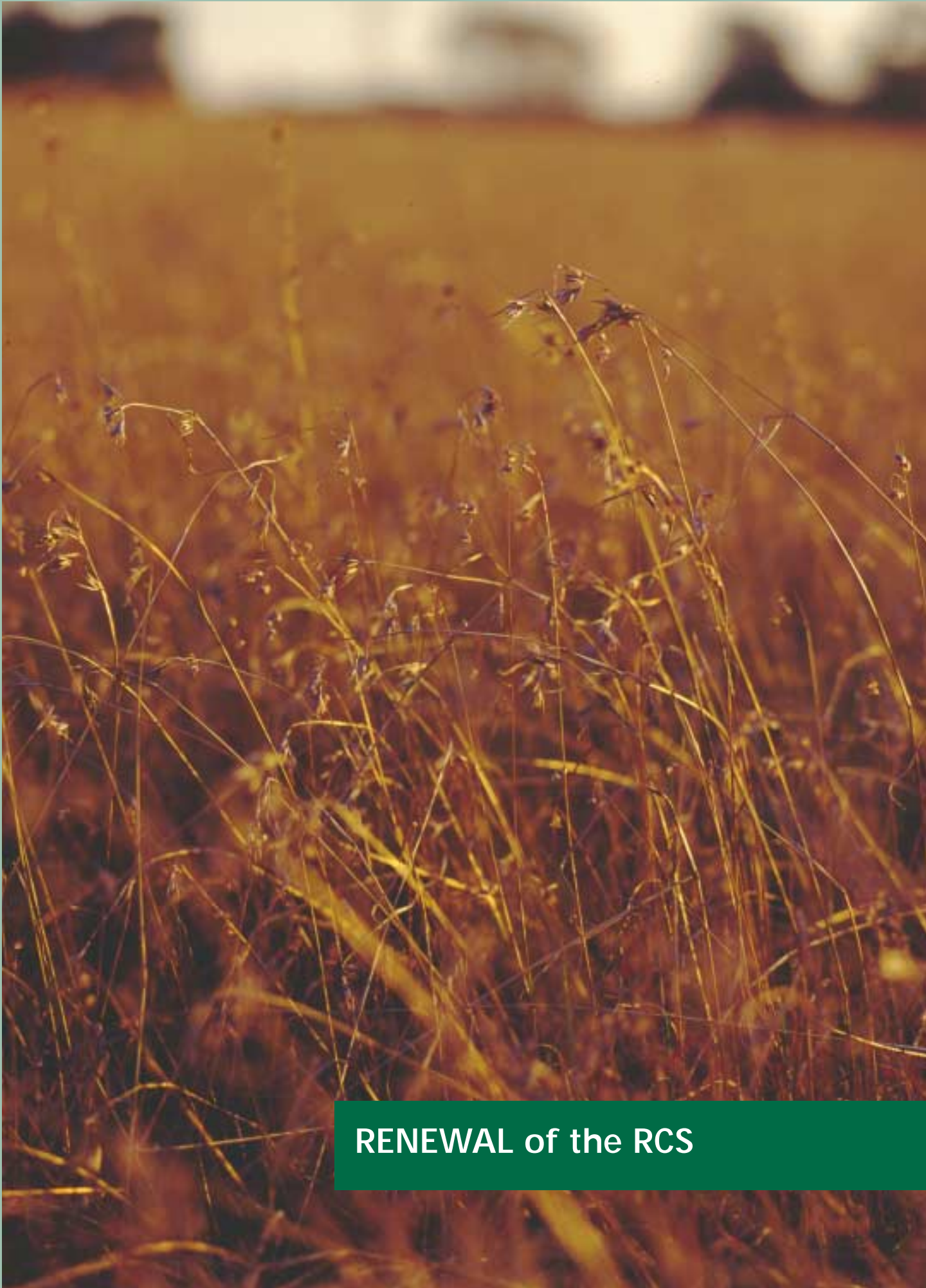
Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Community capacity building	PO2 – Increase the capacity and participation of people and organisations in catchment management	<p>PT4 - Each year to 2008, secure an increase in:</p> <ul style="list-style-type: none"> <li>the proportion of available Victorian and Australian government funding for RCS programs in the region</li> <li>the total amount of corporate investment in RCS programs</li> </ul> <p>PT5 - Maintain or increase the number and geographic coverage of community groups in the region, and increase the active membership of community groups by 20 per cent (from 2001 levels) by 2008</p> <p>PT6 - Increase community awareness and understanding of the condition of catchment assets and associated trends</p>	<p>PA1 - Review existing forums and committee structures and identify efficient ways to:</p> <ul style="list-style-type: none"> <li>plan and conduct community involvement in integrated catchment management</li> <li>facilitate coordination and share information</li> <li>identify local issues and develop priority programs</li> </ul> <p>PA4 - Establish forums that enable rural communities, industries and landholders to identify, discuss and resolve priority issues relevant to catchment management including rural development, land use and land management</p> <p>PA5 - Develop and implement protocols for the involvement of Indigenous groups and incorporation of Indigenous cultural values in the implementation of this RCS</p> <p>PA8 - Implement the strategy for the support and coordination of Landcare and community groups in the Port Phillip and Western Port region</p> <p>PA 10 - In the catchments of the region, develop and begin implementing a major project that fully engages and involves key stakeholders and that attract major new funding</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Reducing our ecological footprint	PO3 - Reduce the overall impact of the regional community on catchment assets	<p>PT7 - Maintain the region's total ecological footprint at or below at the 2003 level, and reduce the average ecological footprint (per capita) for the region by 25 per cent by 2030</p>	<p>PA9 - Pilot and evaluate the use of methodologies including the ecological footprint as an educational and monitoring tool to drive behavioural change in key sectors of the community, and identify opportunities for regional programs to reduce the total footprint</p>
Nitrogen	WO4 - Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas	<p>WT8 - Improve the water quality in rivers and streams so that:</p> <ul style="list-style-type: none"> <li>At least 80% of monitoring sites attain SEPP objectives or regional targets by 2009</li> <li>All monitoring sites attain SEPP objectives or regional targets by 2030</li> </ul> <p>WT21 - Improve water quality in estuaries, bays and seas so that all monitoring sites attain State environment protection policy objectives or regional targets by 2030</p> <p>WT22 - Reduce the average annual nitrogen levels entering Port Phillip Bay by 1000 tonnes by 2006</p>	<p>WA6 - Map the land-based sources of nutrients, sediments and other pollutants to waterways, Port Phillip Bay and Western Port and develop and implement a Regional Water Quality Improvement Plan to address the major sources</p> <p>WA10 - Meet best practice standards in urban stormwater discharges in new urban areas</p> <p>WA44 - Implement the Port Phillip Bay Environmental Management Plan with a focus on reducing the annual nitrogen input into Port Phillip Bay by 1,000 tonnes per year and review and extend the plan to address additional risks to the Bay</p> <p>WA45 - Investigate and pilot ways for new nitrogen inputs to Port Phillip Bay to be offset by reduced inputs from elsewhere</p> <p>WA46 - Initiate research and major integrated programs to identify the specific sources and reduce the inputs of sediments, nutrients and other pollutants to Western Port</p> <p>LA13 - Ensure that urban design considers landscape and catchment values through the development of performance standards for planning applications and building permits that include water sensitive design and other environmental and catchment parameters</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Risk assessment	<p>MO1 - Adequate, appropriate, efficient and cost effective monitoring of catchment assets, ecosystem processes, trends, risks, implementation of actions and outputs</p> <p>MO2 - Timely, rigorous, efficient and cost effective evaluation of catchment management planning and implementation</p>	<p>MT3 - Evaluation processes to assist priority setting and assess links between actions and outcomes agreed and in place by 2008</p>	<p>WA20 - Further develop the regional risk assessment model to identify the level of risk facing groundwater assets</p> <p>LA2 - Develop a comprehensive risk assessment of rural and urban-rural land use compared to land capability</p> <p>LA3 – Develop and apply a methodology for comprehensive risk assessment of soil health, as a basis for development of a Regional Soil Health Plan</p> <p>BA8 - Assess the risks to biodiversity from pest plants and animals, and establish integrated management programs to reduce the impact of environmental weeds and pest animals on native vegetation and fauna</p> <p>MA3 - Further develop an asset-risk assessment methodology and apply it consistently to catchment assets to assist integrated priority setting</p>

