Draft Port Phillip and Westernport Regional River Health Strategy

Second stakeholder draft: June 2004

INSIDE FRONT COVER

A large amount of information and data was used to develop this strategy. This detailed information has been made available through a Resource Document to accompany the strategy. This document can be found on the attached CD and includes information relating to the condition and values of each of the region's rivers and creeks and an analysis of the risks to these values.

The Resource Document also contains a description of the method and assumptions on which the Strategy is based and the detailed program for the first five years of the strategy as well as a 20-year river health program for the rivers and creeks within the region. The assumptions surrounding cost calculations and cost-sharing principles used to implement the strategy are documented in Section 2 of the Resource Document.

This detailed information is also available at www.melbournewater.com.au and www.ppwcma.vic.gov.au

Melbourne Water is owned by the Victorian Government. Melbourne Water is responsible for waterway, regional drainage and floodplain management for about 70% of the region's rivers and creeks. This operating area extends from Melbourne's water supply catchments high up in the Yarra Ranges, to the Mornington Peninsula and Western Port, north to Yan Yean and west to Werribee.

Melbourne Water works closely with the Port Phillip and Westernport Catchment Management Authority (CMA) to protect and improve the region's rivers and creeks. The CMA is responsible for the overall strategic management of natural resources and regional planning for the Port Phillip and Westernport region through the development of a Regional Catchment Strategy.

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Introduction

The Port Phillip and Westernport region contains about 8,000 kilometres of rivers and creeks. These rivers and creeks are major assets that are highly valued by the community.

There has been significant improvement in waterway health in recent decades and there are some rivers and creeks in the region in excellent condition. However, nearly half are in poor or very poor condition and there is much work to be done.

The goal is to ensure that the region's rivers and creeks are healthy, with increased numbers of native fish, platypus and plants. Our rivers and creeks will continue to be a hub for recreation and our communities will actively participate in improving their condition. By 2025, all natural rivers and creeks will be in good or better condition.

This Port Phillip and Westernport Regional River Health Strategy provides a five year blueprint for Melbourne Water, the Port Phillip and Westernport Catchment Management Authority, councils, community groups and environmental and industry associations to work together to achieve the goals for our rivers and creeks. The strategy is an important part of the Port Phillip and Westernport Regional Catchment Strategy, which sets the framework for the overall co-ordination of natural resource management in the region (Figure 1).

The estimated total cost to deliver the Port Phillip and Westernport Regional River Health Strategy is $218 million over five years. An estimated $44 million per annum in funding is required from authorities with a role in river health including Melbourne Water, Port Phillip and Westernport Catchment Management Authority, local government, Parks Victoria, Southern Rural Water and EPA Victoria and river health funding sources including both Commonwealth and State funding. Currently, some $23 million is spent in Melbourne Water's area on the Healthy Rivers program. Specific references to funding levels in this strategy are for indicative purposes only. The level of government investment in this strategy is contingent on budgets and government priorities.

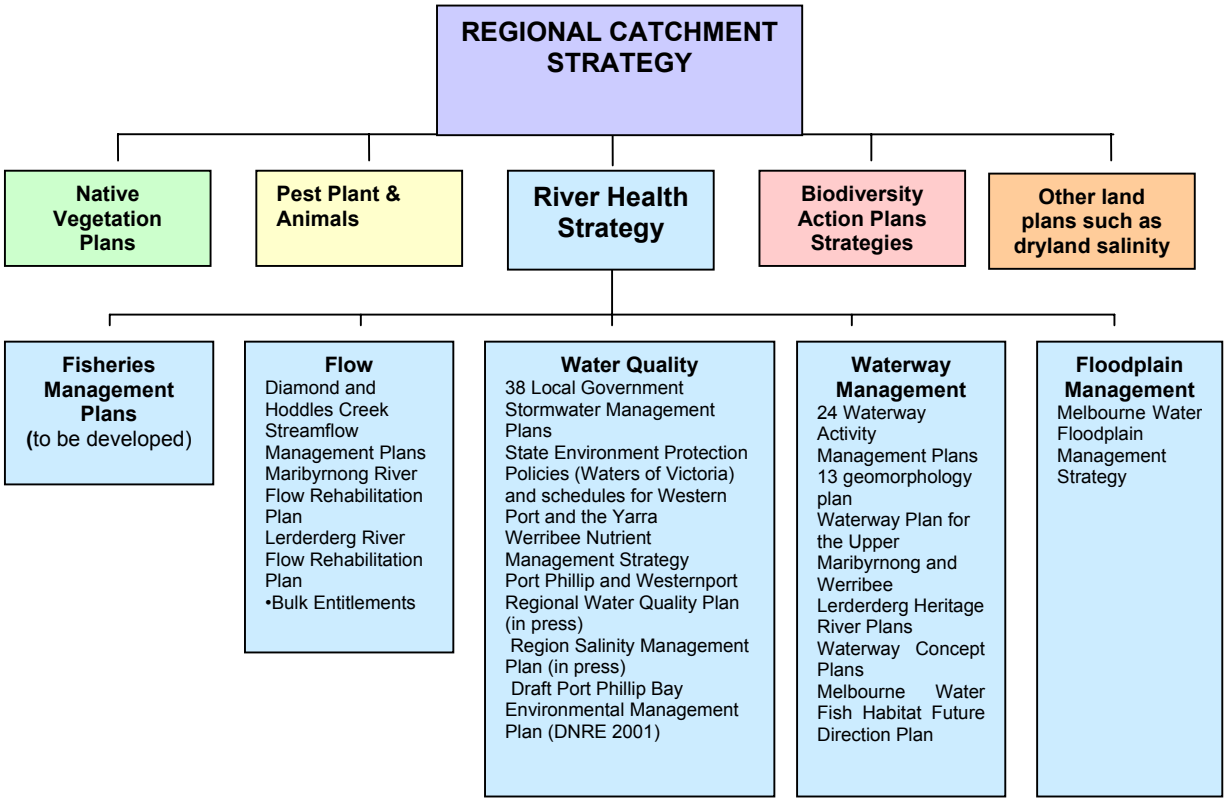


Figure 1:Regional Planning Framework

How the strategy was developed

The strategy has been developed in consultation with a range of stakeholders and community representatives using an asset valuation and risk-based approach through the Melbourne Water STREAMs decision support tool (Appendix 1, CD Section 2 for more detail).

Scales

The region has been divided into a number of units, with the five main catchments making up the highest level. Each of these catchments, Dandenong, Maribyrnong, Werribee, Westernport and Yarra, has been divided into 44 smaller management units (referred to as rivers and creeks) centred on a major waterway or group of similar waterways and 167 smaller sub-management units. A table detailing these units is included in Section 2 of the Resource Document.

Detailed information about the 167 sub management units can be obtained on the accompanying CD. River health programs in this strategy are summarised at the management unit scale.

Values

Values (also referred to as 'assets') are features of rivers and creeks we appreciate or seek, gain benefit from and want to protect, such as native fish and water quality that enables people to use the water for swimming. Three types of assets groups were valued:

- Environmental assets that measure the rarity, naturalness and representativeness of rivers and creeks and include features such as the presence of native fish and streamside vegetation
- Social assets that have value to the community including, for example, passive recreation, European and Aboriginal heritage
- Economic assets are an indirect measure of the financial contribution the waterway makes and includes, for example, tourism and provision of water supply

Risk assessment

Risk assessment provides a measure of the likelihood and consequences of a decline in the quality of river and creek assets. For example, the likelihood that water quality could deteriorate and the associated impact on the health of the river and/or the ability to swim in it.

The risk assessment involved identifying assets and the threats that lead to a deterioration in their condition, such as bed erosion and water pollution. This information on assets and threats was then used, with additional information on the relationship between the asset and threat, to determine risk (see CD, Section 2). Programs were then developed to manage risks.

Prioritisation

Every river and creek within the region has value and supports a range of assets, but a prioritisation process is necessary to determine the order of the implementation of river health programs.

The process adopted in this strategy is based on the Victorian River Health Strategy (2002). It is designed to ensure the protection of existing high-value rivers and creeks in good condition and improve rivers and creeks in areas where there is:

- The highest environmental and community gain for the resources invested
- Community commitment towards long-term improvement of river health

The prioritisation involved determining the significance of each river and creek in the regional context using the values and risk ratings (refer to CD, Section 1 for criteria to determine significance and Appendix 2 for results). Each program action identified during the risk assessment was prioritised based on:

- Degree of public perception/ support
- Opportunity to improve river health
- Multiple benefits
- Return of investment
- Downstream benefits

(Refer to Appendix 3 to see how each of the criteria was scored to enable a priority for the action to be determined).

The significance ratings and action priorities were applied to determine the timeframes for the implementation of the river health programs. Very high priority actions and high priority actions for improving river and creek vegetation form the five-year program.

Consultation

This Strategy has been developed in consultation with a range of stakeholders and community representatives. Consultation involved establishing a multistakeholder Steering Committee to provide direction on the development of the Draft Strategy and a total of 13 facilitated workshops were held throughout the region to identify values, risks and determine priorities. Input from Aboriginal communities with links to the Port Phillip and Westernport Catchments was also sought. Melbourne Water's Waterways and Drainage Advisory Committee has also provided input. This draft strategy will be used as the basis for a significant consultation process.

Rivers and Creeks

The Port Phillip and Westernport region is made up of five main catchments.

Figure 2: Port Phillip and Westernport region

Condition and significance

Recent analysis shows that in the region, 25% of rivers and creeks are in good or excellent condition and 75% are in moderate to very poor condition (Figure 3). These results reflect the major land use patterns. The rivers and creeks located in mountainous, forested areas, much of which is protected for water supply purposes, are in excellent to good condition. Condition deteriorates progressively downstream as a result of poor quality drainage and runoff from urban and agricultural land, weeds, bed and bank erosion, loss of instream habitat and the presence of barriers to fish migration. Urbanisation and land clearing as well as extraction for urban and agricultural uses have led to modified flows in many rivers and creeks.

An examination of values shows that nearly 70% of the major rivers and creeks in the region are significant in the regional context and have been identified as important for management in the five-year program (Figure 4).

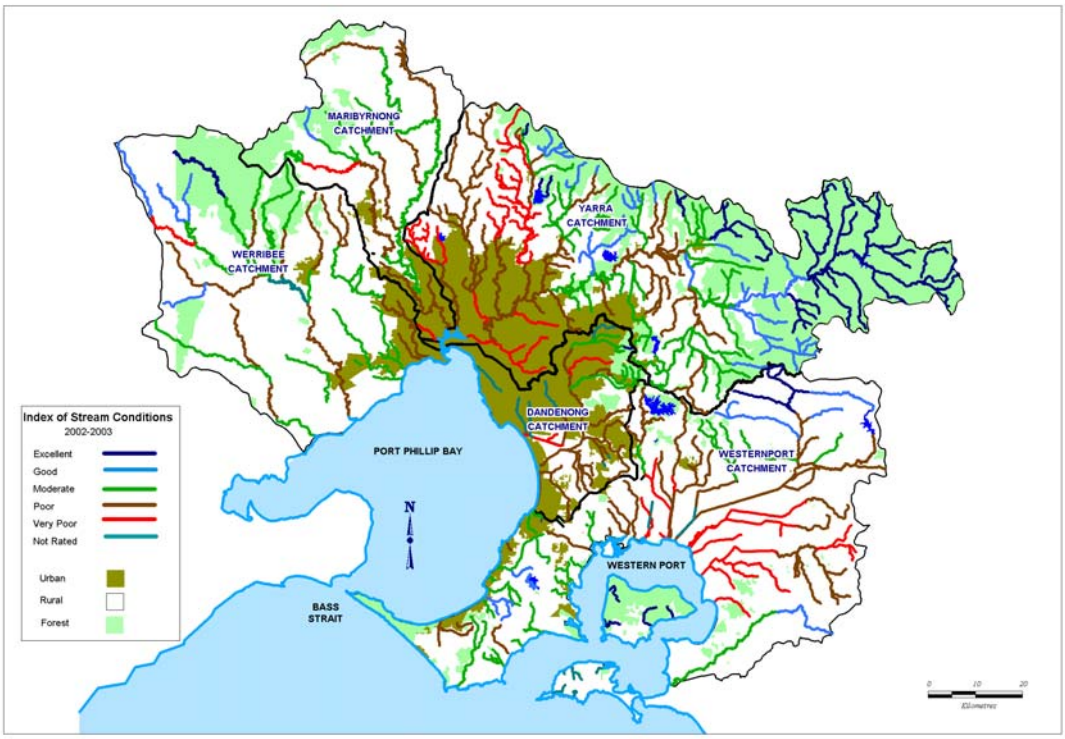


Figure 3: Waterway condition

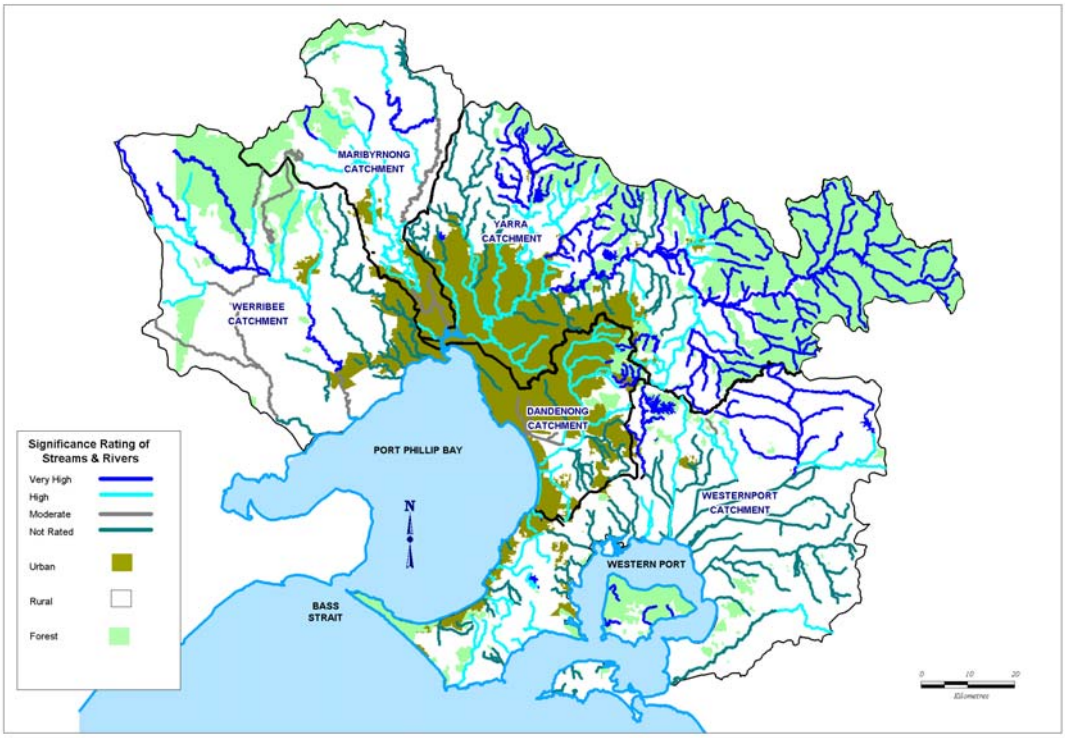


Figure 4: Very High and high significance rivers and creeks

The condition ratings and targets provided in this strategy are based on the Index of Stream Condition (ISC), developed by the Department of Sustainability and Environment for rural rivers and creeks. When improvement works are undertaken in rivers and creeks, it often takes a number of years for the benefits to become apparent and measurable. Given the time factor, this Strategy outlines a five-year program of priority works that will result in the stated targets being reached within 10 years.

