8. Healthy waterways for all

Image: Pelican and wood ducks on the Wangangarra / WyYung (Mitchell River), Gunaikurnai Country

Healthy waterways are vital for the region's health, economy and liveability – supporting agriculture, industry and jobs and ensuring we have water for communities, Traditional Owners and the environment. Yet almost every waterway in the region is under stress due to water extraction, land-use changes, population growth and climate change. This Strategy will return additional water to rivers (environmental water) to achieve environmental outcomes and invest in complementary actions to improve waterway health. The Victorian Environmental Water Holder and waterway managers will continue to ensure the most efficient and effective use of existing environmental water to achieve environmental outcomes.

8.1 Returning water to our rivers

We all rely on healthy rivers, yet river water is declining

Everyone in the Central and Gippsland Region relies on healthy rivers. However decades of extracting water, changes to land use, and a warmer and drier climate have resulted in less water in rivers and significant disruptions to natural flows. In 2020, the long term water resource assessment found that river water in Southern Victoria has declined by up to 21 per cent since the last sustainable water strategy, and that this trend is likely to continue – see **Figure 8.1** (DELWP 2020a). All water users have been affected. However, in most rivers the decline has not been shared equally with users who extract water from rivers, and the environment now has a smaller share of available water. We need to act now to achieve critical environmental outcomes without compromising the needs of other water users, including farmers.

Note: percentage decline was not assessed for Phillip Island as part of the long-term water resource assessment.