Matters for targets and other key issues addressed within the RCS	RCS Objectives (comparable to “Aspirational Targets”)	RCS Targets (comparable to “Resource Condition Targets”)	RCS Actions (comparable to “Management Action Targets”)
Research and investigation	<p>MO1 - Adequate, appropriate, efficient and cost effective monitoring of catchment assets, ecosystem processes, trends, risks, implementation of actions and outputs</p> <p>MO2 - Timely, rigorous, efficient and cost effective evaluation of catchment management planning and implementation</p>	<p>MT3 - Evaluation processes to assist priority setting and assess links between actions and outcomes agreed and in place by 2008</p>	<p>WA15 - Investigate the hydrological and ecological relationships between surface waters and groundwater and develop catchment-based water budgets</p> <p>WA20 - Further develop the regional risk assessment model to identify the level of risk facing groundwater assets</p> <p>WA33 - Investigate, assess and manage accelerated coastal erosion and other degrading processes at high value sites where recreation, heritage, Indigenous culture, environmental values and public infrastructure are at risk</p> <p>WA41 - Continue to investigate marine ecosystems and the links with key threatening processes and identify an appropriate set of indicators and targets.</p> <p>WA42 - Research the health of and risks to estuaries in the region</p> <p>WA46 - Initiate research and major integrated programs to identify the specific sources and reduce the inputs of sediments, nutrients and other pollutants to Western Port</p> <p>LA2 - Develop a comprehensive risk assessment of rural and urban-rural land use compared to land capability</p> <p>LA3 – Develop and apply a methodology for comprehensive risk assessment of soil health, as a basis for development of a Regional Soil Health Plan</p> <p>LA4 - Undertake detailed mapping and modelling of salinity hotspots as a basis for completing and implementing the regional Salinity Management Plan</p> <p>BA8 - Assess the risks to biodiversity from pest plants and animals, and establish integrated management programs to reduce the impact of environmental weeds and pest animals on native vegetation and fauna</p> <p>BA14 - Investigate and record the diversity of native freshwater fish species in the region and the extent and health of the populations, and establish links between this data and planning approval processes</p> <p>BA15 - Develop an inventory of urban biodiversity and undertake research, community education and involvement campaigns to promote and pilot urban practices that contribute to the health of natural ecosystems</p> <p>PA2 - Establish a whole-of-region research forum to identify gaps and the needs for research and development</p> <p>MA3 - Further develop an asset-risk assessment methodology and apply it consistently to catchment assets to assist integrated priority setting</p>





## RENEWAL of the RCS

## 12 RENEWAL of the RCS

### 12.1 Review of the 1997 RCS

An initial RCS for the Port Phillip and Western Port Region was developed and adopted in 1997 by the CMA's predecessor - the Port Phillip and Westernport Catchment and Land Protection (CaLP) Board.

The 1997 Strategy provided a platform for important policies, partnerships and actions to improve the condition and management of natural resources in this region.

As required in the process of writing this new RCS, the CMA reviewed the 1997 RCS and submitted its findings to the Minister.

The 1997 Strategy identified 39 actions. The review found that 12 actions had been completed, eight had been completed to a substantial degree, 15 completed to a medium level and four were in their initial stages.

The completed projects included:

- Establishment of five catchment committees
- Preparation of annual reports on the condition of the region and the progress of initiatives
- The development of a stormwater quality management initiative with the Environment Protection Authority, Melbourne Water and local government
- Review of the State environment protection policies (SEPPs) for the catchments in the region
- Development of a Regional Weed Plan, including the incorporation of a statewide system for weed evaluation.
- Production of a draft Regional Native Vegetation Plan
- The incorporation of habitat values in the review of Crown frontages.

The review identified some major issues for the region that are being addressed in the development of the new RCS including the need for:

- more thorough and extensive stakeholder and community consultation
- recognition of the special circumstances that exist in the Port Phillip and Westernport region – its community's needs and values and the environmental impacts of its lifestyles
- use of a triple-bottom-line approach, balancing the social, economic and environmental priorities of the region
- incorporation of sustainability principles with specific and measurable objectives, and the need to complement the '2030 Metropolitan Strategy' as a partner document
- a strong science-base balanced strategy with a writing style that makes it reader-friendly for its diverse target audiences which include governments at all levels, agencies, environmental organisations and community members
- recognition that the region's 38 local government councils will continue to play a major role in catchment management as the planning authorities in the region, and it is important to develop links between the RCS and their planning schemes and strategies

## 12.2 Process for renewal

The broad process to manage the renewal of the Regional Catchment Strategy is set out in Figure 38 and comprises five main steps followed by the implementation stage, which includes the funding process as well as the monitoring and evaluation of actions and targets. The process is shown as 'circular' because the implementation stage and the associated monitoring and evaluation will be a key input into the next RCS.