This strategy provides information and targets for each river and creek as a whole, not specific sections identified by the ISC. The significance ratings are based on an analysis of river and creek assets and risks. A detailed description of the methods to determine the ISC and significance, and results is provided in Appendix 2 and Section 2 and 3 of the attached CD.

Community expectations

In pre European times, rivers and creeks were a vital part of the Aboriginal culture as they yielded many resources and were important places of spiritual and community activity, including birthplaces, burial sites, places of ceremony and transport routes. There are many significant sites along major rivers and creeks within the region, which represent a way of life that existed because of the presence of a river or creek, wetland, billabong or the floodplain.

Melbourne Water has undertaken research over the past 10 years to seek community views on rivers and creeks. Since the first surveys were undertaken, the community has become more aware of rivers and creeks and, as a result, their expectations have increased, particularly with regard to environmental condition.

These surveys indicate that safety, appearance and natural surrounds are important. In recent surveys, most people (72%) were satisfied with the condition of their local river or creek. Almost 80% also thought that their local river or creek was in better or the same condition as five years ago, and that protecting the environment should be the first priority for river and creek management.

Improving the Region's Rivers and Creeks

In protecting and improving the region's rivers and creeks the main objectives are to:

- Achieve an improvement in waterway health so that by 2025 all natural rivers and creeks will be in good or better condition
- Enhance opportunities for the community to enjoy their rivers and creeks
- Work with the community and key stakeholders to protect and improve rivers and creeks

The most significant risks to the health of rivers and creeks in the Port Phillip and Westernport region include changes in land use; poor quality of the streamside vegetation; changes in flow; fish barriers; poor water quality; the presence of stock; invasion by weeds, introduced fish and bed and bank erosion (see attached CD, Section 4 for detailed description of risks to rivers and creeks).

The challenge is to manage these risks and re-establish healthy rivers and creeks while ensuring sufficient opportunity for communities to use and enjoy them.

The broad priorities of the five-year program include:

- River health planning and regional initiatives
- Community engagement, partnerships and education
- Monitoring and investigations
- Improving river and creek vegetation
- Improving aquatic habitat
- Establishing and managing environmental flows
- Improving beds and banks
- Improving water quality
- Protecting heritage
- Maximising recreation opportunities

A summary of the first five-year program is provided in the following pages for each catchment. The five-year program targets are described throughout this summary and shown in Appendix 4. The detailed five-year program and long-term (20-year) program of broad actions and priorities is presented in sections 4, 6,8,10,12,14 and 15 of the attached CD.

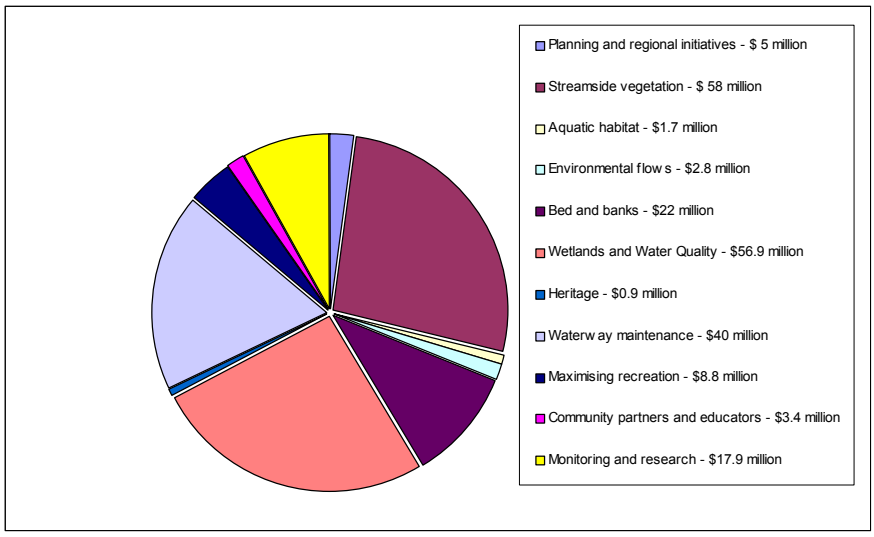


Figure 5: Estimated five-year program costs

River health planning and regional initiatives

The Regional River Health Strategy makes an important contribution to catchment management in this region. It sits under the Regional Catchment Strategy and alongside a number of other plans focused on issues such as salinity, native vegetation, pest plants and pest animals.

It is vital that the delivery of these plans is undertaken in an integrated manner. Strong coordination between the organisations involved will ensure effective implementation, the best outcomes and the best value for money.

The priority of actions and the timelines for implementation are flexible within all of these plans and strategies so that integrated implementation can be achieved, opportunities can be capitalised on and emerging issues can be addressed.

More detailed plans and river health projects are needed to assist in implementing the broad programs identified in this strategy. These include:

- The completion of a Regional Water Quality Plan
- Assessment to determine the risk to values associated with water quality not meeting state environmental protection policy objectives. This will help in determining regional water quality targets
- Further work in developing and urban areas to improve regulation and enforcement of building sites practices, land subdivision, industrial site management and capacity to incorporate water sensitive urban design.
- Regional wetlands and estuarine management plans
- Waterway plans in six rivers and creeks that have high environmental value

Community engagement, partnerships and education

The communities of the Port Phillip and Westernport region have participated in determining this Strategy's priorities for rivers and creeks through involvement in committees such as Melbourne Water's Waterway and Drainage Advisory Committee and the Catchment Management Authority's catchment committees. There will remain a strong commitment to community engagement in the implementation of this strategy and its review and the development of associated plans, such as the Regional Water Quality Plan.

Community members also actively participate in improving rivers and creeks as local landholders and as members of "Friends of" and Landcare groups. Authorities with a role in river health, including Melbourne Water, Parks Victoria and the Catchment Management Authority, offer grants and work closely with community members to assist them to plan and implement improvement works.

Across the region, education programs will also be developed and implemented to raise community awareness and understanding of the values of our rivers and creeks, the issues they face and the actions being implemented to protect and enhance these valuable assets.

The Port Phillip and Westernport region is the country of the Woiworung (Maribyrnong, Dandenong and Yarra), Boonerwrung (Westernport) and Wathurong (Werribee) communities. Aboriginal communities have a vital role to play in developing and implementing river health

programs. The Aboriginal cultural values and customary practices remain valid, even though there has been a loss of knowledge, a significant change in the natural geography and the desecration of many significant sites. Aboriginal knowledge and oral histories of stories associated with the rivers and creeks will be documented in a joint project between the Koorie Heritage Trust and Melbourne Water.

Monitoring and investigations

A comprehensive program of fixed site monitoring, waterway investigations, fish surveys and research projects aims to provide information on the condition of rivers and creeks to help managers and the community develop and measure performance of river health programs. An important part of this program is an ongoing partnership with the Cooperative Research centres for Freshwater Ecology, Catchment Hydrology and Australian Weed Management.

Volunteers also provide valuable information on the condition of rivers and creeks. The Melbourne Water Watch program and Melbourne Water Frog Census will continue to provide important data on waterway health.

Improving river and creek vegetation

Changes in land use change, vegetation removal, stock access and invasion of weeds have affected rivers and creeks by decreasing the quality and quantity of vegetation. Improving this vegetation requires the protection of areas of existing remnant vegetation along rivers and creeks, removing introduced plants (such as willows), fencing off zones to remove stock and replanting with native species that are local to the area (indigenous).

Streamside revegetation is proposed for 560 kilometres of rivers and creeks, while some 600 kilometres will be treated to control weeds. This will result in an improvement in the streamside zone ISC sub index in 3,000 kilometres of rivers and creeks.

Improving aquatic habitat

Barriers to fish passage in rivers and creeks are created by structures such as dams, weirs and road crossings. These structures hamper access to habitat and limit migrations of some species, especially native fish, which in turn hinders their breeding cycles. In addition to fish barriers, removal of snags, loss of habitat, land use change and poor water quality affect plants and animals that live in our rivers and creeks. To protect and improve the number and range of plants and animals in our rivers and creeks, it is planned to protect existing habitat, create habitat such as pools and small rapids, reintroduce large woody debris and vegetate the streamside zone.

The five-year plan involves the removal of 33 fish barriers and opening 1,500 kilometres of rivers and creeks to fish movement. There will also be an improvement in habitat in ten ISC reaches and improvement in the ISC aquatic life index in about 3,000 kilometres of rivers and creeks.

Establishing and managing environmental flows

Stream flow management plans and operating rules for urban and rural diversions are being negotiated by waterway managers, water users and environmental interests and these projects will continue as part of implementing this plan. The aim is to better allocate the timing and volume of water diversions for consumptive uses in order to define a share of the water resource for the environment

Stream flow management plans will set aside water volumes and timing of flows to benefit the environment without seriously affecting consumptive water users. However, some waterways are heavily committed. In these circumstances it may only be possible, during the term of this plan, to partially establish the recommended environmental flows, limit any further diversions or to create trading and operating rules that will gradually enhance flows.

Environmental flow regimes will be negotiated in 12 rivers and creeks. Stream flow management plans will be developed for the upper Maribyrnong, Werribee, Olinda, Stringybark, Little Yarra, Woori Yallock and Steels, Pauls and Dixons Creeks. Plans for stressed rivers and bulk water entitlements will also assist provision of environmental flows in the Lerderderg, Maribyrnong and Yarra Rivers.

Improving beds and banks of rivers and creeks

Excessive bed and bank erosion is today a problem in 14% of rivers and creeks. The five-year program will involve halting erosion at 76 sites, which will result in an improvement in the ISC physical form sub index in about 3,000 kilometres.

Many of our urban rivers and creeks have stable bed and banks because of channel modification such as concrete lining. While stable, these rivers and creeks do not provide good habitat for aquatic plants and animals.

Improving bed and banks will be achieved through building artificial structures such as rock chutes to halt erosion and removing introduced plants and replanting with indigenous vegetation.

Improving water quality

Poor water quality is a problem in many of the region's rivers. This limits the value of water for various uses, affects the range of plants and animals that can live within rivers and creeks and can change habitat, for example, by causing excessive growth of plants.

The five-year plan involves implementing urban stormwater management plans to reduce pollution and to protect water quality from new urban developments. In rural areas, the plan aims to facilitate the implementation of best land management practices to protect run off quality. The strategy provides for a series of wetlands to treat stormwater pollution before it reaches our rivers, creeks and bays. Removal of litter, obstructions and pollution in rivers and creeks forms an important part of the stormwater quality program.

Protecting heritage

The rivers and creeks of the region are rich in Aboriginal and European heritage. Aboriginal people have a strong social, cultural and spiritual connection to rivers and creeks and there are many Aboriginal and European sites of significance associated with rivers and creeks.

The program includes improving knowledge by undertaking archaeological surveys, protecting listed sites and improving the health of rivers and creeks where there is a strong spiritual connection between the river and the Aboriginal communities. In this region, the five-year plan will involve protecting and enhancing heritage values in 29 rivers and creeks.

Maximising recreational opportunities

The region's rivers and creeks are a hub for recreation. Every year, Melburnians make about 100 million recreational visits to our rivers and creeks and streams, and one in three

Melburnians live within one kilometre of a waterway. We aim to maximise opportunities for recreation whilst minimising the impact on the health of rivers and creeks. This involves creating one additional regional park as outlined in the Parks Victoria "Linking People and Spaces" strategy as well as maintaining existing facilities.

Werribee Catchment

The Werribee catchment lies west of Melbourne and covers an area of approximately 2,700 square kilometres. Basalt plains dominate the region's geology and the landscape varies from steep sided hills, gorges to flat plains. Rainfall varies from about 1000mm per year to as low as 450mm in the southern plains.

The catchment includes all rivers and creeks to the west of the Maribyrnong River through to Little River, such as the Werribee and Lerderderg rivers, Kororoit and Skeleton creek.

Around 25% of the catchment retains natural vegetation, 67% is agricultural and five % urban. Extensive grasslands were once a feature of the lowland plains, but now only scattered remnants remain. Forestry occurs in the upper areas of the catchment. Water storages include the Melton, Pykes Creek and Merrimu reservoirs.

Many of the major rivers and creeks flow through coastal wetlands listed under the international Ramsar convention, including Melbourne Water's Western Treatment Plant, Point Cook Marine Sanctuary, Avalon Airport and the Spit Wildlife Reserve. A feature of the catchment is the presence of several remnant grasslands that are of national or state significance for their flora values, such as the Derrimut Grasslands, William Angliss and the Altona Native Grass reserves.

Aboriginal people inhabited the rivers and creeks at least 30,000 years ago. The Werribee River is an important clan estate boundary forming the natural boundary between the Woi Wurrung and Boon Wurrung clans. The high density of archaeological material, including fish traps, artefacts and burial sites, along their banks and escarpments demonstrate that both Kororoit Creek and the Werribee River had large campsites.

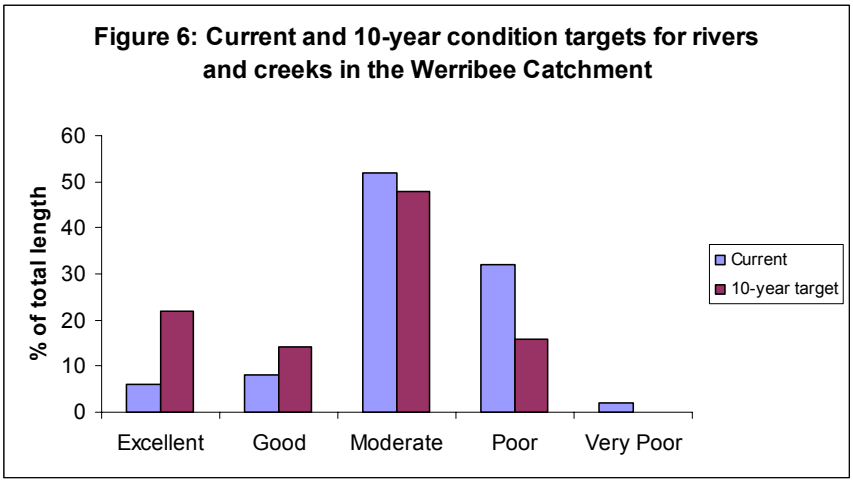
The condition of rivers and creeks is highly variable. Most rivers and creeks are generally moderate to poor. The catchment is located in a comparatively low rainfall area and stream flow is a major issue. Reduced stream flows have been exacerbated by the current, long-running drought.

Five-Year Program Objective

Strategies and actions will be put in place to reduce flow stress on rivers and creeks, while protecting water supply values.

The Werribee River will remain a major focus for passive recreation, fishing and boating as the network of parks and linear trails expands to cater for predicted population growth. Actions undertaken as part of the heritage programs and improvements to river health will enhance Aboriginal values and access to rivers and creeks.

Figure 6: Current and 10-year condition targets for rivers and creeks in the Werribee Catchment



The upper tributaries will be treated for erosion leading to an improvement in the physical form rating of the ISC in over 289 kilometres.

In five years, about 42 kilometres of streamside land will be revegetated and weeds controlled.

The Heritage River values of the Lerderderg River will be protected and enhanced and a clear planning framework will be established to guide direction. Water quality will be maintained in the lower sections of the catchment

In 10 years, there will be 321 kilometres of rivers and creeks in good or excellent condition, of which 38 kilometres will be considered ecologically healthy.