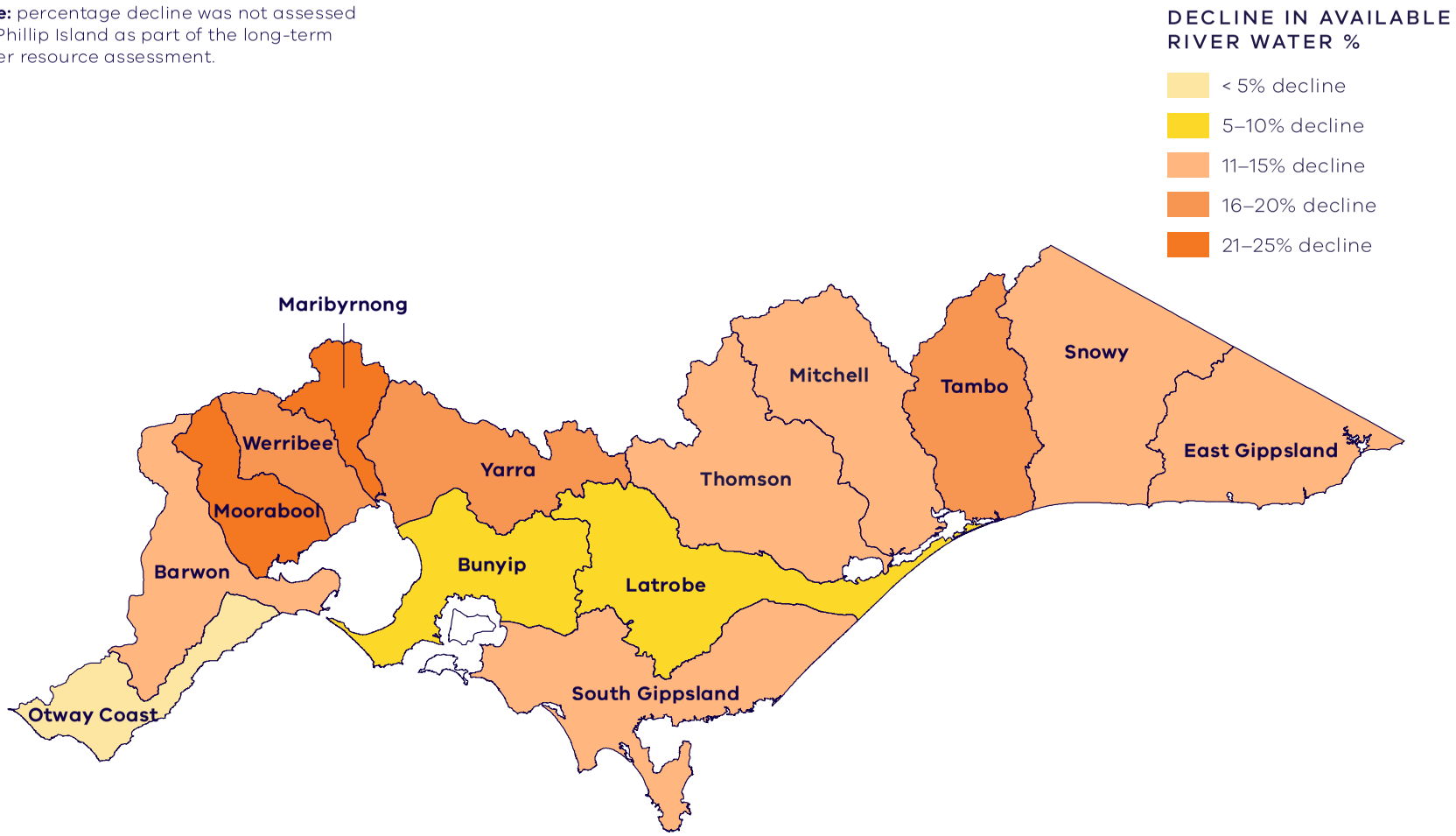


Figure 8.1: Percentage decline in river water availability in each river basin across the Central and Gippsland Region for 1975–2020, relative to the long-term record

We cannot recover all the water our rivers need

There are regulated and unregulated river systems across the Central and Gippsland Region. Unregulated rivers are important natural assets and the Victorian Government has committed to not building any new dams on these rivers. Environmental water recovery, required to improve and maintain environmental values in the nine major regulated rivers in the region, has been informed by FLOWS studies. An estimated 380 gigalitres of water per year (on average) would be needed to meet the full environmental water requirements for major rivers in the Central and Gippsland Region – a volume greater than Melbourne's total annual residential water usage.[28,29] This environmental water deficit cannot be met with a growing population and drying climate without taking water away from households, industry, businesses and farms – it is simply too large.

While recognising we cannot recover all the water our rivers need immediately, environmental water recovery targets have been developed that strive to meet critical environmental outcomes over the next decade without taking water away from other uses. We expect that environmental water recovery will continue to be an ongoing challenge across the region for the decades to come.

Returning critical volumes of environmental water

Environmental water recovery targets have been developed that reflect a balance between meeting critical environmental outcomes and affordable water bills without taking water away from other users. Over the next 10 years, a total of up to 99.5 gigalitres of water will be returned to the environment in major rivers in the Central and Gippsland Region. Water will be recovered for the environment through infrastructure upgrades, local opportunities to use recycled water and stormwater, instead of river water, for non-drinking uses (See **Chapter 3**), and by moving water more effectively around Victoria's water grid. Water will not be taken away from farmers, and all existing water entitlements provided under the Water Act will be protected.

In the longer-term (the next 10 years and beyond) we will look for opportunities to return larger volumes of river water (currently held by urban water corporations) to Traditional Owners and the environment as we add more manufactured water to the region's supplies. For example, additional desalinated water supplies could free up a portion of existing river water used for drinking via substitution – when, by agreement, the right to draw on one water source is replaced by the right to draw on another (see **Chapter 4**). While these projects are being developed, we will deliver a package of investments to improve waterway health, including building fishways, upgrading water infrastructure and addressing constraints to improve the effectiveness of environmental watering.

Appendix C explains how the actions set out in this chapter to meet the environmental water recovery targets also respond to the findings of the long-term water resource assessment.

Adaptive targets and objectives

We recognise that rivers still need more water to improve waterway health and resilience in the long-term (as shown by the environmental water deficits), and that water recovery targets will need to be adapted over time. Irreversible changes in climate and land use also mean that in the future not all values in every system can be maintained. An evidence-based approach is used for reviewing and changing management objectives for waterways, and this occurs in consultation with communities every eight years through regional waterway strategies and Melbourne Water's *Healthy Waterways Strategy* (Melbourne Water 2018) (**Figure 8.2**). The 10 year review and renewal process for this Strategy allows us to further adapt water recovery targets based on the agreed management objectives in regional waterway strategies.

28 Estimated volume, based on FLOWS studies for the nine major regulated rivers in the region.

29 Total residential water usage in Melbourne in 2020–21 was 298 gigalitres (*Melbourne's water outlook 2022* (Melbourne Water et al. 2021)).