This draft strategy is the output of step 4 of the process.

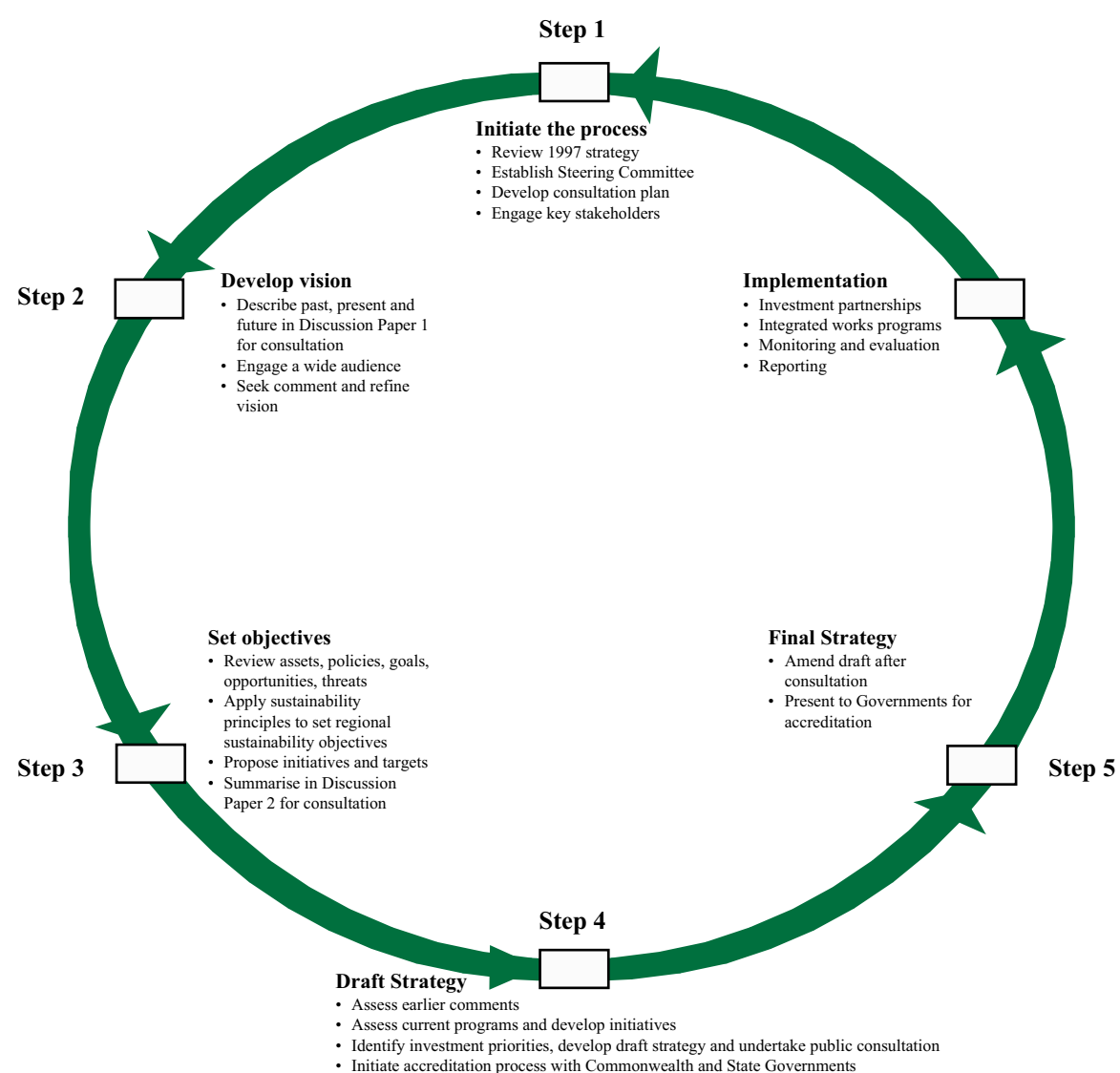


Figure 38: A diagrammatical representation of the process used to develop the Port Phillip and Western Port Regional Catchment Strategy

## 12.3 Stakeholder engagement and public consultation

This region includes a large population and many organisations and community groups with a role or interest in catchment management.

In terms of the number and diversity of the region's professional, social, economic and scientific interests in natural resources, the Port Phillip and Western Port region is the most complex in Victoria.

For this RCS it is not possible to engage the entire population directly. However, there are key stakeholders who have significant responsibilities in catchment management or who provide a focus for community activity, or both. The consultation process and the actions within the RCS aim to improve catchment assets by working with key stakeholders including:

- Water authorities
- Local government authorities
- Major land holders
- Business groups
- Environmental organisations
- Government departments and instrumentalities
- Community groups
- Cultural and heritage groups.

In order to engage the community, to encourage participation and to maximise the potential for successful outcomes, there have been a number of approaches used including:

- Preliminary contact with major stakeholders
- Establishment of a multi-organisation RCS Steering Committee
- Introductory information sessions
- Development of background papers
- An initial public discussion paper titled 'Managing natural resources in the Port Phillip and Western Port Region - Past, Present and Future'
- A second public discussion paper, this time titled 'Sustainability objectives for natural resource management in the Port Phillip and Western Port Region'
- Convening of thematic focus groups
- Development of an internal draft RCS for consultation and negotiation with key stakeholders and Catchment Committees
- Development and release of a public draft RCS with an extensive program of community consultation.

### Preliminary contact with major stakeholders

The first steps involved

- The development of a project plan, which was formally agreed to by three of the major catchment management organisations in the region (the Port Phillip and Western Port Catchment Management Authority, Melbourne Water and the Port Phillip regional office of the Department of Natural Resources and Environment)
- The direct involvement of the community-based CMA Board in the development and agreement of the project plan, followed up with regular updates on progress and directions at Board meetings
- The invitation of key stakeholders to participate on a steering committee
- Communication with each of the 38 councils in the region and the Department of Infrastructure regions to invite their nomination of specific contact officers as a main conduit for RCS information
- The distribution of a newsletter to the staff of agencies, water authorities, local government agencies and community groups advising of the RCS and the proposed process.