A summary of the river health programs and target conditions for rivers and creeks within the Werribee Catchment are described on the following pages. The highlighted red section of the map indicates the catchment area for the individual river or creek. A detailed description of all rivers and creeks and the program for the first five years as well as the 20-year program are contained in the attached CD sections 5, 6 and 15 respectively.

Lerderderg

Significance: Very High

Current Condition: Good Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆	◆	◆	◆	◆
Moderate				◆	
Poor					
Very poor					

Current Social Value: High Target: High

This area includes the Lerderderg River and Goodmans Creek. The Lerderderg River and Goodmans Creek originate in the Wombat State Forest and travel through forested and agricultural land and Bacchus March before joining the Werribee River. The Lerderderg is an important environmental asset and is one of two Victorian Heritage Rivers and the only Representative River in the region. The creeks are in good condition and support a range of aquatic life, including six species of fish.

The rivers have high social value, being popular for passive recreation. Key risks to river health include changes in natural flow, barriers to fish migration and, in the lower section, poor quality streamside zone. Localised patches of bed and bank erosion pose a risk to river health in Goodmans Creek.

River Health Program: Appropriate environmental flows, priority actions from the Port Phillip and Westernport Regional Water Quality Plan (in prep) and stream frontage management involving two kilometres of revegetation will be implemented. The program will also collect additional stream health information, maintain social and heritage values and protect 31 kilometres of ecologically healthy rivers.

Laverton Creek

Significance: Low

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆		◆		◆
Moderate	◆				
Poor		◆		◆	
Very poor					

Current Social value: Moderate Target: Moderate

Laverton Creek originates in a semi rural area and passes through urban and industrial areas before discharging to Port Phillip Bay at Altona. The creek passes through the Truganina swamp, which is of state significance because of the presence of the threatened Altona skipper butterfly. Key risks for this creek include poor water quality, litter and poor quality of streamside vegetation. Poor water quality also poses a risk to the health of Port Phillip Bay.

River Health Program: Priority actions will be implemented from the Wyndham Stormwater Management Plan to address risks such as litter and contaminated runoff from industrial areas and to improve the quality of water entering Port Phillip Bay. The five to 20-year program will address other risks and include activities to improve water quality as well as stream frontage management. Further improvements in condition are expected in the 20-year timeframe.

Middle Werribee River

Significance: Very High

Current Condition: Moderate Target: High

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆			
Good	◆	◆	◆	◆	◆
Moderate			◆	◆	
Poor					
Very poor					

Current Social Value: Target: High

This section of the Werribee River rises near Ballan and runs towards Myrniong, Bacchus Marsh and Melton. It includes the Pykes and Melton reservoirs, which service Melton, Bacchus Marsh. Korkuperimmul and Myrniong creeks are included in this catchment. Much of this area is an Urban Water Supply Protection Area. The Werribee Gorge is notable because of its landscape values, geological significance and presence of relatively intact native vegetation. It also provides good habitat for fish and other aquatic animals, such as Platypus.

Key risks to the health of the Werribee River through this section include changes to the natural flow regime, a number of fish barriers including the major reservoirs, and presence of

weeds. In the tributary rivers and creeks, erosion of the bed and banks is a key risk to river health.

River Health Program: Erosion control will be a focus at a number of sites and revegetation and weed control will occur in over 18 kilometres. Willows and other trees and shrubs will also be removed. Environmental flows will be provided.

Lower Werribee River

Significance: Moderate

Current Condition: Poor Target: High

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆	◆	◆	◆	
Moderate			◆		
Poor				◆	◆
Very poor					

Current Social Value: High Target: High

This area includes the Lower Werribee River and Lollipop Creek. The Lower Werribee runs through Werribee and the Western Treatment Plant before it flows into Port Phillip Bay. Through Werribee, the river is a significant recreational area for passive recreation and fishing and boating are popular in the estuarine sections. Through the Western Treatment Plant, the Werribee River is associated with important migratory wading bird habitat. The lower Werribee River is home to a range of fish species and lined with highly valued river red gums. Water is taken from the lower Werribee River to supply an intensive vegetable growing area at Werribee South.

Key risks to the lower Werribee River include changes to the natural flow regime, loss of streamside vegetation and weeds. The expanding urban area associated with Werribee is also a potential source for future water quality issues.

River Health Program: A new regional and recreational park will be created along the lower reaches of the Werribee River. Approximately six kilometres of revegetation and weed control activities are also programmed for this section of the Werribee River. Other activities include providing environmental flows and providing tools to minimise the impacts of urban development through better planning.

Little River

Significance: Moderate

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					◆
Good	◆	◆			
Moderate				◆	
Poor			◆		
Very poor					

Current Social Value: High Target: High

Little River rises in the northern section of Brisbane Ranges National Park and flows through the townships of Balliang and Little River before joining Port Phillip Bay at the Western Treatment Plant.

The Little River is ephemeral, meaning it stops flowing and dries up most summers. The estuary of the Little River is of high value as it runs through a Ramsar site and is valuable as migratory wading bird habitat. Little River runs through an important landscape, which includes significant native grassland and grassy woodland areas, associated with the remnant river red gums that line the river.

Stock access is a major risk to the health of the Little River. Urban growth associated with the outskirts of Werribee and growth of the Little River township is a potential risk.

River Health Program: The five-year program will focus on ensuring that development is managed to minimise the impacts on Little River. Strategies might include the use of planning overlays to protect significant values and the use of water sensitive urban design principles. The five to 20-year program will address other risks and include development of a waterway plan, continued water quality activities and stream frontage management.

Parwan Creek

Significance: Low

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent		◆			
Good	◆	◆			◆
Moderate	◆			◆	
Poor			◆		
Very poor					

Current Social Value: Low Target: Low

Parwan Creek rises near Fiskville and runs in an easterly direction towards Rowsley before joining the Werribee River south of Bacchus Marsh. It is home to the growling grass frog, which has high conservation value. The catchment and creek are subject to major erosion and weed issues, which are a risk to river and creek health and water quality. Fish barriers have also been identified as a significant risk.

River Health Program: The focus of the first five years will be reducing the impact of catchment activities on the downstream water supply reservoirs on the Werribee River. The five to 20-year program will address other risks and include development of a waterway plan, continued water quality activities as well as stream frontage management.

Skeleton Creek

Significance: Low

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent			◆		
Good	◆				◆
Moderate	◆	◆			
Poor					
Very poor				◆	

Current Social Value: Low Target: Moderate

Skeleton Creek originates in a rural area near Mt Cottrell and passes through urban areas before discharging to Port Phillip Bay. The Cheetham Wetlands, a site of significance for migratory birds, is located in the catchment. The creek has important Aboriginal spiritual values and parts of the creek are popular sites for passive recreation.

Skeleton Creek is in moderate condition, but it is becoming increasingly urbanised as new developments extend from Hoppers Crossing. This new development poses a major risk to the health of the river, if not managed in a sustainable manner. Other key risks include poor water quality and poor quality of streamside vegetation.

River Health Program: Improving protection of the Cheetham wetlands and water quality entering the Bay will occur through implementing priority actions from the Melton and Wyndham Stormwater Management Plan. The five to 20-year program will address other risks and include continued water quality activities as well as stream frontage management. Prospects for improving environmental conditions are low because the creek has been heavily modified, although further improvements are expected in the 20-year time frame.

Stony Creek

Significance: High

Current Condition: Very Poor Target: Poor

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good					
Moderate				◆	
Poor	◆	◆	◆	◆	
Very poor					◆

Current Social Value: Very High Target: Very High

Stony Creek has an urban and industrial catchment and flows through the inner western suburbs of Melbourne including Sunshine, Tottenham, West Footscray and Yarraville. Much of Stony Creek is highly modified for flood protection (e.g. concrete-lined, straightened or piped). Natural reaches exist along some of the parks and reserves. Although environmental values tend to be low, the creek supports some native frog species and a number of native fish are likely to inhabit the lower estuarine reach. In addition, the creek has high social value associated with bike paths and recreation reserves. Key risks to river health are urban stormwater, poor instream habitat and a lack of streamside vegetation.

River Health Program activities in the next five years will involve developing and implementing a revegetation plan for Stony Creek, and protecting recreation and heritage values.

Maribyrnong Catchment

The Maribyrnong catchment lies northwest of Melbourne. It covers an area of approximately 143,000 hectares and yields an average annual flow of 120,000 million litres. The Maribyrnong River has two main branches: Deep Creek and Jacksons Creek. Both are fed by a number of major tributaries including Boyd Creek and Konagaderra Creek. All rivers and creeks tend to be deeply incised, exhibit a high variability in flow and subject to extended periods of low flow.

Around 10% of the catchment retains natural vegetation, 80% is agricultural and 10% urban. A small forestry industry (both hardwood and plantation) occurs in the upper reaches.

The Rosslynne Reservoir is located on Jacksons Creek, just west of Gisborne, and supplies both irrigation and domestic water.

Deep incised valleys are a distinguishing feature of many of the rivers and creeks in the catchment. Within these valleys, valuable areas of remnant vegetation are found, including the highly valued river red gum. The rivers and creeks are characterised by poor water quality, changed flows and loss of riverbank and aquatic habitat. A rich Aboriginal culture exists and some of the most significant sites around Melbourne are found in this catchment.

The health of the rivers and creeks in the upper catchment is good, but many tributaries and the middle and lower reaches of the river have declined as a result of rural and urban development. There has been much urban and industrial development in the lower section and the impacts of this are evident through poor water quality.

Five-Year Program Objective

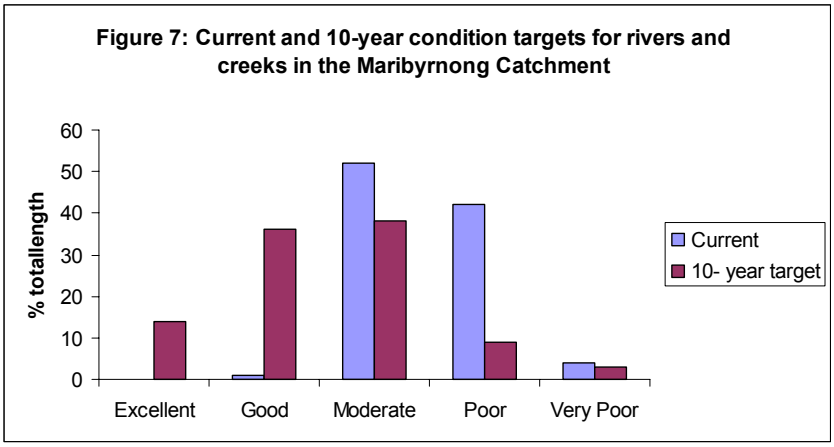


Figure 7: Current and 10-year condition targets for rivers and creeks in the Maribyrnong Catchment

The Maribyrnong catchment program will significantly increase knowledge and understanding of the relative priority of risks to the health of rivers and creeks. Strategies will be put in place to reduce flow stress on rivers and creeks and land management will be improved, reducing nutrient runoff and erosion and improving water quality. Throughout the catchment, streamside vegetation and the natural and cultural landscapes will be enhanced and protected. Within five years, the Maribyrnong catchment river health program will have reduced nitrogen contributions to rivers and creeks. Reservoir catchments will be protected from land use activities.

Around 46 kilometres of streamside land will be revegetated. In ten years, there will be 367 kilometres of rivers and creeks in good or excellent condition, of which 18 kilometres will be considered ecologically healthy.

There will be approximately 332 kilometres of rivers and creeks with an improvement in the ISC physical form rating.

The lower sections of the Maribyrnong River will be a focus for recreation with significant boating and fishing facilities and extensive trails linking parks. The rich indigenous heritage values in this section of the catchment will also be protected and interpreted to allow others to understand their significance.

A summary of the five-year river health program and target condition for rivers and creeks within the Maribyrnong Catchment are described on the following pages. The highlighted red section of the map indicates the catchment area for the individual rivers and creeks. A detailed description of all rivers and creeks and the program for the first five years as well as the 20-year programs are contained in the attached CD Section 7,8 and 15 respectively.

Maribyrnong River

Significance: High

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent			◆		
Good	◆		◆		
Moderate		◆		◆	◆
Poor				◆	◆
Very poor					

Current Social Value: Very High Target: High

The Maribyrnong River flows through a gorge area, significant because of its landscape values, recreational opportunities, geomorphological significance and European and Aboriginal heritage values. The Brimbank Park area has a rich Aboriginal culture and contains some of the most significant sites. Brimbank Park also provides an extensive trail network and is a source of water for local vegetable growers.

The Lower Maribyrnong flows through a largely urbanised area before running through Yarraville and joining the Yarra River. River red gums and the resident platypus population are important community values. Fishways have been installed in the lower Maribyrnong River, which will enable important native fish species such as the Australian grayling to recolonise the upper tributaries.

As with much of the Maribyrnong catchment, changes to flow pose a risk to river health. Other risks include lack of remnant native vegetation and poor quality streamside zones, including the presence of weeds.

River Health Program: Over 13 kilometres of vegetation and weed control will occur, which will also enhance heritage values. Stream flow will be managed to secure and manage appropriate environmental flows.

Deep Creek Upper

Significance: Low

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate	◆	◆	◆	◆	◆
Poor				◆	
Very poor					

Current Social Value: Low Target: Moderate

The upper sections of Deep Creek and Boyd Creek run through the rural townships of Lancefield and Newham. These creeks often cease flowing each summer and aquatic life is reliant on the remaining deep pool habitats. Important populations of Yarra pygmy perch, mountain galaxias and spotted galaxias, that have special conservation value, inhabit the upper reaches of these creeks. The upper section of Deep Creek is also a source of irrigation water for agriculture and is a proclaimed Water Supply Catchment. The upper sections of Deep Creek also support passive recreation and some public open space.

Erosion, stock access and weeds are key risks in these sections of the Deep and Boyd Creeks. Changes to the natural stream flow also pose a risk to river health.

River Health Program Environmental flows will be established and managed and information gathered on the animals and water quality within the creek. About 2.4 kilometres of revegetation will be undertaken along with weed control and streamside fencing.

Deep Creek Lower

Significance: Very High

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆	◆	◆	
Good	◆	◆			
Moderate				◆	◆
Poor					
Very poor					

Current Social Value: Moderate Target: Moderate

The lower section of Deep Creek runs through small rural townships including Romsey and Bulla and its tributaries provide water for agricultural use. The Kongaderra Creek is a tributary of Deep Creek and is included in this unit. The deep pools are extremely important habitats for native fish and other animals such as platypus and water rat. An important population of the Yarra pygmy perch, which has special conservation value, inhabits Deep Creek and is particularly important above Darraweit Guim. There is significant intact native vegetation in the lower parts of Deep Creek. Weeds and stock access are key risks.

River Health Program The Upper Maribyrnong Stream Flow Management Plan will be implemented to provide environmental flows in Deep Creek. Approximately 18 kilometres of revegetation, streamside fencing and weed control will be undertaken. The fish, aquatic macroinvertebrates and water quality will be further studied to gain a better understanding of the values and risks to river health. Some 36 kilometres of Deep Creek will be considered ecologically healthy.

Emu Creek

Significance: High

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆	◆	◆		
Moderate	◆			◆	◆
Poor					◆
Very poor					

Current Social Value: Low Target: Low

The Emu, Main and Bolinda creeks rise near Mt Macedon and join the Jacksons Creek near Sunbury. A number of small weirs divert water supply for townships including Gisborne, and the catchments have been declared water supply catchments. Sections of Emu Creek are popular for fishing and Emu Creek is likely to have populations of Yarra pygmy perch, mountain and spotted galaxias, which all have special conservation significance. However, there are a number of barriers to fish migration, often associated with water supply or farm dams. Key risks are changes to stream flow, presence of weeds and stock access, which leads to poor streamside vegetation.