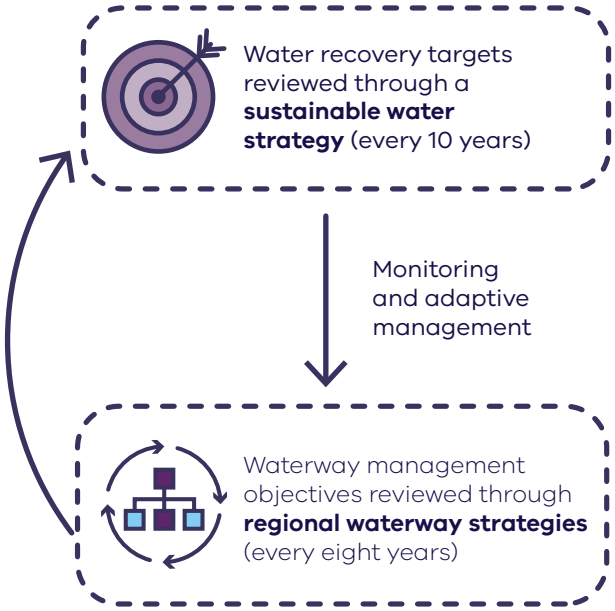


Figure 8.2: Adaptive management cycle of water recovery targets and waterway management objectives (Melbourne Water reviews its healthy waterway strategy every 10 years)

8.2 How much water do our rivers need?

Setting water recovery targets

Waterway managers have developed water recovery targets for major rivers in the region over the next 10 years. The targets are unique to each river and focus on achieving the most critical environmental outcomes in the short and medium term, for example flushing refuge pools or aiding native fish breeding and migration. Detailed examples of the environmental outcomes for each of the environmental water recovery targets are in **Appendix D**. Comprehensive FLOWS studies are used to identify the recommended environmental flows and allow the environmental water deficits to be calculated for each system (see **Figure 8.3**).

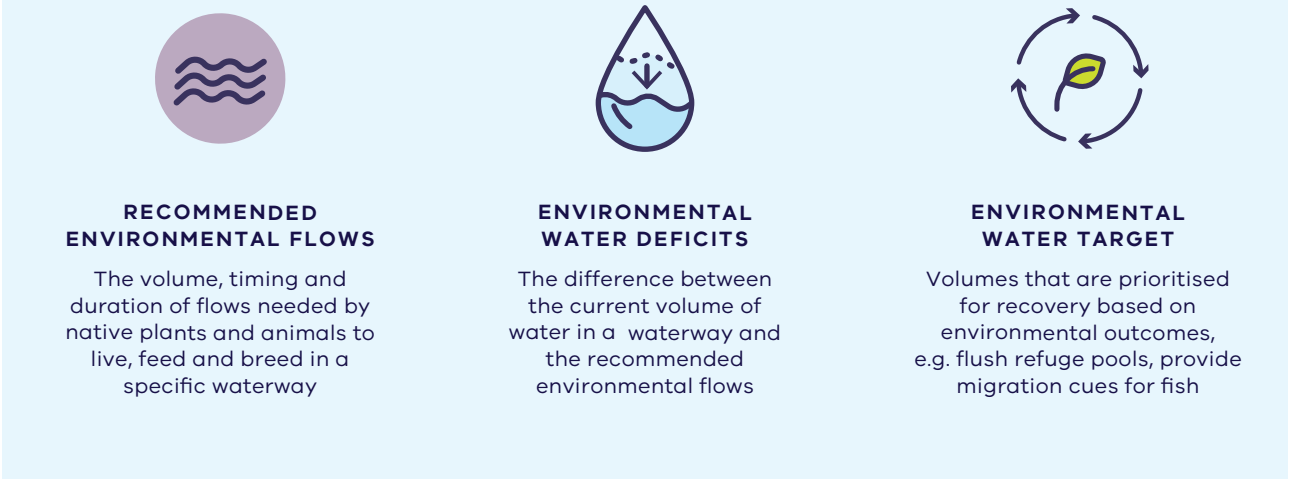


Figure 8.3: How environmental flow recommendations, environmental water deficits and environmental water targets fit together

While it is not possible to meet the full environmental water deficits for all rivers in the region, it is important to highlight these deficits as aspirational figures that would be required to meet existing environmental objectives in the long term. In the short to medium term, prioritised environmental water recovery targets provide a specific commitment to returning water to the environment, and use the term 'up to', as further investigations and analysis are required to determine the exact volumes available from each of the water recovery actions listed for each target.