## Establishment of a multi-organisation RCS Steering Committee

An RCS Steering Committee, chaired by the Port Phillip and Western Port Catchment Management Authority, was convened to oversee and contribute to the development of the RCS. It comprises representatives of key stakeholder organisations with knowledge of and involvement in the water, land, biodiversity and community engagement matters in this region.

The organisations represented on the RCS Steering Committee include:

- Port Phillip and Western Port Catchment Management Authority
- Central Coastal Board
- Department of Sustainability and Environment
- Department of Primary Industries
- Environment Protection Authority
- Environment Victoria
- Municipal Association of Victoria
- Melbourne Water
- Parks Victoria
- Southern Rural Water
- Victorian Farmers Federation.

The membership of the RCS Steering Committee is designed to recognise both the number and diversity of stakeholders (both government and non-government) and the range of catchment assets in this region. For instance, the involvement of Parks Victoria and the Central Coastal Board recognises the importance of our parks, coasts and bays. The involvement of the Department of Sustainability and Environment recognises the development and implementation of the Melbourne 2030 strategy and its links with natural resource management in the region.

The RCS Steering Committee members have played a key role in:

- designing, advising and agreeing on matters of process
- providing technical input from key organisations
- providing a focal point for communication with the key organisations
- editing the public discussion papers and draft RCS to ensure technical accuracy and an appropriate writing style for the region's communities of interest
- gaining agreement from their organisations to print and distribute the public documents.

## Introductory information sessions

### Traditional stakeholders

A number of group and one-on-one sessions were organised to brief stakeholder representatives. The sessions addressed the aims and scope of the RCS, how the RCS related to them and their catchment management role, the process for development and how the group could effectively participate in the development of the RCS.

The following group sessions were held either specifically or partially to acquaint stakeholders with the RCS process:

- Two regional local government workshops (attended by representatives of 23 of the region's 38 councils)
- An urban local government workshop hosted by Bayside City Council (attended by representatives of 6 councils)
- A workshop for water authorities hosted by VicWater (attended by representatives of 8 water authorities)
- A workshop on agricultural environmental management systems and the key agricultural issues for this region – hosted by Victorian Farmers Federation, Department of Primary Industries and Port Phillip and Western Port CMA
- Involvement in a Victorian Catchment Management Council-sponsored process to engage the Indigenous community in the RCS
- A meeting with the board of the Kulin Nation Cultural Heritage Program
- A number of meetings with staff of the Port Phillip region of the then Department of Natural Resources and Environment
- Presentations to the CMA's five geographic catchment committees (which include representatives from community groups, local government, water authorities and government agencies) with membership totalling around 130 people
- Presentation to a number of east-of-Melbourne councils at West Gippsland CMA-hosted meeting
- Presentation to recreational fishing organisation VRFish
- Presentation to a coastal planners meeting
- Presentation to a DSE-hosted workshop to discuss the input of coastal and marine issues in the RCS.

*The membership of the RCS Steering Committee is designed to recognise both the number and diversity of stakeholders (both government and non-government) and the range of catchment assets in this region*

## Extending the coverage of the RCS

The premise in developing this RCS has been that the outcomes in managing our catchment affect many facets of life. This is the nature of the 'triple bottom line'. Therefore besides the 'traditional' participants in catchment management, contact was also made with those stakeholders where the linkage between catchment management and their activities is not as well established, or where they have not been previously engaged at a regional level.

Contact was therefore made with:

- Health and social issues were discussed with the Department of Human Services, Australian Medical Association, Australian Institute of Family Studies, Victorian Council of Social Service, Deakin University Health Sciences and Sport and Recreation Victoria
- Heritage Victoria was contacted in respect to non-Indigenous cultural heritage
- Discussions with staff at Melbourne and Monash University were held regarding social and economic activity in the region
- Employer groups Australian Industry Group, Victorian Employers Chamber of Commerce and Industry and Business Council of Australia were contacted to gauge interest and their advice on the best approach into business and industry
- Triple bottom line issues were discussed with the Victorian Department of Premier and Cabinet.

In some cases these relationships have not developed past the first contact at this stage, but in others those approached have shown further interest by, for example, responding to the public discussion papers.

These information sessions were useful in:

- Establishing initial contacts
- Establishing processes for future contact
- Extending knowledge of the RCS and associated processes
- Developing sources of information
- Identifying gaps in knowledge.

## Development of background papers

Following the information sessions, a number of agencies agreed to author or contribute to background papers on topics relevant to the RCS, as outlined in the following table.

Organisation	Topics
Central Coastal Board	coasts and bays
Department of Sustainability and Environment	native biodiversity, wetlands
Department of Primary Industries	agriculture, aquaculture, commercial fishing, extractive industries, forestry
Environment Protection Authority	stormwater, litter, wastewater-sewage management
Heritage Victoria	non-indigenous heritage
Melbourne Water	environmental flows and surface water allocation, river health, water for potable use
Parks Victoria	parks and reserves
Southern Rural Water	groundwater
Tourism Victoria	tourism

These background papers formed the basis of the descriptions of the catchment and the catchment management issues raised in the first and second public discussion papers

### The first public discussion paper

The first public discussion paper, titled 'Managing natural resources in the Port Phillip and Western Port Region – Past, Present and Future', was distributed in September 2002.

It was deliberately designed as an easy-to-read, entertaining and informative introduction to the RCS process. Using a story-telling style, it gave an overview of the history of the region, the issues, present and proposed, and described a more sustainable future. It was also designed to raise awareness of catchment management issues and the RCS, and to check with the target audiences right from the start that the probable scope of the RCS was in line with their views and expectations. The format of the paper was also designed to encourage people to comment by including space on every page for notes to be written.

It was distributed to around 1000 organisations, community groups and individuals throughout the region. The 40 responses to the paper showed wide-ranging views on the issues facing natural resource management, the multiple demands on the resources and the differing priorities and values of the respondents. Most of the 40 responses received supported the regional planning process and showed willingness for further participation.

In most cases the paper generated the type of response anticipated, that is some debate about the important issues facing catchment management in the region. Some organisations commented that the paper was too broad for detailed comment but they wished to remain involved as the process continued. A number of complimentary comments were received on the writing style of the document and the presentation used. The feedback from the first discussion paper was incorporated into the development of the second discussion paper.