River Health Program**:** The five-year program will focus on implementing the Upper Maribyrnong Stream Flow Management Plan. The five to 20-year program will address other risks and include the development of a waterway plan, management of water quality to protect water supply and stream frontage management.

Upper Jacksons Creek

Significance: High

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆	◆	◆		
Moderate			◆	◆	
Poor				◆	◆
Very poor					

Current Social Value: Moderate Target: High

This unit includes the Jacksons, Riddells, Sandy and Baringo creeks. The Jacksons Creek rises near Gisborne and flows through Sunbury before it joins the Deep Creek near Melbourne Airport. Rosslynne Reservoir is located on the Upper Jacksons Creek, and is a major source

of water for urban supply for the towns of Gisborne and Sunbury, and for agricultural users as far downstream as Keilor.

A major risk to the health of the Jacksons and Riddells creeks is the expanding urban centre of Sunbury, as well as growing townships such as Gisborne and Riddells Creek. Streamside vegetation is of poor quality and weeds and stock access pose a risk to the remaining vegetation.

River Health Program: Investigations into aquatic life will be undertaken and a waterway plan developed. Revegetation, weed control and fencing will take place on about seven kilometres of rivers and creek and fish passage will be provided at four sites on Jacksons Creek. Where possible, improvements to environmental flows will also be made.

Steele Creek

Significance: Moderate

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆			◆	
Moderate	◆		◆	◆	
Poor		◆			
Very poor					◆

Current Social Value: Very High Target: Very High

The creek originates near Tullamarine Airport, then flows south through urban areas to meet the Maribyrnong estuary at Avondale heights. Overall condition is poor and there have been a number of pollution spills over the years that have contributed to poor water quality. Some areas are valued for passive recreation. Risk include poor water quality and degraded streamside zone. Development of the old Niddrie Quarry site provides and opportunity to improve the condition of the creek.

River Health Program: Activities will involve implementing priority actions in the Steele Creek Waterway Activity Plan. Revegetation, channel improvements and enhancing the environment for passive recreation will also take place in conjunction with the development of the former Niddrie Quarry.

Yarra Catchment

The Yarra catchment lies north and east of Melbourne, beginning on the southern slopes of the Great Dividing Range in the forested Yarra Ranges National Park. Over one-third of Victoria's population lives in the catchment, which has an area of approximately 4,000 square kilometres.

The upper reaches of the Yarra River and its major tributaries flow through forested, mountainous areas, which have been reserved for water supply purposes for more than 100 years. Most of the land along rivers and creeks in the middle and lower sections has been cleared for agriculture or urban development.

There are numerous major water storages and farm dams and the taking of water from the rivers and creeks for agriculture is also prevalent. This means that flows in the Yarra River and many of its tributaries have been changed significantly since the time of European settlement.

Over one-third of Victoria's native plant and animal species occur in the catchment. The Yarra River between Warburton and Warrandyte has been identified as a Victorian Heritage River and the O'Shannassy River catchment identified as an Essentially Natural Catchment. The catchment also has 40 rivers and creeks that are of high or very high significance and 24 ecologically healthy rivers including the upper reaches of the Plenty River, the main stem of the Yarra River and Little Yarra River.

The rivers and creeks also have significant Aboriginal cultural value. While some features of the Yarra River that were integral to Aboriginal culture no longer exist (e.g. the waterfall at the end of William Street), a strong association with the Yarra River remains. This is demonstrated by the many historic places, including the William Street Falls, Yarra Flats dreaming, the Heide Scar tree and Bolin Bolin Billabong.

While the forested upper catchment tends to have excellent river and creek health, the condition of rural and urban rivers and creeks downstream deteriorates as a result of erosion, poor water quality, weeds, land use change and changes to river flows. Urbanisation and change in flows pose a major risk to the health of rivers and creeks.

In recent years, loss of habitat has been slowed and, in some cases, the range of some species such as platypus has been extended through revegetation, enhancement of habitat and removal of barriers to migration.

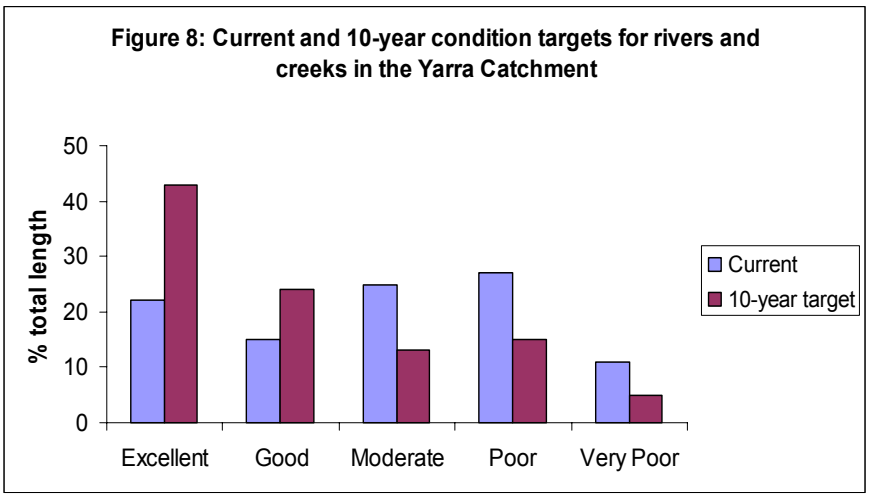


Figure 8: Current and 10-year condition targets for rivers and creeks in the Yarra Catchment

<u>Five-Year Program Objective</u>

The river health programs are extensive and aim to protect existing high value rivers and creeks and improve the condition of rivers and creeks throughout the urban environment. The river health

programs also aim to ensure planning for the allocation of water resources will provide for the long-term needs of both water users and the environment.

Formalised entitlements for the urban water supply, along with clear water sharing rules for agricultural water supply, will ensure that environmental flows are provided and sustainable in five rivers and creeks within the catchment. Stream flow management plans will be developed in priority rivers and creeks such as the Plenty River and Hoddles Creek.

In five years, 300 kilometres of rivers and creeks will be revegetated. In 10 years, these actions will have led to an improvement of one rating in the ISC streamside zone rating along 1,900 kilometres.

Over 2,000 kilometres of rivers and creeks will be in good or excellent condition within 10 years, and over 1,100 kilometres will be considered ecologically healthy.

Fish barriers will be removed from four sites, opening up 1,000 kilometres of rivers and creeks to native fish migration and re-colonisation by threatened species including the Australian grayling and populations of the endangered Macquarie perch.

The management of stormwater will continue throughout the lower to middle Yarra catchment resulting in improvements in water quality. Flood mitigation programs will also be implemented to protect homes and other assets from major floods.

The rich Aboriginal heritage values will also be protected and interpreted to allow others to understand the significant cultural connections between Aboriginal communities and the rivers and creeks.

A summary of the river health programs and target conditions for rivers and creeks within the Yarra Catchment are described on the following pages. The highlighted red section of the map indicates the catchment area for the individual river or creek. A detailed description of all rivers and creeks and the program for the first five years as well as the 20-year program are contained in the attached CD Sections 9, 10 and 15 respectively.

Case Study

How the Yarra River was formed as told by Barak

One day two boys were playing in the bush, throwing their toy spears at whatever bird they saw. After a while they tired of this game, and sighting an old wattle tree went up to it in the hope of finding some wattle gum, of which they were very fond. They saw some gum on a bough fairly high up, and one of the boys climbed the tree and reached it. He began to throw the gum down to the other boy, who was waiting for it underneath the tree. But when the lumps of gum reached the ground they disappeared, and the boy who had remained below could not find them. At last he noticed a hole, and thinking that the gum may have rolled down, he poked the end of his little spear in it.

As soon as he did this a deep growling voice was heard, and the ground seemed to shake. An old man, who had been sleeping underground with his mouth open, suddenly made his appearance. He picked up the frightened boy, and shuffled off, dragging his feet, because he was old and the boy was heavy to carry.

As the old man huddled along he made a furrow, which deepened into a gutter, then into a creek, and lastly became the Yarra River. All this time the little boy was crying with fright. At last Bunjil heard him. He put sharp stones in the path of the old man over which he fell, and cut himself into pieces. The boy ran off to his home.

Just before the old man died, Bunjil appeared, and said to him "Let this be a lesson to all old men. Thy must be good to little children."

Upper Yarra River:

Source

Significance: Very High

Current Condition: Excellent Target: Excellent

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆	◆	◆	◆
Good					
Moderate					
Poor					
Very poor					

Current Social Value: Moderate Target: Moderate

Rural Sections

Significance: Very High

Current Condition: Moderate Target Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆	◆		
Good	◆	◆	◆		
Moderate				◆	◆
Poor				◆	
Very poor					

Current Social Value: High Target: Very High

The Upper Yarra River contains the section of Yarra River upstream of Warrandyte, including major tributaries such as Don River. The headwaters of many tributaries arise in protected forests and are of excellent environmental condition, provide high quality drinking water for Melbourne and sustain a diversity of flora and fauna including the Mt Donna Buang stonefly. The Yarra River between Warburton and Warrandyte is a Victorian Heritage River. In addition to its environmental value, this section of the river also has high social values. The protected catchments are highly valued by the people of Melbourne and the lower sections of the river attract many visitors.

The Yarra River retains many environmental values but a number of risks persist including poor water quality, poor quality of streamside zone vegetation and stock access, and change in flow from natural.

River Health Program: A waterway plan for the middle Yarra will be developed. Activities for the next five years will also involve finalising the Yarra Bulk Entitlement and managing associated flows, reviewing the Heritage River Management Plan, improving instream habitat and improving water quality.

Little Yarra River and Hoddles Creek

Significance: Very High

Current Condition: Good Target: Excellent

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆	◆	◆	◆
Good	◆	◆			
Moderate				◆	
Poor					
Very poor					

Current Social Value: Moderate Target: Moderate

The Little Yarra River catchment contains the Little Yarra River and Hoddles Creek. The headwaters of these rivers and creeks arise from protected forest slopes but quickly shift to rural dominated landscapes in their middle and lower reaches. Environmental values of the upper reaches are high. These reaches support a variety of significant flora and fauna species, good water quality and a diversity of streamside and instream habitats. Recent introduction of old tree trunks into the Little Yarra has improved habitat. The condition of lower reaches reflects pressures arising from land use including the loss of habitat through sand deposition, stock access and poor quality streamside vegetation. In Hoddles Creek, changes in flow from natural pose a risk to river health.

River Health Program: Activities for the next five years will involve implementing priority actions from the Port Phillip and Westernport Regional Water Quality Plan (in prep), ensuring water use is managed appropriately, collecting additional stream health information, developing a waterway management plan for Hoddles Creek, investigating and constructing fish passage, implementing stream frontage management addressing weeds, stock access and revegetation and protecting and maintaining heritage and social values.

Woori Yallock Creek

Significance: Very High

Current condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆			
Good		◆	◆ ◆	◆	◆
Moderate	◆				◆
Poor				◆	
Very poor					

Current Social Value: Moderate Target: Moderate

The Woori Yallock catchment is a major tributary of the Yarra River and has tributaries such as Cockatoo, Shepherd, McCrae and Wandin Yallock creeks. The catchment is mostly rural with minor urban centres and some forested headwaters.

The Woori Yallock supports a range of threatened flora and fauna, platypus and several native fish and frog species and sections of Cockatoo Creek are ecologically healthy. The Yellingbo State Nature Reserve, which extends along several kilometres of the rivers and creeks support the largest remaining population of the critically endangered helmeted honeyeater. Parts of the Woori Yallock are valued for fishing and contain European heritage values. Risks include a lack of streamside vegetation, stock access, change in natural flow, poor water quality and barriers to the migration of fish and other aquatic life.

River Health Program: The streamside zone will be improved from poor to good condition by fencing to manage stock access, revegetating 64 kilometres of streamside, and weed control. A Woori Yallock Stream Flow Management Plan will be developed and water quality improved. Barriers to fish migration will be removed and additional stream health information will be collected. Public open space values will also be protected.

Watts River:

Source

Significance: Very High

Current Condition: Excellent Target: Excellent

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆			
Good			◆	◆	◆
Moderate					
Poor					
Very poor					

Current Social Value: Very High Target: Very High

Rural Section

Significance: High

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent				◆	
Good	◆	◆	◆		
Moderate	◆		◆	◆	◆
Poor					
Very poor					

Current Social Value: High Target: High

The Watts River is largely contained within the forested Maroondah Reservoir water supply catchment. The reservoir was completed in 1927 and has a capacity of 22,000 million litres. The reaches upstream of the reservoir are considered ecologically healthy. While the dam wall prevents fish migration, spotted galaxias are found in these upper reaches. Tributaries of Watts River include Donnelly's and New Chum creeks. Donnelly's Creek has a high social value and contains a heritage-listed weir. Most of Donnelley's Creek and the upper parts of New Chum Creek have very high environmental values due to undisturbed forested catchments. Downstream of Maroondah reservoir, the loss of vegetation, reduced flows, erosion and degraded water quality pose significant risks to the Watts River.

The headwaters of Graceburn and Coranderrk creeks are also in forested water supply catchments where environmental values are high and the reaches have been defined as ecologically healthy. High Aboriginal values are associated with Coranderrk Creek because of the history connected with the Coranderrk Aboriginal mission. The Aboriginal community now manages this area. European heritage is also high due to a historical weir on Coranderrk Creek. Whilst being of high social value, this weir poses a significant risk to native fish, preventing migration upstream and downstream. Downstream of the forested areas the condition declines due to cleared streamside vegetation, reduced flows and poor water quality.

River Health Program: In the forested reaches of these rivers and creeks, the actions over the next five years will include protecting heritage values and collecting information on water quality, fish and platypus. Fishways will be investigated and constructed where possible on both Graceburn and Coranderrk creeks. In the rural reaches, Bulk Entitlements will be finalised, heritage values will be protected and, in partnership with landowners and the Aboriginal communities, streamside vegetation will be improved.

Steels and Pauls Creeks

Source

Significance: Very High

Current Condition: Good Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆		◆		◆
Moderate		◆		◆	
Poor					
Very poor					

Current Social Value: Low Target: Low

Rural Sections

Significance: Low

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good		◆	◆	◆	
Moderate		◆	◆	◆	◆
Poor	◆				
Very poor					

Current Social Value: Low Target: Low

Steels and Pauls creeks enter the Yarra River from the north, near Yarra Glen. Much of the streamside vegetation was removed when the catchments were cleared for farming which led to instability. The condition of the rural reaches is poor. Small areas of the headwaters lie in the forested King Lake National Park and remain ecologically healthy. Key risks to both creeks in the rural areas include degraded streamside vegetation, changes in flow from natural and erosion. In some forested reaches, poor water quality poses a risk to river health.

River Health Program: Activities in the next five years in the rural reaches include streamside management to improve vegetation and stabilise banks. The development of a stream flow management plan will help to manage water allocation between private use and the environment. In the forested areas water quality will be improved by implementing the Port Phillip and Western Port Water Quality Plan (in prep) and in particular, ensuring that best practice road management is achieved.