Optimising use of environmental water

Water that is held for the environment, for example in dams and storages, is released into rivers and wetlands as environmental flows to achieve specific environmental outcomes. This means releasing the right volume of water at the right time and for the right duration. For example, at certain times of the year, higher flows are needed to allow fish migration and breeding. At other times, lower flows are needed to maintain pools and slow-water habitats that provide shelter and refuge. In addition to releases of held environmental water, passing flows provide a range of benefits for all water uses in many systems, including the environment.

Releases of held environmental water are planned by the Victorian Environmental Water Holder – an independent statutory body – in partnership with water corporations and CMAs. The Victorian Environmental Water Holder works with water corporations and CMAs/Melbourne Water to deliver environmental water as efficiently and effectively as possible. For example, environmental water may be released from storage at the same time as water for downstream consumptive use, allowing a larger flow to move down the river and provide more environmental benefits.

Environmental monitoring assesses how environmental water is working, whether environmental objectives are being met and how environmental water delivery and outcomes can be improved.

We use FLOWS studies to tell us the volume, timing and duration of flows needed to support environmental values, and monitoring programs (statewide and regional) to tell us how the environmental flows are working. The Victorian Environmental Flows Monitoring and Assessment Program helps us better understand how our waterway ecosystems respond to the release of environmental water, focusing on fish and vegetation, so that we can manage environmental water more effectively.

Thomson River environmental flows

Base flows and freshes in the Thomson River are supporting native fish breeding and migration by helping juvenile fish enter the river in spring or early summer and by supporting large numbers of adult fish to migrate downstream to spawn in autumn. Monitoring shows that juvenile tupong are migrating to the mid-reaches of the Thomson River within around two months of entering the estuary, and reaching the upper reaches by the next sampling event, a year later.

8.3 Improving waterway health for rivers in the west

Our plan:

- return additional water to the environment in major rivers in the west to achieve environmental outcomes, without compromising the needs of other water users
- deliver a suite of complementary investments to improve the health and resilience of waterways

Moorabool Yulluk (Moorabool River)

The Moorabool Yulluk (Moorabool River) is one of the state's most flow-stressed rivers. The river's current environmental entitlement – 2.5 gigalitres per year – only delivers 25 per cent of the annual minimum recommended flows. During most summers, disconnected pools develop in the lower reach of the river and, if flows are not provided, the pools can dry out completely within a week, resulting in fish deaths.

Comprehensive studies have found the Moorabool Yulluk (Moorabool River) has an environmental water deficit of 17 gigalitres per year and additional water is urgently needed to improve summer flows and support the survival of native fish species (including tupong, galaxiids and Australian grayling) and platypus. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). Water recovery will also maintain, and help to improve, the environmental and cultural values of the river and broader economic and social values.

Chapter 4 sets out plans to improve water management in the Moorabool Yulluk (Moorabool River) to benefit the environment, Traditional Owner cultural values and other shared benefits.

To achieve the greatest possible environmental outcomes in the Moorabool Yulluk (Moorabool River) from any water recovery or improvements in flow regimes, complementary works or measures will be required. This may include works to restore and rehabilitate the river at Batesford and prevent flow losses. Restoration and rehabilitation will need to consider maintenance of flows in the Moorabool River at Batesford following the Batesford Quarry decommissioning expected later this decade, when the contribution of groundwater pumped from the quarry and transferred to the Moorabool Yulluk (Moorabool River) downstream as an environmental flow will cease. Resource risks in the upper Moorabool catchment will also be reviewed to identify potential impacts from small catchment dams (See **Action 4-13**).