### The second public discussion paper

The second public discussion paper, titled 'Sustainability objectives for natural resource management in the Port Phillip and Western Port Region', was distributed in September 2003. It suggested sustainability principles as a basis for the RCS, a vision for the future, a description of the region's natural assets, goals, objectives and examples of targets and actions that might be used in the draft RCS.

As well as reflecting the feedback from the first discussion paper and other workshops on what might be considered within the normal scope of catchment management issues, the paper addressed others that reflect the urban component of the region. These include issues such as its consumption patterns (ecological footprint), urban ecosystems and their values, stormwater and treated effluent as resources and the effects of urbanisation on other natural resource values.

Over 1300 copies were distributed to the region's politicians, government departments and agencies, community groups, local government authorities, Indigenous organisations, natural resource industry organisations, universities and research groups, other CMAs, consultants and major land developer organisations.

To support the launch of the discussion paper, to community groups in particular, three presentations were made in different parts of the region; Pakenham in the east, Doncaster in the north and Melton in the west. These were attended by 64 representatives of community groups, local government and agencies.

There were 69 responses to the second public discussion paper. Respondents included representatives of most of the groups mentioned above. Some of the changes or additions that were suggested to be incorporated in the draft RCS were:

- Explanation is required of the role of a catchment strategy
- Actions need to have timelines and responsibilities allocated
- A better explanation of the roles of the stakeholders is needed, in particular the CMA
- A recognition of the work already undertaken by current community groups should be included
- Greater prominence is required for community involvement and engagement
- The importance of introduced species, as well as native species, needs to be included
- An increased focus on economic outcomes is required.

The feedback on the second public discussion paper was captured in its entirety in a database and a report provided to the RCS Steering Committee as to how the feedback has been incorporated into the draft RCS. Letters were also sent to those who provided comment explaining how their key comments have been incorporated into the draft RCS.

### Thematic focus groups

Further workshops were then held to focus on issues that have been identified as requiring further work to ensure appropriate coverage in the draft RCS. Some workshops covered issues that were of concern to stakeholders with similar responsibilities while others concentrated on specific topics such as wetlands and indigenous cultural heritage. The latter type of workshop brought together representatives from a cross-section of organisations with an interest in the topic.

The workshops held were:

- Rural production – hosted by Department of Primary Industries.
- The role of parks in the RCS – hosted by Parks Victoria
- Small group workshops hosted by the CMA and addressing the following topics:
  - Coastal and marine issues
  - Ecological footprint
  - Groundwater
  - Indigenous cultural heritage
  - Sustainable agriculture
  - Threatened species
  - Water supply catchments
  - Water quality
  - Wetlands.

The outcomes from these workshops have included:

- Identification, and quantification where possible, of the threats and risks to our catchment assets
- Input to the identification of priority targets and actions
- Identification of gaps in our knowledge
- Provision of additional technical detail
- Agreement on ways to proceed.

## Internal draft RCS for consultation with key stakeholders and Catchment Committees

In 2004, an internal draft of the RCS was developed and provided for comment and discussion to:

- RCS Steering Committee  
The Steering Committee provided detailed comment on the text and presentation of the draft. Further detailed sessions were then held with the following organisations to improve the technical accuracy of the draft and to gain agreement with the organisations' representatives that the draft could be released publicly for consultation:
  - Department of Primary Industries
  - Melbourne Water
  - Parks Victoria
  - Central Coastal Board
  - Environment Protection Authority
  - Department of Sustainability and Environment.
- The community-based Board of the Port Phillip and Western Port Catchment Management Authority also had a workshop on the draft and provided detailed comment on the text and presentation. The Board approved the public release of the document publicly once the agreed amendments had been included.
- Focussed sessions were also held with each of the five Catchment Committees in the region to elicit comments on the internal draft. These comments were recorded in the minutes of the committee meetings and will be incorporated in the finalisation of the RCS.

## Community consultation on the public draft of the RCS

Almost 1,500 copies of the public draft of the RCS were distributed to stakeholders with invitations to comment.

To generate a sound understanding of the document by stakeholders and to generate feedback, a number of consultation sessions were held including:

- Four forums designed specifically for local government held across the region, hosted by the City of Melbourne, Melton Shire, Nillumbik Shire and the City of Casey. Summaries were provided to participants beforehand of the RCS actions in which local government was listed as having a lead role of as a key partner. Feedback on this approach was very positive and assisted councils in the preparation of their submissions. The four sessions were attended by representatives from 30 of the region's 38 councils.
- Nine community forums were held across the region, all in evenings. An innovative approach was used for these sessions whereby CMA representatives were on hand to discuss any elements of the draft that participants wished to cover. People were invited to attend at any time during the advertised meeting time and to leave at any time they felt they had accomplished the level of discussion they

believed was sufficient. One-to-one and small group discussion was a feature of this approach, enabling people to have brief discussions if they wished or to engage in lengthy and detailed debate about targets and actions. Both scenarios were evident, with some people very pleased to be able to make their point in 10 minutes and be on their way, while a number of others took the opportunity for a 2 hour in-depth exploration of catchment management issues enabling the crux of issues to be identified and specific actions put forward for consideration to be included in the RCS. Many important improvements to the RCS were identified during these sessions. Feedback from the participants in these sessions was that it was a much more productive process than the traditional "information session" involving a presentation and a question and answer approach.

- Many targeted workshops, discussions and meetings with specific organisations were held including with Melbourne Water, Southern Rural Water, Department of Primary Industries, Environment Protection Authority, Department of Sustainability and Environment, Indigenous groups, Central Coastal Board and Parks Victoria. These sessions identified many improvements to the RCS and maintained the ownership of these organisations in the document.
- Over 70 written submissions were received on the draft RCS from agencies, councils, community groups, non-government organisations and individuals. Individual responses were prepared to all submitters explaining how their comments influenced and were incorporated into the RCS.

## Consultation Case Studies

While consultation on the development of the RCS has taken many forms, the following two case studies are provided as examples of the effort put into engaging particular target audiences.