Watsons Creek

Significance: Very High

Current Condition: Good Target: Excellent

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆	◆	◆	◆
Good	◆	◆			
Moderate				◆	
Poor					
Very poor					

Current Social Value: Low Target: Low

Watsons Creek enters the Yarra River from the north near Wonga Park. The creek originates in the forested King Lake National Park and quickly passes into cleared land at Christmas Hills and Kangaroo Ground. Watsons Creek has excellent channel form, good streamside vegetation and its headwater reaches have been defined as ecologically healthy. Weeds pose a risk to both the headwater and rural sections.

River Health Program: Activities in the next five years include improving the streamside vegetation through continuing to support the Stream Frontage Management Program and undertaking water quality and fish investigations.

Stringybark Creek

Significance: Low

Current Condition: Poor Target: Poor (halt further decline)

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good		◆			◆
Moderate	◆		◆		
Poor					
Very poor				◆	

Current Social Value: Moderate Target: Moderate

Stringybark Creek originates at Mount Evelyn and is surrounded by semi-rural and rural landscapes. The land use is reflected in the environmental values, which are relatively low. Risks include degraded streamside zones and stock access. European heritage values are high, and the creek landscape values have been recognised in the planning scheme. Prospects for improving the condition of the creek are moderate to low.

River Health Program: Activities over the next five years will focus on protecting and maintaining heritage values. The five to 20-year program will address other risks and include activities to improve water quality activities as well as stream frontage management. An improvement in condition is expected in the 20-year timeframe.

Olinda Creek

Significance: Very High

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					◆
Good	◆	◆	◆	◆	
Moderate	◆	◆	◆		◆
Poor					
Very poor				◆	

Current Social Value: Very High Target: Very High

Olinda Creek originates in the forested slopes of the Dandenong Ranges and its middle and lower sections traverse rural and urbanised landscapes. The creek retains high environmental values in its upper reaches which is reflected by the existence of a number of flora and fauna species of conservation significance, high water quality and a diversity of instream and streamside habitats. The middle and lower reaches have reduced environmental condition. The creek is also an important source of water for agriculture and contains both Aboriginal and European heritage values. Risks include the degradation of streamside zones, the existence of barriers to fish migration and stream flow stress as a result of extractions.

River Health Program: Activities for the next five years will involve developing and implementing a stream flow management plan, implementing priority actions from the Port Phillip and Westernport Regional Water Quality Plan (in prep), collecting additional stream health information, implementing stream frontage management addressing weeds, stock access and revegetation and protecting and improving social values.

Middle and Lower Yarra River

Significance: Very High

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆			◆	
Moderate	◆		◆		
Poor		◆		◆	◆
Very poor					

Current Social Value: Very High Target: Very High

The Middle and Lower Yarra River catchment represents the section of the Yarra below Warrandyte, including minor tributaries such as Anderson, Jumping, Ruffeys, Salt Creek and Banyule creeks. The Yarra River through its lower section retains a number of environmental values such as significant flora and fauna species including the threatened Australian grayling and Australian mudfish. The social value of the lower Yarra is very high; it provides excellent facilities such as trails and receives numerous visitors. The river is also a popular spot for tourists and hosts a number of important events including the Moomba festival. Tributaries within the section are typically highly dominated by urban influences. As a result, their environmental values are reduced. However, many still retain important

attributes such as recreational facilities. High Aboriginal values are associated with the area where Merri Creek joins the Yarra River because of the history connected with the site as a meeting place prior to European settlement, and as an Aboriginal mission post settlement. The wetlands in the Banyule area also possess significant Aboriginal heritage values. European heritage is also high due to Dights Falls and the historical flour mill.

Key risks to the lower and middle Yarra River relate to changes in hydrology, reduced water quality as a result of stormwater, partial barriers to fish migration and the prevalence of exotic weeds and pests.

River Health Program: Activities for the next five years include the development of a waterway management plan for the middle Yarra. The Yarra Bulk Entitlement will be finalised, the Dights Falls fishway modified, water quality improved through stormwater management activities and stream frontage management will address weeds, stock access and revegetation. In addition, heritage and social values will be maintained.

Diamond Creek

Source

Significance: Very High

Current Condition: Good Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆		◆	◆	◆
Good		◆	◆	◆	
Moderate					
Poor					
Very poor					

Current Social Value: Low Target: Low

Rural Sections

Significance: High

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					◆
Good	◆	◆		◆	◆
Moderate	◆	◆	◆		
Poor				◆	
Very poor					

Current Social Value Target: Moderate

This section includes the Diamond and Arthurs creeks. Both creeks rise in the King Lake National Park and flow through rural landscapes for most of their length. Diamond Creek also passes through semi rural areas before flowing into the urban area of Eltham.

The upper reaches of these creeks are in good condition and some are ecologically healthy. The presence and potential spread of weeds is the only major risk to these headwater reaches. Outside the King Lake National Park, condition deteriorates to moderate reflecting a change in land use. The creeks still support important environmental values, including freshwater blackfish, mountain galaxias, and a breeding population of platypus. The continuity of streamside vegetation is one of the

creeks' environmental assets. However weeds and stock access pose a risk. Some areas of the creeks are popular for passive recreation and fishing.

River Health Program: Activities in the next five years in the rural reaches include continuing to improve the streamside vegetation, addressing localised bed and bank erosion, and implementing stream flow and stormwater management plans. Weed control will be the main activity in the headwater reaches.

Plenty River

Source

Significance: Very High

Current Condition: Good Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆			
Good			◆	◆	◆
Moderate				◆	◆
Poor					
Very poor					

Current Social Value: Low Target: Low

Rural and lower Sections

Significance: Very High

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆	◆	◆	◆	
Moderate		◆			
Poor	◆			◆	◆
Very poor					◆

Current Social Value: High Target: High

The Plenty River and its tributaries flow from the headwaters around Whittlesea to where it joins the Yarra near View Bank. Major tributaries include Barbers, Bruces, Scrubby and Jacks creeks. Two major domestic water storages (Yan Yean and Toorourrong) are found within the catchment. The river has a largely rural catchment with two major towns at Mernda and Whittlesea. The catchment becomes fully urban downstream of South Morang.

In the upper, forested reaches rivers are ecologically healthy. As a whole, the river supports a range of rare and threatened flora and fauna species. Recent surveys have found spotted galaxias and short-headed lamphrey. The Plenty Gorge is a major feature of the river and has Aboriginal heritage values. The lower sections are popular for passive recreation.

Change is stream flow is a serious issues while other risks include poor water quality, lack of streamside vegetation and barriers to the migration of aquatic life. The prospects for improving this river are good.

River Health Program: Activities in the next five year includes finalising the Plenty River Stream Flow Management Plan and Yarra Bulk Entitlement, stream frontage management on 50 kilometres of rivers, implementation of the Port Phillip and Westernport Regional Water Quality Plan (in prep.) and stormwater management plans, stabilising the beds and banks of Barbers and Bruces creeks, removing fish barriers and protecting heritage values.

Darebin Creek

Rural Sections

Significance: Low

Current Condition: Very Poor Target: Very Poor (halt further decline)

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate		◆			◆
Poor	◆				
Very poor				◆	

Current Social Value: Low Target: Moderate

Urban Sections

Significance: High

Current Condition: Poor Target: Poor

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆				
Moderate	◆		◆		
Poor		◆			◆
Very poor				◆	

Current Social Value: Very High Target: Very High

Darebin Creek rises on Melbourne's northern outskirts and travels through rural landscapes before entering urban and industrial areas as the creek flows towards Melbourne.

The creek has been heavily modified and environmental values are low. However, some threatened flora and fauna species such as growling grass frog are present and the recent building of fishways on several barriers have improved the ability of native fish, such as common galaxias and short-finned eel to move through the creek. The extensive network of bike paths, parks and reserves, as well as Aboriginal and European heritage, contribute to a high social value. Risks include poor water quality, poor quality streamside zone, flow stress and the presence of exotic fish.

River Health Program: Prospects for improving environmental condition are low because the creek has been heavily modified. Activities for the next five years will focus on protecting and maintaining heritage values and managing stormwater in the urban reaches to prevent further deterioration. The five to 20-year program will address other risks and include activities to improve water quality as well as stream frontage management. An improvement in condition is expected in the 20-year timeframe.

Merri Creek

Rural and Forested Sections

Significance: Low

Current Condition: Poor Target: Poor (halt further decline)

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good					◆
Moderate		◆	◆		
Poor	◆			◆	
Very poor					

Current Social Value: Low Target: Low

Urban Sections

Significance: High

Current Condition: Very Poor Target: Poor

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate			◆		
Poor	◆	◆		◆	◆
Very poor	◆			◆	

Current Social Value: Very High Target: Very High

Merri Creek flows from the foothills of the Great Dividing Range north of Wallan on the Hume Highway. It is a major tributary of the Yarra River flowing over basalt plains to meet the Yarra at Fairfield. Tributaries include Edgars and Central creeks. Merri Creek has high Aboriginal heritage value, as the creek and surrounding lands were important for food, shelter and travel. The Merri Creek catchment includes remnants of former vegetation communities characteristic of the basalt plains north of Melbourne. In particular are remnant red gum woodlands, stony knolls and grasslands.

Despite a history of land clearing and agricultural development, the rural reaches have retained some natural stream form and related landscape values and, feature a number of sites of state/national conservation significance. The state significant endangered growling grass frog is found in several locations. Risks to the rural reaches of the Merri Creek include poor water quality, streamside vegetation and fish barriers.

While only few environmental values remain in the urban reaches, the creek has very high social value because of passive recreation, and European and Aboriginal heritage. The confluence of the Merri Creek and the Yarra River has high Aboriginal heritage values and was once an important meeting place. Risks to the lower reaches of Merri Creek include stormwater – both the quality and quantity, poor quality streamside vegetation and fish barriers.

River Health Program: Prospects for improving environmental condition are low because the creek has been heavily modified. Activities in the next five years will focus on the urban reaches where water quality improvements will be made through implementing stormwater management plans, heritage values will be protected and streamside vegetation will be improved. In the rural reaches community

grants will help to improve and protect streamside vegetation. The five to 20-year program will address other risks and include activities to improve water quality as well as stream frontage management. An improvement in condition is expected in the 20-year timeframe

Moonee Ponds Creek

Significance: Moderate

Current Condition: Very Poor Target: Very Poor (halt further decline)

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate	◆				
Poor	◆	◆			◆
Very poor				◆	

Current Social Value: High Target: High

Moonee Ponds Creek flows from Greenvale down through Tullamarine and joins the Yarra River in West Melbourne. Tributaries include Yuroke Creek, which enters Moonee Ponds from the north in West Meadows, and Attwood Creek, which rises just to the west of Mickleham Road in Greenvale. The catchment is largely urbanised except for the very upper rural reaches.

Works undertaken in the 1950s to increase flood protection resulted in the removal of bank vegetation and instream debris in conjunction with concrete lining of much of the lower reaches of the creek. Although the overall condition of Moonee Creek is very poor, there are small areas in better condition. For example, the creek through Woodlands Historic Park has the best examples of a comparatively natural waterway within the catchment. The creek has a high social value and is popular for passive recreation. Risks to the creek include poor streamside vegetation and stormwater runoff.

River Health Program: Prospects for improving environmental condition are low because the creek has been heavily modified. Activities in the next five years will focus on the lower reaches improving water quality, protecting heritage values and improving the creek environment for passive recreation. In the rural reaches, community grants will help to improve and protect streamside vegetation. The five to 20-year program will address other risks and may include a program of removing concrete lining in some areas. An improvement in condition is expected in the 20-year timeframe

Gardiners Creek

Significance: High

Current Condition: Very Poor Target: Very Poor (halt further decline)

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate	◆				
Poor	◆	◆			
Very poor				◆	◆

Current Social Value: Very High Target: Very High

Gardiners Creek, including Scotchmans and Damper creeks, has a predominantly urban catchment. Although the system tends to rate poorly from an environmental perspective, the creeks support important species of native fish (e.g. common galaxias, climbing galaxias), water rats and the growling grass frog. Gardiners Creek is highly valued for its extensive network of bike paths, trails, recreation reserves and parks. Key threats include stormwater (including litter), weeds, localised bank erosion and barriers to the migration of aquatic life.

River Health Program: Activities in the next five years include identifying and addressing instances of localised bank erosion and protecting heritage values. The five to 20-year program will address other risks and an improvement in condition is expected in the 20-year timeframe.

Dandenong Catchment

The Dandenong catchment lies southeast of Melbourne and has an area of 855 square kilometres and some 485 kilometres of rivers and creeks. Dandenong Creek is the major waterway in the catchment. The creek originates in the Dandenong Ranges National Park and discharges into Port Phillip Bay via both Mordialloc Creek and the Patterson River. Major tributaries include Bungalook Creek, Blind Creek, Eumemmerring Creek, Corhanwarrabul Creek and Mile Creek

Approximately 45% of the catchment is now urbanised, although farmland (mainly grazing, but also horticulture and poultry) is widespread in areas such as Bangholme and Narre Warren East. Some forest pockets remain, particularly in the Dandenong Ranges and along middle Dandenong Creek. Industrial activity occupies large areas around Dandenong, Bayswater and Moorabbin.

Modifications to rivers and creeks for flood protection (e.g. piping, concrete lining and channel straightening) have also been extensive. Most notably, the Carrum swamplands were drained in the late 1800s with the construction of Patterson River. These swamplands previously covered an area of around 4,500 hectares.

The health of rivers and creeks in the catchment closely match land use. In general, condition is moderate to poor throughout, although some areas are still in relatively good condition, especially the forested source of Dandenong Creek and parts of the Corhanwarrabul-Monbulk Creek system.

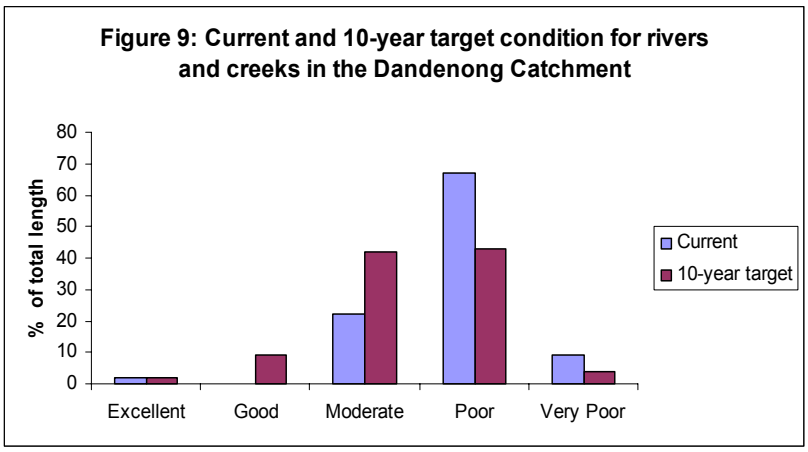
Water quality is generally fair to poor throughout, with better quality tending to occur in the forested hills. There have been significant improvements in water quality in the last 30 years as the sewerage system has been extended and industrial discharges to rivers and creeks have been phased out. Risks to the health of rivers and creeks in the catchment include urban stormwater, barriers to the migration of aquatic life, weeds and lack of streamside vegetation.

Five-Year Program Objective

The Dandenong Creek catchment river health program will improve and protect the high value environmental, social and economic assets. All environmental assets will be protected in the forested section of the upper Dandenong and riparian vegetation will be enhanced in middle and lower sections to increase the amenity value of the Dandenong Creek and Patterson River. Although maintenance of high social value and a pleasant environment will drive streamside management along modified rivers and creeks, some improvement to environmental assets is also expected.