Image: Lal Lal Falls, Moorabool River, Wadwurrung Country

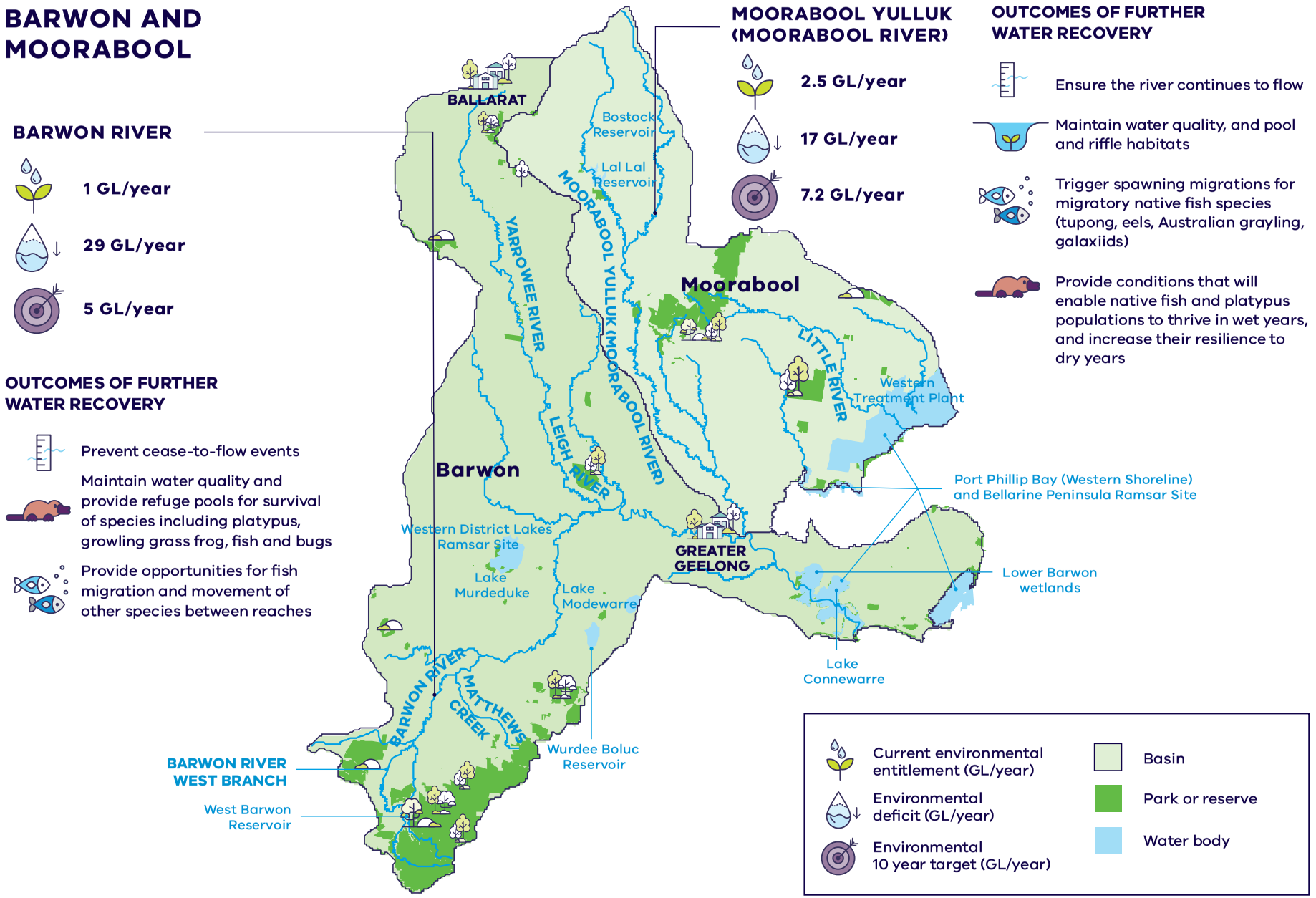


Figure 8.4: Environmental outcomes for rivers in the west – see Appendix D for further detail

Policy 8-1:
Return water to the Moorabool Yulluk (Moorabool River) west branch

The Victorian Government will return up to 6.5 gigalitres to the Moorabool Yulluk (Moorabool River) west branch to improve waterway health by maintaining water quality and preventing fish deaths.

By 2032

Policy 8-2:
Return water to the Moorabool River east branch

The Victorian Government will return up to 700 megalitres to the Moorabool Yulluk (Moorabool River) east branch to improve waterway health and support thriving native fish and platypus populations.

By 2032

These outcomes will be achieved through a combination of:

- transferring a long-term average of up to 3 gigalitres per year from Barwon Water's bulk entitlement in Lal Lal Reservoir to be shared between the environment and Wadawurrung Traditional Owners by 2025 (see **Action 4-3** and **Action 4-4**)
- transferring a long-term average of up to 700 ML/year from Barwon Water's bulk entitlement in Bostock Reservoir to be shared between the environment and Wadawurrung Traditional Owners by 2025 (see **Action 4-3** and **Action 4-4**)
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2**) as well as increase their use as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**)
- substituting river water with manufactured water in the longer-term (see **Policy 4-3**).