### Local Government

The Port Phillip and Western Port region contains 38 local government areas (eight also being involved with adjacent CMAs). This is half of Victoria's councils, with the other half being spread across the other nine CMA regions. Given the significance of the consultation task, efforts to engage local government have been diverse and have included:

- The close involvement of the CMA Board (three current Board members are also councillors in the Port Phillip, Yarra Ranges and Melton areas of the region)
- Input from a CMA Local Government Committee which is developing processes for ongoing consultation with local government
- The close involvement of two local government representatives on the RCS Steering Committee (the then-Mayor of Port Phillip Council and a Municipal Association of Victoria representative who is also the CEO of Macedon Ranges Shire Council)
- Involvement of the geographically based catchment committees in the process (of which the membership includes representatives of 28 councils)
- Two workshops in late 2003 to cover the relationship between the RCS and the local government planning process, as well as feedback on issues to go into the RCS (23 councils attended).
- A further workshop arose from this (hosted by Bayside City Council) to take a particularly urban perspective (6 councils involved).
- Copies of two discussion papers sent to each of 38 councils (five responded to the first and thirteen to the second)
- The appointment by the CMA of a local government engagement officer to facilitate input of local government to the RCS and to initiate preparation of individual RCS schedules for each of the 38 councils, detailing the specific implications, issues, etc. from the RCS
- The draft RCS has drawn on input from a number of focus groups which included local government representatives where appropriate
- Formal nomination by all 38 councils of specific a 'RCS contact person' from their council who would act as the "funnel" for information regarding the RCS development
- Involvement of the CMA CEO in a MAV-convened steering committee for a project aimed at better aligning local government planning with catchment regional planning including pilot studies with some councils in the region on possible amendments to planning schemes, MSSs, Corporate Plans etc.
- Submissions by the CMA into 23 council reviews of MSSs

- Presentation to some individual councils
- Distribution of copies of the draft RCS to Mayors, CEOs, Environmental Officers and various other contacts in each council
- Four tailored consultation sessions on the draft RCS with councils across the region, attended by representatives of 30 of the region's 38 councils.
- Consideration of the written comments received from councils and preparation of a tailored response explaining how the comments have been incorporated.

### Indigenous Community

The region is home to around 50% of the State's Indigenous population. The diversity of the region's Indigenous organisations and the breadth of coverage of the RCS mean that effective consultation is challenging. The following steps have been undertaken:

- Discussions with Mirimbiak as regards them running a consultation process
- Six meetings with staff of Aboriginal Affairs Victoria to discuss the most appropriate mechanisms for engagement of Indigenous people in this region
- Involvement of a VCMC sponsored process to engage the Indigenous community in the RCS
- Involvement of Indigenous facilitators from DSE in the process
- Discussion with the Kulin Nation Cultural Heritage Program staff and a presentation to their Board. They asked for and were offered a place on the steering committee, and a representative attended for one meeting
- Participation in a workshop for Aboriginal managed lands in the region
- Participation in Koori cross-cultural induction day with Melbourne Water
- A focus meeting with three Indigenous facilitators/rangers/cultural heritage officers to explore Indigenous cultural heritage issues in the region. The group's members came from the Wathaurong, Wurundjeri and Taungurung tribes. This resulted in a discussion paper that was also distributed to Boonerwong for additional comment, and was also the basis for further consultation around the draft RCS.
- Participation in the workshop 'Enhancing Indigenous Engagement in Natural Resource Management' at Echuca in May 2004. This workshop provided an opportunity for CMAs in general to discuss with their regional Indigenous counterparts ways to improve consultation processes.
- Distribution of the public draft RCS to various representatives of Indigenous groups
- An extended discussion with representatives of the Kulin people regarding the draft RCS and identifying various amendments and improvements to be incorporated to better reflect the value, beliefs, traditions and protocols of Indigenous residents of this region

### Marine interests

- An extensive process of consultation with various organisations involved in marine management has taken place regarding the public draft RCS.
- Representatives of organisations including the EPA, DSE and CCB worked with the CMA to substantially amend and improve the "Estuaries, Bays and Seas" chapter. This included additions of substantial text in the introductory sections of the chapter, cross-referencing to existing strategies and policies, and substantial revision of targets and actions.

- The result is that these agencies have now reached agreement of the content of the RCS in regard to marine management, and have a very strong ownership of these elements.
- All maps in the RCS were also re-developed to show a revised regional boundary that includes the near-shore marine environment to 3 nautical miles and highlights that these waters, including the bays, are an integral component of this strategy for natural resource management.
- The extensive consultation undertaken with these marine interests has helped to produce an RCS that breaks new ground in linking catchment management with the management of receiving waters including oceans.



### Summary of stakeholder contact

Table 17 summarises the contact made with stakeholders in the development of the draft RCS. The table reflects only stakeholders who have shown an active interest by being formally involved in the process, hosting or attending meetings, providing information or responding to discussion papers. It does not include the many people and organisations who were mailed copies of the discussion papers but did not formally respond. Where people in the process have indicated membership of an organisation, the organisation has been listed, but the table does not include individuals names. In many cases, organisations have had input into the RCS development process through multiple mechanisms, denoted by the symbol #.

Table 17: Summary of stakeholder involvement

Organisations consulted	Steering Committee	General Information sessions	Background papers	Response to Discussion Paper 1	Community group presentations	Response to Discussion Paper 2	Thematic workshops	Input to internal draft RCS	Community consultation meetings	Response to draft RCS
<b>Government agencies</b>										
Aboriginal Affairs Victoria		*#								*
Central Coastal Board	*	*	*				*	*	*	*
Department of Human Services		*		*						
Department of Premier and Cabinet		*								
Department of Primary Industries	*	*#	*		*	*	*	*	*	*
Department of Sustainability and Environment		*#	*		*	*	*	*	*	*
Ecorecycle Victoria		*								
Environment Protection Authority Victoria	*	*#	*			*		*	*	*
Heritage Victoria		*	*							
Marine Safety Victoria										*
North Central Catchment Management Authority										*
Parks Victoria	*	*	*		*	*	*		*	*
Sports and Recreation Victoria		*								
Tourism Victoria		*								
Victorian Catchment Management Council		*					*			
VicRoads		*		*		*		*		*
West Gippsland Catchment Management Authority										*