A network of open space and recreational facilities will be widespread along the rivers and creeks. These will support a wide range of passive recreation pursuits and boating activities.

Figure 9: Current and 10-year target condition for rivers and creeks in the Dandenong Catchment



In the upper forested reaches of the Dandenong Creek, the seven ecologically healthy river reaches will be maintained. Approximately 102 kilometres of river and creeks will have an improved streamside zone and 128 kilometres of rivers and creeks will have an improved channel

form. Water quality trends for many parameters including *E. coli* and nitrogen will continue to decrease and algal blooms in the Patterson Lakes will decrease in intensity and frequency.

The aquatic life ISC sub index ratings for rivers and creeks will be maintained. The nationally significant dwarf galaxias (*Galaxiella pusilla*) and growling grass frog (*Litoria raniformis*) will be protected, as will isolated populations of platypus.

Careful management of land use changes from rural to urban in the growth corridors will protect the natural structure of bed and banks, native fish and the presence of threatened species as well as reduce the risk of a decline in water quality and changes in flow. Because of the highly urbanised nature of this catchment, after the five-year program, only 34 kilometres of rivers and creeks are expected to be in good or excellent condition.

A summary of the five-year healthy river program and target condition for rivers and creeks within the Dandenong Catchment are described on the following pages. The highlighted red section of the map indicates the catchment area for the individual rivers and creeks. A detailed description of all rivers and creeks and the program for the first five years as well as the 20-year programs are contained in the attached CD Section 11, 12 and 15 respectively.

Dandenong Creek Source

Significance: Very High

Current Condition: Excellent Target: Very High

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆		◆	◆
Good		◆	◆		
Moderate					
Poor					
Very poor					

Current Social Value: Very high Target: Very High

The Dandenong Creek source is situated in Doongalla Forest near Mount Dandenong. These reaches are ecologically healthy, largely due to the surrounding forest. As well as generally good health, the upper Dandenong Creek system (including Dobsons Creek) and Monbulk Creek support the only substantial platypus populations in the Dandenong Valley. Powerful owls roost along upper Dobsons and Dandenong Creek. The Dandenong Creek source also has high social value associated with the National Park. Weeds and barriers to the movement of aquatic life are the key risks to river health.

River Health Program: Activities in the next five years will involve management of weeds and collecting additional river and creek health information.

Middle Dandenong Creek

Significance: High

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆	◆	
Moderate	◆		◆	◆	
Poor		◆			
Very poor	◆				◆

Current Social Value: Very High Target: Very High

Middle to Upper Dandenong Creek includes the catchment upstream of Dandenong to Upper Dandenong Creek and Dobsons Creek at The Basin. This catchment incorporates a number of other creeks, including Heatherdale, Bungalook, Tarralla and Old Joes. Upper Dandenong and Dobsons Creeks support significant environmental values, including the threatened Dandenong freshwater amphipod, whereas river health tends to decline dramatically in the urban and industrial areas downstream. Despite the poor condition of rivers and creeks, the presence of threatened flora and fauna species including Yarra gums, dwarf galaxias, swamp skinks and growling grass frog represent important environmental values. The extensive network of bike paths, parks and reserves associated with rivers and creeks throughout the catchment contribute to a high social value. Key risks to river health include urban stormwater, barriers to the migration of aquatic life, weeds and a lack of streamside vegetation.

River Health Program: Activities in the next five years will involve weed control and planting seven kilometres of vegetation and the protection of heritage and recreation values. In the upper sections, activities to improve water quality will be undertaken. The five to 20-year program will see water quality actions and other risks continue to be addressed throughout the creek.

Lower Dandenong Creek

Significance: High

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good					
Moderate	◆		◆		
Poor	◆	◆	◆	◆	
Very poor					◆

Current Social Value: Very High Target: Very High

Lower Dandenong Creek commences at Dandenong. The catchment has a strong urban and industrial influence, although rural zones exist such as around Bangholme and Keysborough. While the environmental values are generally low, native fish populations are good in the lower reaches and a number of threatened flora and fauna species such as the growling grass frog are present. The Edithvale Wetlands are internationally significant for migratory birds under the Ramsar convention.

The National Watersports Centre is popular for boating, fishing and passive recreation. The former Carrum swamp area also has Aboriginal heritage value. Key risks to river health include urban stormwater, barriers to the migration of aquatic life, weeds and a lack of streamside vegetation.

River Health Program: Activities in the next five years will involve the implementation of stormwater management plans, the removal of barriers to fish migration, controlling weeds and planting 1-2 kilometres of vegetation along the Patterson River, and the maintenance of recreation along Patterson River and Mordialloc Creek.

Blind Creek

Significance: High

Current Condition: Very Poor Target: Very Poor (halt decline),

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate	◆				
Poor		◆			
Very poor				◆	◆

Current Social Value: Very High Target: Very High

Blind Creek has a largely urban catchment, although its headwaters are within the Dandenong Ranges National Park. The creek flows through Ferntree Gully and Wantirna South before entering Dandenong Creek at Scoresby. The creek generally has low environmental value, however significant species such as threatened Yarra gums and dwarf galaxias have been recorded in recent years. Notable social values include an extensive bike path along the creek between Ferntree Gully and Nortons Park, Wantirna South. Risks to river health include urban stormwater, barriers to the migration of aquatic life and lack of streamside vegetation.

River Health Program: Prospects for improving environmental condition are low because the creek has been heavily modified. In the next five years, work will return stream flows to the old creek channel through Boronia. This is a demonstration project to assess the effectiveness of re-establishing old waterway paths. The five to 20-year program will address key risks and an improvement in condition is expected in the 20-year timeframe.

Corhanwarrabul, Monbulk and Ferny Creeks

Significance: Very High

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent			◆		
Good	◆		◆	◆	
Moderate	◆	◆		◆	
Poor					◆
Very poor					

Current Social Value: High Target: High

Corhanwarrabul Creek is a major tributary of middle Dandenong Creek, originating in the Dandenong Ranges around Sherbrooke and meeting Dandenong Creek at the Police Road wetlands, Rowville. Major rivers and creeks include Monbulk, Ferny, Ferntree Gully and Clematis creeks. Much of the catchment is urbanised, although significant forested areas exist in the headwaters and some rural land use occurs along Monbulk Creek. Environmental values are moderate to good, with better reaches tending to be in the headwaters. Monbulk Creek is one of only two systems in the Dandenong Valley known to support platypus, and the threatened Dandenong freshwater amphipod is present in Ferny and Ferntree Gully creeks. Corhanwarrabul Creek and its tributaries also rate highly for social values such as the National Park, Birds Land Reserve and Belgrave Lake Park.

Key risks to river health include urban stormwater, barriers to the migration of aquatic life and weeds.

River Health Program: Activities in the next five years will involve management of weeds and planting vegetation along five kilometres, stabilising river and creek banks, implementing priority actions from the Port Phillip and Westernport Regional Water Quality Plan (in prep.), collecting additional river and creek health information and protecting and maintaining social values.

Eumemmerring Creek

Significance: Low

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good					
Moderate	◆	◆	◆	◆	◆
Poor				◆	
Very poor					

Current Social Value: Very High Target: Very high

Rivers and creeks in this unit, including Eumemmerring Creek, Troups Creek, Ti Tree Creek, Hallam Main Drain and Eastern Contour Drain cover areas of Lyndhurst, Hampton Park and Endeavour Hills. Land use is principally urban and rapidly expanding. While environmental condition is generally low, the presence of threatened growling grass frog and dwarf galaxias is noteworthy. The recent construction of several water quality treatment wetlands to reduce pollutants entering Port Phillip Bay, such as the Hampton Park Wetlands are also important environmental features. Lysterfield Park and several bike paths are among the social values rivers and creeks. Key risks to river health include urban stormwater, barriers to the migration of aquatic life, weeds and a lack of streamside vegetation.

River Health Program activities in the next five years will involve the implementation of stormwater management plans, developing a waterway management plan for upper Eumemmerring Creek and protecting heritage values. While stormwater actions will bring about improvements in water quality, water quality will remain moderate in the first five years. Further improvements are expected in the 20-year time frame.

Kananook Creek

Significance: High

Current Condition: Poor Target: Poor (halt further decline)

Significance: High

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate	◆	◆			
Poor	◆				
Very poor				◆	◆

Current Social Value: High Target: Maintain at high

The Kananook Creek catchment incorporates areas such as Frankston, Seaford and Carrum Downs. Major tributaries are Boggy Creek, Tamarisk Creek and Eel Race Drain. The Seaford Wetlands, internationally significant for migratory birds under the Ramsar convention, are located in this catchment. The Langwarrin and Pines Flora and Fauna reserves are also important conservation reserves. Threatened flora and fauna species such as the swamp skink, growling grass frog and dwarf galaxias have been recorded and, overall, the catchment has moderate environmental value. The Kananook Creek estuary, parks, reserves and paths provide recreational opportunities. Key risks to river health include urban stormwater, barriers to the migration of aquatic life, weeds and a lack of streamside vegetation.

River Health Program: Prospects for improving environmental condition are low because the creek has been heavily modified. Activities in the next five years will involve the implementation of the local stormwater management plan, protection and enhancement of Edithvale-Seaford Wetlands and maintaining recreation. The five to 20-year program will address other risks and an improvement in condition is expected in this timeframe.

Westernport Catchment

The Westernport catchment, including all of the Mornington Peninsula, has an area of 3,433 square kilometres and some 2,232 kilometres of rivers and creeks. The landscape varies from the northern highlands (including the Bunyip State Park) and the southern uplands (including part of the Strezlecki Ranges), to the flat, undulating terrain of the former Koo Wee Rup Swamp region

Major rivers and creeks include the Bunyip and Tarago rivers and Cardinia and Toomuc creeks. There are also a number of small creeks within Phillip Island and French Island.

Approximately 70% is rural land, 20% is Crown land and five % is urban. Dairying remains the primary industry. Forested areas are mainly in the northern highlands and industrial zones are mostly confined to Hastings.

Since European settlement, the former Koo Wee Rup Swamp was drained for agricultural use. Previously, the swamp extended for some 400 square kilometres and much of it was dense tea tree scrub. It once intercepted a high proportion of river flows prior to entering Western Port. But as a result of the draining, many of the rivers and creeks in the lower catchment have become channel drains and much of the surrounding swamp vegetation has been lost. Resulting erosion issues have taken many years to address.

Although urbanisation is currently low, the catchment is undergoing rapid urban growth along the southeastern growth corridor (including Berwick and Pakenham) and the Mornington Peninsula.

The marine ecosystem within Western Port is of regional, national and international importance (including Ramsar listing), with a range of habitats and associated mangrove, salt marsh, seagrass, reef and soft seabed communities.

The region has a rich indigenous history, including the traditional Aboriginal belief of the *Too-roo-dun* (otherwise known as the bunyip) that occupied the Koo Wee Rup Swamp and was said to live at the mouth of what is now called Sawtells Creek at Tooradin (Eidelson 1997).

The rivers and creeks are diverse in form and health, varying from good or very good in the northern highlands, to poor or very poor in the rural and urban sections in the lowlands.

The apparent loss of 50-70% of seagrass cover in Western Port since the mid 1970s has become a focus of concern in recent years because of the critical role that seagrass meadows play not only in providing food and shelter for fish and other marine animals, but also in stabilising seabeds and improving water clarity.

Five-Year Program Objective

Considerable effort will be required to improve the health of rivers and creeks and to minimise catchment impacts to the Ramsar listed Western Port. While the channel form and streamside programs within this catchment are costly, this investment is relative to the direct and indirect benefits that the programs will have on a range of river and creek assets.

In addition to the broad benefits of revegetating streamsides and stabilising bed and banks, fish passage will be restored at three sites, which will reopen over 90 kilometres to native fish. Significant habitat will be protected for the listed Australian grayling, dwarf galaxias and growling grass frog.

Improvements in current land management activities will minimise impacts to water quality and, in areas where land use changes from rural to residential or industrial, these changes will be managed to

ensure that direct impacts to the local waterway environments and Western Port are minimised. Specifically, this will involve implementing environmental best practice design and construction measures.

In five years, approximately 42 kilometres will be revegetated and 48 sites treated for erosion. Within 10 years, this will lead to an improvement in approximately 1,000 kilometres of rivers and creeks and an improvement in the ISC physical form rating. Approximately 650 kilometres will be in good or excellent condition, of which 190 kilometres will be ecologically healthy.

Figure 10: Current and 10-year condition targets for rivers and creeks in the Westernport Catchment

Environmental knowledge of the Westernport catchment's rivers and creeks will improve as investigations are undertaken. Understanding of Aboriginal values associated with the rivers, creeks and Koo Wee Rup swamp will also improve from the implementation of the heritage program.

A summary of the river health programs and target conditions for rivers and creeks within the Westernport Catchment are described on the following pages. The highlighted red section of the map indicates the catchment area for the individual river or creek. A detailed description of all rivers and creeks and the program for the first five years as well as the 20-year program are contained in the attached CD Sections 13, 14 and 15 respectively.

Bass River

Significance: Low

Current Condition: Moderate Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent		◆	◆		◆
Good	◆	◆	◆	◆	
Moderate	◆			◆	
Poor					
Very poor					

Current Social Value: Moderate Target: Moderate

The Bass River rises near Poowong and flows through Glen Forbes and Bass before joining Western Port, north of San Remo. The catchment is predominantly rural. The river is in moderate condition and has pockets of good condition as well as sites of geological, Aboriginal and European heritage value. The river is also valued for fishing. The lower reaches of the Bass River include a valued saltmarsh community that is important for bird and fish populations.

Key risks include stock access and weed infestations, while sediment contributions from Bass River pose a risk to the health of the highly valued Western Port.

River Health Program: Over 11 kilometres will be revegetated, weeds controlled and streamside fencing erected. Catchment and gully erosion will be managed to minimise the amount of sediment entering Western Port. A waterway plan will be developed for managing the Bass River and information will be collected on water quality, fish and aquatic macroinvertebrates.

Tarago River

Significance: Very High

Current Condition: Good Target: Good

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent		◆	◆		◆
Good			◆		
Moderate	◆			◆	
Poor					
Very poor					

Current Social Value: Moderate Target: Moderate

The Tarago River is a major tributary of the Bunyip River. Its headwaters are within the Tarago State Forest and flow into the Tarago Reservoir at Neerim. Downstream of the reservoir, the Tarago flows through the towns of Rokeby and Robin Hood before meeting the Bunyip River at Longwarry North. Tributaries include Labertouche, Whisky, Gum Scrub, and Spion Kopje creeks. Much of the catchment is forested upstream of Tarago Reservoir,, although rural land use is considerable along the Tarago River East Branch. Downstream of the reservoir, the catchment is mostly rural with some small townships and forested areas such as the headwaters of Labertouche and Red Jacket Creeks. The upper Tarago is considered ecologically healthy and the lower reaches retain good environmental values including, for example, native fish (such as Australian grayling and river blackfish) and a very healthy platypus population. Other significant species include the Warragul burrowing cray, giant

Gippsland earthworm and Strzelecki gum. The Tarago system is also valued for fishing. Risks include a lack of streamside vegetation, stock access, weeds, water quality and barriers to the migration of aquatic life.

River Health Program: Activities over the next five years will involve working in partnerships with land owners to control stock access and weeds along approximately 10 kilometres of rivers and creeks in the upper system, constructing a fishway in the Tarago River at Fishers Road, collecting additional stream health information, developing a steam flow management plan and implementing priority actions in the Tarago Catchment Management Plan.