Complementary actions

Action 8-1:
Rehabilitate the Moorabool Yulluk (Moorabool River) at Batesford Quarry

The Victorian Government will investigate impacts to the Moorabool Yulluk (Moorabool River) from the closure of Batesford Quarry and fund preliminary investigations to determine the best methods of restoring and rehabilitating the river and preventing flow losses. These investigations consider environmental and Wadawurrung Traditional Owner cultural values. In addition this will contribute to the resilience and liveability of the North and Western Geelong Growth Area neighbourhoods through integration of this work with the IWM Plan.

By 2026

Action 8-2:
Increase understanding of water needs of the Upper Moorabool and Leigh catchments

The Victorian Government, Corangamite CMA and Wadawurrung Traditional Owners Aboriginal Corporation will investigate flows required to protect environmental and Traditional Owner values for the upper Moorabool and Leigh catchments. This will also consider the relative importance of water recovery in these areas against existing water recovery targets for the Barwon catchment that include both the Moorabool Yulluk (Moorabool River) and Leigh River.

By 2027

Stony Creek and Little River

Stony Creek is a major headwater tributary of Little River that is popular for recreation, including fishing and picnicking. Barwon Water operates the Upper Stony Creek Reservoir as part of Geelong's water supply system. The now decommissioned Lower Stony Creek Reservoir – Geelong's first dam – is among the earliest water supply systems constructed in Victoria. The Little River catchment contains places of cultural significance to Traditional Owners.

Investigations will determine whether upgrades to the Lower Stony Creek Reservoir could improve flows in Stony Creek and Little River by allowing a more natural flow regime to be released from the reservoir. Any works will consider the heritage and cultural values of the area.

Action 8-3: Improve flows in Stony Creek

The Victorian Government will work with Melbourne Water, Barwon Water, Parks Victoria and the Wadawurrung Traditional Owners Aboriginal Corporation to explore options for improving flows in Stony Creek and Little River through operational changes. This will include assessing the feasibility of providing more transparent passing of natural flows from Lower Stony Creek Reservoir into Stony Creek.

By 2027

Barwon River

The Barwon River is one of Geelong's most loved natural assets – supporting recreation, tourism, and Traditional Owner values – however, the river is under significant stress due to low flows and poor water quality. Low flows in the lower reaches through Geelong, particularly in summer and autumn when the river is most used by the community, have led to more frequent outbreaks of blue-green algae and poor water quality.

The existing upper Barwon River environmental entitlement of 1 gigalitre per year delivers only a small portion of the recommended summer flows for the upper Barwon's east and west branches, with diminishing returns as it moves downstream in most years.

Comprehensive studies have found that the Barwon River has an environmental water deficit of 29 gigalitres per year, and additional water is urgently needed to prevent cease-to-flow events and support more continuous flows. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). Water recovery will also help maintain water quality and provide enough water over summer for spotted galaxias, Australian grayling and other native fish species to survive.

Policy 8-3: Return water to the Barwon River

The Victorian Government will return up to 5 gigalitres of water for the environment in the Barwon River to improve waterway health by preventing cease-to-flow events, maintaining water quality, and providing water for native fish species to survive.

By 2032

These outcomes will be achieved through a combination of:

- substituting river water with manufactured water in the longer-term (see **Policy 4-3**, **Chapter 4**)
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2**, **Chapter 4**) and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23** in this chapter).

Social and economic benefits of the Barwon and Moorabool rivers

In 2021, Corangamite CMA undertook a study to examine the social and economic benefits that the Barwon and Moorabool rivers provide to the community of Geelong, and the importance of river flows for supporting and protecting these values (RMCG 2021a).

The lower Barwon and Moorabool rivers and their surrounding parklands support a wide range of recreational activities which are valued by Geelong locals and visitors. These include walking, cycling, fishing, rowing, paddle sports and game hunting, or simply taking the time to enjoy nature.

Declining flows in the Barwon and Moorabool rivers are leading to reduced water quality in the lower Barwon through Geelong, particularly in summer and autumn when the river is most widely used and valued by the local community. This decline has also led to the increased frequency and severity of blue-green algal outbreaks, which impact the surrounding environment and threaten safe boating and recreational water sports over the long term.