Organisations consulted	Steering Committee	General Information sessions	Background papers	Response to Discussion Paper 1	Community group presentations	Response to Discussion Paper 2	Thematic workshops	Input to internal draft RCS	Community consultation meetings	Response to draft RCS
<b>Local Government</b>										
Association of Bayside Municipalities						*				
Banyule City Council					*			*	*	*
Bass Coast Shire Council		*					*	*	*	*
Baw Baw Shire Council								*		
Bayside City Council		*				*	*		*	
Boroondara City Council								*		*
Brimbank City Council		*			*		*	*	*	*
Cardinia Shire Council		*		*	*	*	*	*		*
Casey City Council						*		*	*	*
Darebin City Council								*	*	*
Frankston City Council					*			*	*	*
Glen Eira City Council		*					*		*	
Greater Dandenong City Council		*		*			*	*	*	*
Hobsons Bay City Council				*		*			*	*
Hume City Council					*		*	*		
Kingston City Council		*					*	*	*	*
Knox City Council						*		*	*	
Macedon Ranges Shire Council		*			*	*	*	*	*	*
Manningham City Council		*				*	*	*	*	*
Maribyrnong City Council									*	*
Melbourne City Council					*	*		*	*	*
Melton Shire Council					*			*	*	
Mitchell Shire Council									*	
Monash City Council		*		*			*	*	*	*
Moonee Valley City Council		*		*			*	*	*	
Moorabool Shire Council					*			*	*	
Moreland City Council		*		*	*		*	*	*	
Mornington Peninsula Shire Council		*		*	*	*	*	*	*	*
Municipal Association of Victoria		*		*						
Nillumbik Shire Council		*					*	*	*	*
Port Phillip City Council		*					*	*	*	
Stonnington City Council								*	*	*
Whitehorse City Council				*		*	*	*	*	*
Whittlesea City Council		*					*	*	*	*
Wyndham City Council						*	*	*	*	*
Yarra City Council		*					*	*	*	*
Yarra Ranges Shire Council		*			*		*	*	*	*
<b>Water Authorities</b>										
Barwon Water						*	*			
City West Water							*	*		
Melbourne Water	*	*#	*		*	*	*	*	*	*
Southern Rural Water	*	*	*	*			*	*	*	*
South East Water				*		*	*	*		
Westernport Water							*			
Western Water							*	*		
Yarra Valley Water							*	*		*

Organisations consulted	Steering Committee	General Information sessions	Background papers	Response to Discussion Paper 1	Community group presentations	Response to Discussion Paper 2	Thematic workshops	Input to internal draft RCS	Community consultation meetings	Response to draft RCS
<b>Environmental Organisations</b>										
Australian Rare Fauna Research Association										*
Candlebark Nursery					*					
Darebin Creek Management Committee										*
Employment Focus – Native Habitat Group					*					
Environment Victoria	*	*			*	*				
Field Naturalist Club Blackburn					*					
Greening Australia (Victoria Inc)		*			*	*		*		
Habitat Trust										*
Inland Fisheries Committee										*
Merri Creek Management Committee						*		*	*	
Moonee Ponds Creek Co-ordination Committee								*		
Mornington Peninsula and Western Port Biosphere Foundation									*	*
Mullum Mullum Branch of the ACF				*		*				
Native Fish Australia					*					
Port Phillip Ecocentre										*
River Basin Management Society										*
Serrated Tussock Working Party										*
Threatened Species Network										*
Trust for Nature						*				*
Waterwatch		*								
Werribee River Association					*	*				
Wetland Care Australia						*	*			
<b>Community Groups</b>										
AGRA									*	*
Arthur's Creek Landcare Group								*		
Back Creek Catchment Group					*	*		*		
Bass Coast Landcare Network										*
Bass Valley Landcare Group								*		
Bayside Friends of Native Wildlife						*				
Blackburn and District Tree Preservation Society										*
Blackwood/Barry's Reef Landcare Group				*	*	*				
Bridge Landcare Association								*		
Cardinia/Bunyip Catchment Landcare Network					*					
Cardinia Catchment Landcare Group					*					
Cape Sound Committee of Management									*	
Cardinia Environment Coalition									*	*
Cardinia Hills Landcare and Ragwort Group					*					
Carrum Residents Action Group								*		



Organisations consulted	Steering Committee	General Information sessions	Background papers	Response to Discussion Paper 1	Community group presentations	Response to Discussion Paper 2	Thematic workshops	Input to internal draft RCS	Community consultation meetings	Response to draft RCS
<b>Community Groups (continued)</b>										
Coast Care/Coast Action Volunteers				*						
Coimadai Landcare Group					*	*				
Capel Sound Committee of Management										*
Cootamundra Walk						*				
Cottles Bridge Landcare Group					*					
Dandenong Catchment Committee		*			*			*	*	
Diamond Creek Landcare										*
Exford Rabbit Busters					*			*		
Frankston Environment Friends Network					*					
French Island Landcare										*
Friends of Bass Valley Bush						*		*		
Friends of Braeside Park									*	
Friends of Chambers Reserve					*					
Friends of Dandenong Creek								*		
Friends of Dandenong Valley Park								*		
Friends of Emerald Lake Park										*
Friends of Gardiners Creek Valley					*					
Friends of Kororoit Creek					*					
Friends of Lower Kororoit Creek								*		*
Friends of Maribyrnong Valley								*		
Friends of Mullum Mullum					*			*		
Friends of Plenty River					*					
Friends of Pyrete				*						
Friends of Ricketts Point					*					
Friends of the Lerdererg										*
Friends of William Morris Reserve					*					
Friends of Williamstown Wetlands									*	
Glen Eira Environment Group				*						
Gould League								*		
Greater Dandenong Environment Group					*					
Greenlink Box Hill				*	*	*				*
Hochkins Ridge Flora Group				*		*				
Hughes Creek Group				*	*					
Johns Hill Landcare Group				*	*	*			*	*
Lang Lang Coast Action Group					*					
Lilydale to Warburton Rail Trail						*				
Macclesfield Landcare Group				*						*
Manton and Sony Creek Landcare Group									*	
Maribyrnong Catchment Committee		*			*			*	*	
Maribyrnong Landcare Association								*		
Melton Environment Group					*	*				
Mentone Parkdale Village Community									*	
Mordialloc Beaumaris Conservation League				*		*				
Native Fish Australia									*	
Nillumbik Landcare Network									*	*