Middle and Upper Bunyip River

Significance: Low

Current Condition: Good Target: Excellent

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent		◆	◆		◆
Good	◆			◆	
Moderate				◆	
Poor					
Very poor					

Current Social Value: Moderate Target: Moderate

The catchment includes the Upper Bunyip River and tributaries upstream of Princes Highway. Most of the catchment is within State forest, although rural land use dominates the lower reaches around Tonimbuk and Labertouche. Major tributaries include Back, Diamond and Dyer Creeks. Environmental values are high, with many reaches considered to be ecologically healthy. Several significant species occur within the upper Bunyip system, including azure kingfishers and powerful owls. Risks include a lack of streamside vegetation and barriers to the migration of fish and other aquatic life.

River Health Program: In the next five years, work will be done in partnerships with local landowners to control stock access and weeds and to plant vegetation along 18 kilometres. Priority actions will also be implemented from the Port Phillip and Westernport Regional Water Quality Plan (in prep), stream channels will be stabilised and fishways constructed.

Lower Bunyip River

Significance: Low

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆	◆	
Moderate	◆	◆	◆		◆
Poor	◆			◆	
Very poor					

Current Social Value: Very Low Target: Very Low

This area includes Yallock Creek, Monomeith Drain and the Bunyip River and its tributaries from the Princes Highway to Western Port near Koo Wee Rup. Land use in the catchment is predominantly rural with small urban zones associated with townships such as Koo Wee Rup, Bayles and Drouin South. Prior to European settlement, the Koo Wee Rup Swamp covered most of this area. The swamp was drained and many of the rivers and creeks are today highly modified agricultural drains. Some parts that still retain some natural form include the section of the Bunyip River immediately downstream of the Princes Highway, lower Yallock Creek and upper Musk and King Parrot Creeks. In general, environmental values are moderate to poor. However significant species such as Australian grayling, azure kingfisher, giant Gippsland earthworm and growling grass frog are present. The lower Bunyip River and Yallock systems have notable economic and social value associated with agricultural productivity, European heritage and fishing. The former Koo Wee Rup Swamp area also has significance for Aboriginal communities because it provided a wide range of native plants and animals for the Mayune balug clan of the Boon wurrung people. Key risks include water quality, a lack of streamside vegetation, stack access, changes to natural stream flows and barriers to the migration of fish and other aquatic life.

River Health Program: Activities over the next five years will involve implementing priority actions in the Port Phillip and Westernport Regional Water Quality Plan (in prep), developing a stream flow management plan, stabilising stream channels and working in partnership with local landowners to control stock access, weeds and plant vegetation along approximately 30 kilometres.

Cardinia, Toomuc, Deep and Ararat Creeks

Significance: Moderate

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good		◆		◆	◆
Moderate	◆	◆	◆		
Poor	◆			◆	
Very poor					

Current Social Value: Moderate Target: Moderate

Cardinia, Toomuc, Deep and Ararat Creeks, including Gum Scrub Creek, cover a large portion of the northern Westernport catchment and incorporate areas such as Upper Beaconsfield, Nar Nar Goon and Dalmore. Land use in the highlands is generally low-density drinking water storage. Historically, these rivers and creek were disconnected from the bay by the former Koo Wee Rup Swamp. Notable fauna include native fish, frogs and the swamp skink. Many of these significant species occur along Cardinia Creek. In addition, platypus have successfully re-established in upper Cardinia following recent translocation. Social values are also important, particularly in upper Cardinia Creek where there is fishing, European heritage and passive recreation. Risks to river health are urban development, lack of streamside vegetation, stock access, poor water quality and changes to natural stream flows.

River Health Program: A comprehensive program is proposed and includes the protection of heritage and recreation values, implementing stormwater management plans and the Port Phillip and Westernport Regional Water Quality Plan (in prep.). Activities will focus on ensuring that development is managed to minimise the impacts on receiving waters, developing rules to manage the licensed stream flow diversions and, controlling weeds and stock access. Revegetation will occur along approximately 30 kilometres of rivers and creeks, additional stream health information will be collected, sections of Upper Cardinia and Ararat Creeks, will be stabilised, and there will be habitat improvement works for native fish along Cardinia Creek.

Dalmore Outfalls

Significance: Low

Current Condition: Poor Target: Poor

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good			◆		
Moderate	◆	◆			
Poor				◆	◆
Very poor					

Current Social Value: High Target: High

The Dalmore Outfalls consist of a number of creeks and drains that flow intro Western Port via the Pearcedale, Devon Meadows, Clyde and Tooradin areas. Rivers and creeks include Langwarrin Creek, Christies Drain, Wylies Drain, Tooradin Road Drain and the Western Outfall Drain. The catchment is predominantly rural and most of the rivers and creeks have been modified or are constructed agricultural drains. While environmental values tend to be low to moderate, passive recreation is valued in some areas such as the major inlets like Tooradin and the Cranbourne Botanic Gardens. Swamp skinks, southern toadlets and growling grass frogs are among the significant fauna in the area. European and Aboriginal heritage values are also important. Risks include a lack of streamside vegetation, modification of river beds and banks, weeds and changes to natural stream flows. Water quality in the drains is poor and poses a risk to the health of Western Port.

River Health Program: Prospects to improve environmental condition are low because the drains are heavily modified. Activities in the next five years will focus on the protection of heritage and recreation values, and planting vegetation along approximately four kilometres of the Tooradin Road Drain. The five to 20-year program will address other risks and some improvements in water quality and streamside zone vegetation are expected in the 20-year timeframe

French and Phillip Islands

Significance: Very High

Current Condition: Excellent Target: Excellent

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent	◆	◆	◆	◆	◆
Good					
Moderate					
Poor					
Very poor					

Current Social Value: Low Target: Low

The small creeks of French and Phillip Island are isolated from the mainland and many provide important references. Some of the creeks are in poor to moderate condition. However, the upper section of creeks on French Island are ecologically healthy. Risks to the creeks on French Island include stock access, whilst the creeks on Phillip Island are subjected to degrading factors such as water quality issues, lack of streamside vegetation and weeds.

River Health Program**:** Fish, aquatic macroinvertebrate and water quality investigations will be undertaken for the creeks on French Island. Over 12 kilometres of streamside are to remain as ecologically healthy. Actions to improve river health on Phillip Island are programmed for the longer term. Opportunities for community groups to undertake projects will be available over the next five years.

Lang Lang River

Significance: Low

Current Condition: Poor Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent		◆	◆		
Good		◆			
Moderate	◆		◆	◆	◆
Poor	◆				
Very poor				◆	

Current Social Value: Low Target: Low

The headwaters of the Lang Lang River are situated in the Strzelecki Ranges near Poowong. Major rivers and creek in this catchment include O'Mahony, Minnieburn, Pheasant, Adams and Red Bluff creeks and the Little Lang Lang River. The Lang Lang River catchment has undergone significant changes over the last two centuries. Prior to European settlement, it was densely forested and contained a series of swamps with thick tea-tree scrub, which formed part of the Koo Wee Rup Swamp area. Much of the forest and swampland has now been cleared, with agriculture land use covering most of the area. Environmental values are moderate to low, with the middle reaches of the Lang Lang River and some sections of smaller rivers and creeks, such as Minnieburn, Adams and Red Bluff creeks, tending to be in better condition. Several significant animals have been recorded, including native fish, platypus, frogs, swamp Antechinus and the giant Gippsland earthworm. Significant vegetation includes native orchids and the Strzelecki gum. Fishing and European heritage are of social value, particularly in the Lang Lang River. Risks include a lack of streamside vegetation,

stock access, changes to natural stream flows, water quality (including sediment to Western Port) and barriers to fish and other migratory aquatic life.

River Health Program: Activities in the next five years will involve the stabilisation of waterway channels and gullies to decrease sediment loads to Western Port. A fishway will be constructed on the river at Heads Road, and stream frontage management to control weeds (including willows), stock access and revegetation will occur along approximately 30 kilometres.

North-Eastern Peninsula Rivers and Creeks

Significance:Low

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good		◆	◆		
Moderate			◆	◆	◆
Poor	◆				
Very poor	◆				

Current Social Value: Low Target: Moderate

The north-eastern Peninsula rivers and creeks flow into Western Port and include several small creeks including Watsons, Olivers, Kings and Warringine creeks. All have mostly rural-urban catchments. They are generally of moderate environmental value, including supporting significant fauna such as the swamp skink and southern toadlet. Reserves in the Hastings area, such as the Warringine Heritage Park, represent social values associated with the rivers and creeks. Risks include urban stormwater, elevated nutrients in some rural areas, weeds and a lack of streamside vegetation.

River Health Program: Activities in the next five years will involve the implementation of the local stormwater management plan and the Port Phillip and Westernport Regional Water Quality Plan (in prep), as well as protecting and improving streamside vegetation along approximately four kilometres of Watsons Creek and removing barriers to fish migration along Warringine Creek.

South-Eastern Peninsula Rivers and Creeks

Significance: High

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good		◆	◆	◆	◆
Moderate	◆			◆	
Poor					
Very poor					

Current Social Value: High Target: High

Rivers and creeks within the southeastern Peninsula include Merricks, Coolart, East, Stony, Manton and Main creeks. These rivers and creeks flow into Western Port or Bass Strait between Somers and Flinders. They have mainly rural catchments, with some urban centres and remnant forest (particularly associated with the Mornington Peninsula National Park). Environmental values are generally moderate to good, including records of river blackfish, mountain galaxias, swamp skink, southern toadlet and growling grass frog. These rivers and creeks also are important for European and Aboriginal heritage and passive recreation. Risks are changes to natural stream flows, poor water quality and stock access.

River Health Program: Activities in the next five years involve the implementation of the local stormwater management plan and the Port Phillip and Westernport Regional Water Quality Plan (in prep), protecting heritage and recreation values, developing waterway management plans and rules regarding the management of licensed flow diversions, collecting additional stream health data for Main Creek, investigating the removal of barriers to fish migration, stream frontage management for stock access and improving streamside vegetation along approximately nine kilometres of the Main Creek system.

West Peninsula Rivers and Creeks

Significance: Moderate

Current Condition: Moderate Target: Moderate

	Water quality	Aquatic life	Habitat and stability	Vegetation	Flow
Excellent					
Good	◆	◆	◆	◆	
Moderate					
Poor					◆
Very poor					

Current Social Value: Moderate Target: Moderate

West Peninsula rivers and creeks consist of several small coastal waterways that flow into Port Phillip between Mount Martha and Rosebud. Major creeks in this area include Balcombe, Devilbend, Brokil, Dunns, Sheepwash, Drum Drum Alloc, Chinamans, Sweetwater, Kackeraboite, Ballar and Tanti. The catchment is a mix of urban and rural. A number of parks and reserves also exist, including Briars Park, and Mount Martha and Arthurs Seat State Park. These rivers and creeks are generally of moderate environmental value, and include populations of threatened swamp skinks, growling grass frogs, dwarf galaxias and native orchids. Passive recreation is valued in many of these rivers and creeks. Key risks to river health are urban stormwater and a lack of streamside vegetation.

River Health Program: Activities in the next five years will involve implementation of local stormwater management plans, and ensuring that urban development does not impact on water quality. Heritage and recreation values will be protected and vegetation planted along approximately 1five kilometres of the Balcombe Creek system. The five to 20-year program will involve water quality management and further revegetation. Improvements in condition are expected within the 20-year time frame.

Evaluation, Reporting and Review

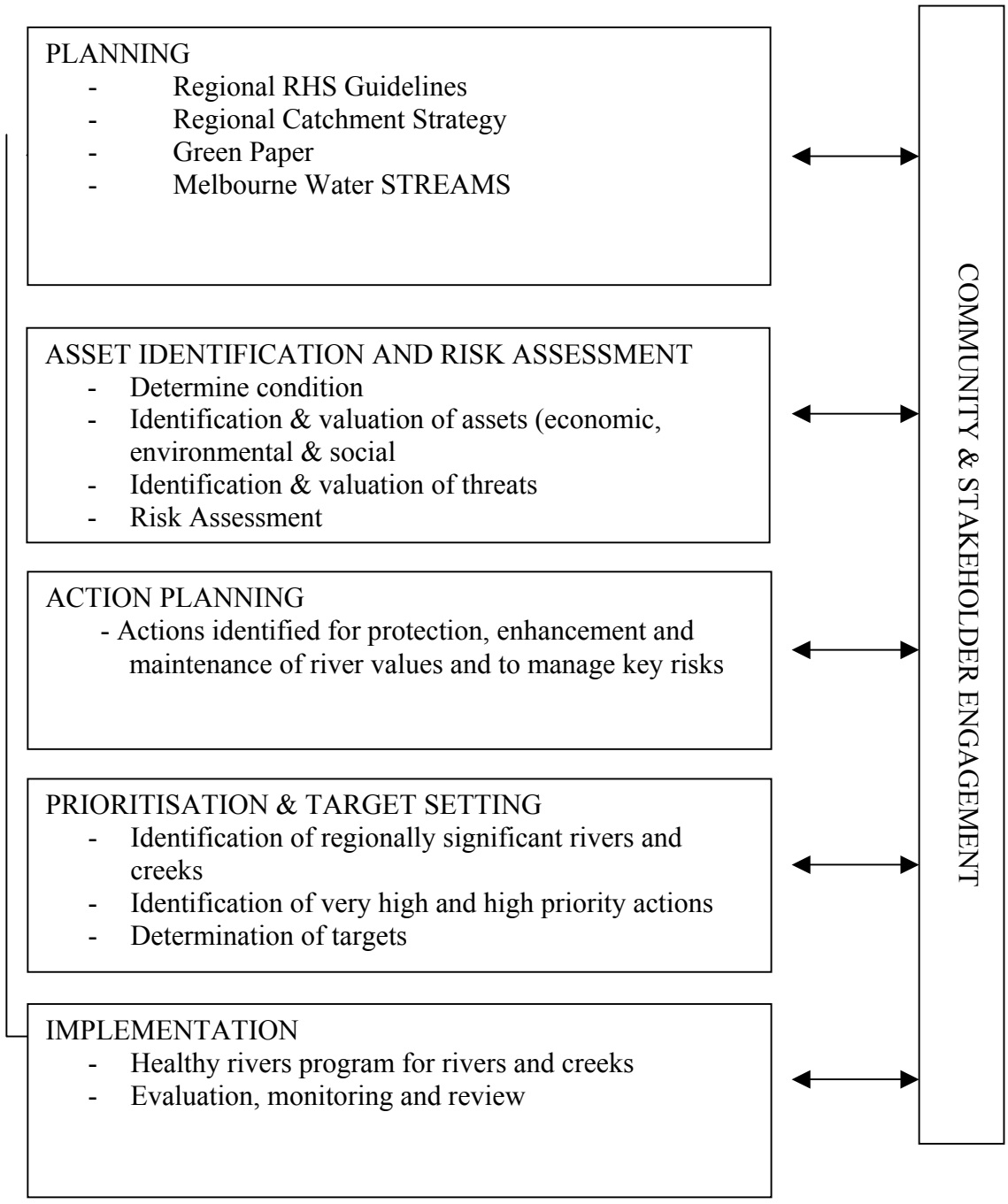
Evaluating, reporting and reviewing progress towards river and creek targets and objectives forms an important component of this strategy. The results of the monitoring and research program will be reported via a number of mechanisms, including:

- The condition of rivers and creeks and performance against targets will be reported in the Melbourne Water and the Port Phillip and Westernport Catchment Management Authority (PPWCMA) annual reports
- Actions in the Regional River Health Strategy will be linked into a regional catchment management action-tracking database, as proposed in the draft Regional Catchment Strategy. The implementation of actions can then be reported in Rivers and Creeks reports and Melbourne Water and the PPWCMA's annual reports
- Water quality data will be included on the Melbourne Water website and in the Victorian Water Quality Monitoring Network Annual Report
- The results of the biological monitoring program will be reported in the Biological and Toxicants Monitoring Annual Report
- Studies undertaken, as part of the investigations program, will be reported and placed on the Melbourne Water web site and linked to the Victorian Water Resources Data Warehouse
- Relevant scientific publications, industry reports and conference proceedings.