Organisations consulted	Steering Committee	General Information sessions	Background papers	Response to Discussion Paper 1	Community group presentations	Response to Discussion Paper 2	Thematic workshops	Input to internal draft RCS	Community consultation meetings	Response to draft RCS
<b>Community Groups (continued)</b>									*	*
No Pipes 4 Shore								*		
Pakenham Farm Tree Group										
Pentland Hills Landcare Group						*				
Phillip Island Conservation Society									*	
Phillip Island Landcare									*	*
Pinkerton Landcare and Enviro Group								*		
Poowong and District Landcare Group								*		
Rowsley Valley Landcare Group						*		*		
San Remo Foreshore Committee									*	
South Gippsland Landcare Network				*	*	*		*		*
South Alphington and Fairfield Civic Assoc								*		
Southern Peninsula Indigenous Flora and Fauna Association										*
Sunbury Conservation Council				*				*		
Tenby Point Friends of Foreshore									*	
Threatened Ecosystems Network									*	
Toolern Vale Landcare Group				*				*		
Toomuc Valley Landcare Group					*					
Truganina Landcare Group					*					
Upper Beaconsfield Conservation Group				*						
Upper Bunyip Action Group										*
Upper Maribyrnong Catchment Group					*	*		*		
Werribee Catchment Committee		*			*			*	*	
Westernport Catchment Committee		*			*			*	*	
West Gippsland Landcare									*	
Western Port Bird Observers Club										*
Western Port Protection Council										*
Yarra Catchment Committee		*			*			*	*	
<b>Business and Industry Groups</b>										
Australian Industry Group		*								
Central Victorian Farm Plantations						*				
Pacific Hydro					*					
Peninsula Branch of the VFF						*		*		
Victorian Employers' Chamber of Commerce and Industry		*								
Victorian Farmers Federation	*	*						*	*	
Victorian Water Industry Association		*					*			
VRFish		*								

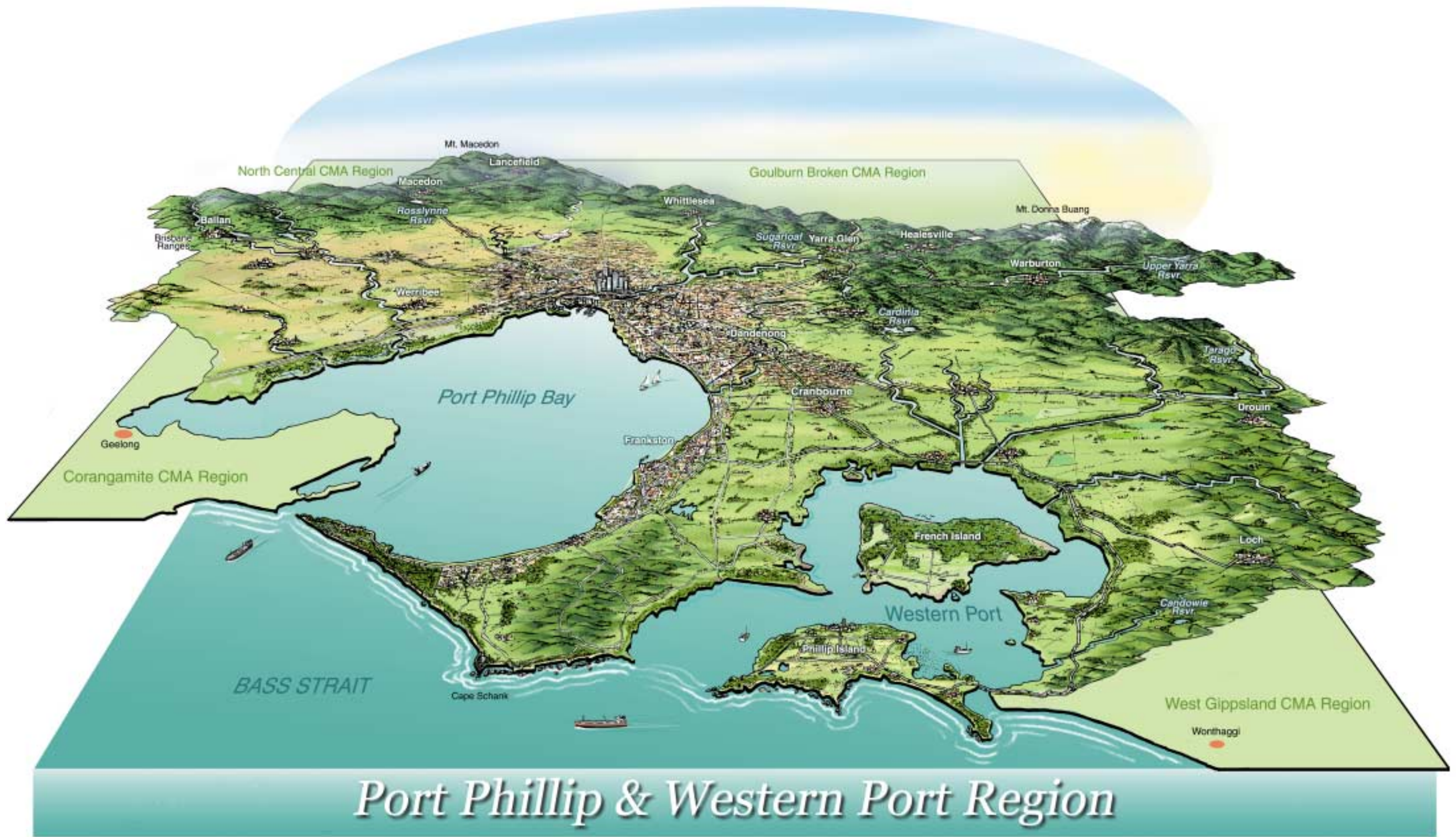
<b>Organisations consulted</b>	<b>Steering Committee</b>	<b>General Information sessions</b>	<b>Background papers</b>	<b>Response to Discussion Paper 1</b>	<b>Community group presentations</b>	<b>Response to Discussion Paper 2</b>	<b>Thematic workshops</b>	<b>Input to internal draft RCS</b>	<b>Community consultation meetings</b>	<b>Response to draft RCS</b>
<b>Other organisations</b>										
Australian Institute of Family Studies		*								
Bunurong Land Council									*	
CRC for Freshwater Ecology						*				
CSIRO		*								
Deakin University		*								
Ecotone Research Services					*					
GEOplan						*				
John Leonard Consulting Services										*
Kulin Nation Cultural Heritage Organisation		*#							*	
Learning and Action Pty Ltd						*				
Mirimbiak Nations Aboriginal Corporation Victoria		*								
Monash University		*								
Royal Melbourne Institute of Technology		*								
Streamline Research									*	*
South West and Wimmera Cultural Heritage Program		*				*	*			
Swinburne University of Technology								*		
The University of Melbourne		*								
University of Sydney						*				
Victorian Boonerwung Elders Lands Council		*								
Victorian Council of Social Service		*								

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20. See 12
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