This Regional River Health Strategy will undergo a review within five years to provide an important mechanism for reporting on the progress toward management targets and an opportunity to evaluate and review:

- The condition of rivers and creeks
- Progress towards implementing actions
- Success of actions in achieving outcomes
- Assumptions made in developing the strategy
- Status of proposed future works, i.e. works identified in the strategy for implementation within the five to 20-year time frame
- Information on river and creek assets to account for changes in community perceptions, expectations and scientific information
- Direction for regional investment in river and creek health.

Appendix 1: Process used to develop the strategy



Appendix 2: Significant Rivers and Creeks

Table 2A: Significant Rivers and Creeks and the Reason for Significance

Very high significance

Sub-management Unit	River & Creek Unit (Management Unit)	Ecologically Healthy	Heritage River	Social, Environmental and Economic Value (High or Very High)
WERRIBEE				
Korweinguboora	Upper Werribee	√		
Lerderderg Lower	Lerderderg			√
Lerderderg Middle	Lerderderg		√	√
Lerderderg Upper	Lerderderg	√	√	
Lower Werribee	Lower Werribee			√
Werribee Gorge	Middle Werribee			√
Werribee Headwaters	Upper Werribee			√
MARIBYRNONG				
Bolinda	Emu	√		
Deep Lower Middle	Deep Lower	√		
Riddles Upper/ Baringo	Upper Jacksons	√		√
YARRA				
Arthurs/ Running Creek- forested	Diamond Arthurs Source	√		
Cockatoo Creek	Woori Yallock	√		
Cockatoo Creek –forested	Woori Yallock	√		
Diamond Creek Upper	Diamond Creek Rural	√		
Diamond Creek Upper	Diamond Arthurs Source	√		
Graceburn- Correnderrk- forested	Watts Source	√		√
Hoddles Creek	Little Yarra River	√		
Little Yarra	Little Yarra River	√		
Little Yarra- forested	Little Yarra River	√		
Olinda Creek- forested	Olinda	√		
Pauls Creek- forested	Steels and Pauls Rural	√		
Pauls Creek	Steels and Pauls Rural	√		
Plenty River Upper	Plenty River	√		
Plenty River Upper- forested	Plenty River Source	√		
Steels Creek- forested	Steels and Pauls Source	√		
Watsons Creek- forested	Watsons Creek (Yarra)	√		
Watts River- forested	Watts Source	√		√
Watsons Creek	Watsons Creek (Yarra)	√		
Yarra River (Healesville)	Yarra River Rural	√		
Yarra River (Healesville)	Yarra River Rural	√	√	
Yarra River Upper	Upper Yarra Source	√		
Yarra River (Upper)	Upper Yarra Source	√	√	√
Yarra River (Warrandyte)	Middle and Lower Yarra River		√	
Yarra River (Yering)	Yarra River Rural		√	√
DANDENONG				
Dandenong Creek- forested	Dandenong Source	√		√
Dandenong Ranges	Corhanwarrabul			√
Upper Cardinia	Cardinia, Toomuc, Deep, Ararat			√
WESTERNPORT				
Bunyip/ Cannibal- forested	Upper Bunyip	√		
Bunyip/ Cannibal	Upper Bunyip	√		
French Island	French/ Phillip Island	√		
Tarago River- forested	Tarago	√		

High significance

Sub-management Unit	River and Creek Unit	Risk/ Value Relationship Environmental	Value/ Risk Relationship Economic	Value/ Risk Relationship Social
WERRIBEE				
Dale		√		√
Djerriwarrh	Werribee	√	√	
Djerriwarrh Forest	Werribee	√		√
Goodman Lower	Lerderderg		√	
Lower Toolern	Werribee			√
Korkuperimmul	Middle Werribee		√	
Myrniong	Middle Werribee		√	
Pyrites Lower	Werribee	√		√
Pykes Reservoir	Middle Werribee			√
Toolern	Werribee		√	
Upper Parwan and Spring	Parwan		√	
Werribee Melton Reservoir	Lower Werribee		√	√
Werribee Upper	Upper Werribee		√	√
MARIBYRNONG				
Bolinda	Emu		√	
Deep (Lancefield)	Deep Upper	√		
Deep Lower	Deep Lower		√	
Deep Middle	Deep Lower		√	
Emu	Emu		√	
Emu Upper	Emu		√	
Jacksons Lower	Upper Jacksons	√		√
Jacksons Middle	Upper Jacksons		√	
Jacksons Upper	Upper Jacksons		√	
Kongaderra	Deep Lower		√	
Maribyrnong Gorge	Maribyrnong		√	√
Riddles Lower/ Sandy	Upper Jacksons		√	
Stony Creek	Stony Creek			√
YARRA				
Arthurs/ Running Creek	Diamond Creek Rural	√		
Darebin Creek (Lower)	Darebin Creek Urban			√
Diamond Creek Lower	Diamond Creek Rural		√	
Gardiners Creek	Gardiners Creek			√
Grace Burn/ Correnderrk	Watts Rural	√		√
Merri Creek Lower	Merri Creek Urban			√
Moonee Ponds Lower	Moonee Ponds			√
Olinda Creek	Olinda		√	√
Plenty Gorge	Plenty River	√	√	
Plenty River (Lower)	Plenty River		√	√
Watts River	Watts Rural			√
Woori Yallock Creek	Woori Yallock	√		√
Yarra River (Lower)	Middle and Lower Yarra River		√	√
DANDENONG				
Ballar	West Peninsula		√	
Blind	Blind			√
Dandenong Creek (Lower)	Lower Dandenong		√	√
Dandenong Creek (Middle)	Dandenong Creek Middle and Upper		√	√
Dandenong Creek (Upper)	Dandenong Creek Middle and Upper		√	√
Eumemmerring Creek	Eumemmerring		√	√
Kananook Creek	Kananook		√	
Little Boggy Creek	Kananook			√
Monbulk Creek	Corhanwarrabul		√	
Patterson River	Lower Dandenong		√	√

Sub-management Unit	River and Creek Unit	Risk/ Value Relationship Environmental	Value/ Risk Relationship Economic	Value/ Risk Relationship Social
WESTERNPORT				
Ararat Creek	Cardinia, Toomuc, Deep, Ararat	√		
Bass Upper	Bass	√		
Balcombe	West Peninsula			√
Dunns	West Peninsula			√
Main	South East Peninsula			√
Merricks/ Coolart/ Stoney	South East Peninsula	√		√
Tarago River	Tarago		√	
Toomuc Creek	Cardinia, Toomuc, Deep, Ararat	√		√
Tooradin Road Drain	Dalmore Outfalls			√

Moderate significance

Sub-management Unit	River and Creek Unit (Management Unit)	Risk/ Value Relationship Environmental	Value/ Risk Relationship Economic	Value/ Risk Relationship Social
Werribee				
Goodman Upper	Lerderderg	√		
Middle Little River	Little River		√	
Parwan Creek Lower	Parwan			√
Pyrites Upper	Werribee	√	√	
Upper Little River	Little River			√
Werribee Outfall	Lower Werribee		√	√
Maribyrnong				
Deep (Bulla)	Deep Lower	√	√	
Deep (Romsey)	Deep Lower	√		
Jacksons Rosslynne Reservoir	Upper Jacksons		√	
Maribyrnong Lower	Maribyrnong		√	√
Dandenong				
Mordialloc Main Drain	Lower Dandenong		√	√
Westernport				
Ararat Creek- forested	Cardinia, Toomuc, Deep, Ararat	√		

Low Significance

Sub-management Unit	River and Creek Unit
Werribee	
Cherry Main Drain	Cherry Creek
Kororoit Creek	Kororoit Urban
Kororoit East Branch	Kororoit Rural
Kororoit Rural	Kororoit Rural
Kororoit West Branch	Kororoit Rural
Laverton	Laverton
Lollypop	Lower Werribee
Lower Little River	Little River
Skeleton Creek	Skeleton Creek
Stony Hut	Upper Werribee
Maribyrnong	
Boyd	Deep Upper
Deep Upper	Deep Upper
Yarra	
Andersons Creek	Middle and Lower Yarra River
Brushy Creek	Brushy Creek
Chirnside Park	Middle and Lower Yarra River
Edgars Creek	Merri Creek Urban
Jumping Creek	Middle and Lower Yarra River
Koonung Creek	Koonung Creek
Lyndhurst	Eumemmerring
Merri Creek Upper	Merri Creek Rural
Moonee Ponds Upper	Moonee Ponds
Mullum Mullum	Mullum Mullum
Ruffeys/ Salt/ Banyule	Middle and Lower Yarra River
Steels Creek	Steels and Pauls Rural
Stringybark Creek	Stringybark
Wandin Yallock	Woori Yallock
Dandenong	
Lyndhurst	Eumemmerring
Mile Creek	Lower Dandenong
Ti Tree	Eumemmerring
Troupes	Eumemmerring
Westernport	
Bass Outfall	Bass
Bass Lower	Bass
Bass Middle	Bass
Bunyip Lower	Bunyip Lower
Sub-management Unit	**River and Creek Unit**
Bunyip Drains	Bunyip Lower
Cardinia/ Gum Scrub	Cardinia, Toomuc, Deep, Ararat
Christies Drain	Dalmore Outfalls
Deep Creek S.E.	Cardinia, Toomuc, Deep, Ararat
Drum Drum Alloc	West Peninsula
Hastings North	North Eastern Peninsula
Lang Lang	Lang Lang
Lang Lang Lower	Lang Lang
Langwarrin Creek	Dalmore Outfalls
Little Lang Lang	Lang Lang
Mackay Drain	Bunyip Lower
Manton	South East Peninsula
Minnieburn/ O'Mahoneys	Lang Lang
Monomeith Drain	Bunyip Lower
Phillip Island	French/ Phillip Island
Sheepwash	West Peninsula
Tassels	West Peninsula
Tanti	West Peninsula
Watsons Creek South East	North Eastern Peninsula
Western Outfall Drain	Dalmore Outfalls
Yallock/ King Parrot/ Musk	Bunyip Lower

Appendix 3: Prioritisation of river health actions

Table 3A: Scoring Criteria for prioritisation of actions

Criteria	Score
Public concern/ support	
No major outrage or concern if action not a high priority and/ or no public support	1
Public/ political concern if action not a high priority and/ or some public support	2
Public/ political outrage if action not a high priority and/ or public highly supportive of action	3
Opportunity	
Little difficultly to implement action e.g. tech available, feasible etc	3
Moderately difficult to implement action; but not impossible	2
Difficult to implement action or almost impossible to implement action	1
Multiple benefits	
Action improves multiple values or addresses multiple threats	3
Action does not improve multiple values or address multiple threats	1
Downstream benefits	
Required to protect important downstream environment such as Ramsar wetland	20
Indirect Link	10
Return on investment	
Low return on investment (IOB)	1
Medium return on investment (IOB)	2
High return on investment (IOB)	3
Link to significance	
Direct link to criteria for significance of sub-management unit, i.e. social, economic or environmental	15
Indirect link to criteria for significance of sub-management unit, i.e. social, economic and environmental	10
No link to criteria for significance of sub management unit, ie. social, economic and environmental	1

Table 3B Rating for priority

Score	Level of priority	Timeframe
>24	Very high priority	1-5 years
18- 23	High priority	5-10 years
12- 17	Moderate	10-15 years
6-11	Low	>15 years

Appendix 4: Targets

The table below outlines the five-year implementation targets. These targets measure the outcomes of river health actions undertaken over the first five years of the strategy implementation.

Target area	2009 Target
Number of rivers with negotiated environmental flow regimes	12
Number of rivers with improvements made to environmental flow regimes	16
Area of streamside land under management agreements	10
Kilometres of streamside land revegetated*	558
Number of barriers where fish passage is improved	33
Length of river subjected to streamside weed control	618 km
Number of plans developed for rivers and creeks of high social value	10
Rivers where heritage values are protected or improved	29
Number of plans developed for rivers and creeks of high environmental value	6
Number of investigations to fill data gaps in high value or high risk rivers or creeks	15
Number of sites subject to bed and bank stabilisation	19

* kilometres of rivers and creeks for streamside zone revegetation may overlap with kilometres of weed control

The table below outlines the ten-year resource condition targets based on implementation of the five-year program outlined in this strategy. These targets measure the change in the condition of rivers and creeks.

Target area	**2014 Target**
Length of rivers and creeks in excellent or good ISC condition	3,500
Number of high value river reaches meeting environmental flow objectives	
Length of river showing improvement in streamside condition	3,600
Length of river with improvement in ISC physical form sub-index rating	3,179
Number of ISC reaches with improved instream habitat	10
Improvement in ISC aquatic life sub-index rating	2,925
Increase in river length made accessible for fish movement	1,500
Kilometres of Ecologically Healthy Rivers reaches maintained	1,300
Percentage of monitoring sites meeting SEPP objectives or regional targets established through the SEPP “WoV”risk assessment process	80

Appendix 5: Legislation and programs relevant to river and creek management

Federal and state legislation

Archaeological and Aboriginal Relics Preservation Act 1972

Catchment and Land Protection Act 1994

Conservation, Forests and Lands Act 1987

Crown Lands (Reserves) Act 1978

Environmental Protection and Biodiversity Conservation Act (19????)

Environment Protection Act 1970

Environment Effects Act 1978

Fisheries Act 1968

Flora and Fauna Guarantee Act 1988

Forests Act 19five8

Cultural Heritage Act 1984

Heritage Rivers Act 1992

Land Act 19five8

Melbourne. Water Act 1992

Minerals and Resources Development Act 1990

National Parks Act 197five

National Strategy for Ecologically Sustainable Development 1992

Planning and Environment (Planning Schemes) Act 1996

Reference Areas Act 1978

State Environment Protection Policy (Waters of Victoria) 2003

Water Act 1989

Wildlife Act 197five

International Treaties

RAMSAR 1971

JAMBA 1986

CAMBA 1974

Federal programs

National Water Quality Management Strategy (NWQMS)

Natural Heritage Trust (NHT)

National Action Plan (NAP) for Salinity and Water Quality (2000)

Council of Australian Governments (COAG) agreement on water reform

State programs

Victorian Nutrient Management Strategy (199five)

Victoria's Draft Native Vegetation Management Framework-A framework for Action (2000)

Victorian Flood Management Strategy (1998)

Victorian Coastal Strategy (2002)

Victorian Biodiversity Strategy (1997)

Victorian Pest Management-a framework for Action (2002)

Victoria's Water Recycling Action Plan (2002)

Victorian River Health Strategy (2002)

Victoria's Salinity Management Framework (2000)

The Green Paper (2003)

Rivers 20five0-The future of rivers in Victoria. (1999).

Stream Flow Management Plan Framework (2002)

Victorian Stormwater Action Program (2000)

Victorian State Fishways Program

Municipal Strategic Statements and Local Planning Policies.