The study estimated that the rivers currently provide an annual value of about $24.7 million to the Geelong community, assuming no impact by low water levels or algal events, which reduce this value by $4.8 million per year. Improving flows in the Barwon and Moorabool rivers can increase the average annual value of the river by $3.8 million per year, or a benefit over a 40 year period of $95 million.

Complementary actions

Action 8-4: Improve waterway health in the Barwon River

The Victorian Government will improve waterway health in the Barwon River, increase the effectiveness of environmental water releases and address constraints to their delivery by:

- investigating options to improve native fish migration at Buckley Falls
- restoring channel form and removing willows and reed sweet-grass from the upper Barwon River
- investigating risks of releasing higher volumes of water and prioritising works to mitigate them.

By 2027

Action 8-5: Update watering recommendations for Reedy Lake and Hospital Swamp

The Corangamite CMA will update the watering recommendations for the Ramsar-listed Reedy Lake and Hospital Swamps, including the development of a water-salt balance model to support effective water management for the Ramsar-listed Reedy Lake and Hospital Swamp and to protect and improve these wetlands for all uses.

By 2025

Meeting management objectives for our Ramsar listed wetlands

Reedy Lake and Hospital Swamp are the two main floodplain wetlands on the lower Barwon River. They are recognised as internationally significant under the Ramsar Convention on Wetlands, forming part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. The Ramsar Convention provides the framework for international cooperation on wetland conservation; contracting countries to the convention are obliged to manage all wetlands through wise and sustainable use. It initially focused on protecting migratory waterbirds, but now considers all biodiversity.

The lower Barwon wetlands consist of a diverse range of aquatic vegetation communities that provide important feeding and breeding habitat for native fish and wetland-dependent bird species. The wetlands are home to several species of rare and endangered flora and fauna, including the Australasian bittern and the orange-bellied parrot.

The primary objective of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site management plan (DELWP 2018) is to:

> *maintain, and where necessary improve, the ecological character of the ecological character of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site and support wise and sustainable use.*

The plan also includes a specific management strategy for these important wetlands:

> *Management strategy 3.4 – Continue to develop and implement environmental water management at Reedy Lake and Hospital Swamp.*

The Barwon River Environmental Entitlement 2011 allows water to be diverted from the Barwon River, to manage water levels in Reedy Lake and Hospital Swamps. The overarching objective of the environmental watering is to maintain the ecological character of the wetlands – that is, the combination of ecosystem components, processes, benefits and services that characterised the wetlands when Ramsar listed. **Action 8-5** will allow us to improve our knowledge to further inform the most effective watering regime for these Ramsar-listed wetlands, to protect and improve these wetlands for all uses. This will also help us to achieve Management Strategy 3.4 from the Ramsar site management plan.

Leigh and Yarrowee rivers

The Leigh and Yarrowee rivers are part of the Barwon River system and are also important contributors to flows into the internationally significant wetlands at Lake Connewarre, Reedy Lake and the lower Barwon further downstream. Key threats to the health of the Leigh and Yarrowee rivers include poor water quality, and erosion from increased urbanisation and stormwater runoff.

The Ballarat South Treatment Plant discharges about 20 megalitres of treated wastewater each day into the Yarrowee River under an EPA licence (or 7.43 gigalitres in 2019–20). For the Leigh and Yarrowee rivers, the environmental FLOWS study highlights the value of the treated water from the plant in providing flows (Alluvium 2021a), as does the *Central Region Sustainable Water Strategy* (DSE 2006), which committed to discharging 2 gigalitres of recycled water into the Yarrowee River each year. The study also found that changes to the timing of discharges and better water quality management could improve the long-term supply of environmental water to the Barwon River system. See **Section 8.7** for more on recycled water and stormwater for the environment.

Action 8-6:
Investigate the use of recycled water and stormwater for environmental flows in the Yarrowee and Leigh rivers

The Victorian Government, Central Highlands Water, Corangamite CMA and Wadawurrung Traditional Owners Aboriginal Corporation will investigate options for using stormwater and recycled water from the South Ballarat Treatment Plant to improve flows and waterway health for the Yarrowee River, Leigh River and Moorabool Yulluk (Moorabool River).

By 2027

Anglesea River

Historically, the Anglesea River has frequently experienced periods of acidic or low-pH water quality, predominantly due to natural sources of acid in the catchment, including coal seams, acid sulphate soils and tea tree marshes. Research suggests that these events are the result of heavy rainfall following a dry period and have been exacerbated by lower rainfall and higher temperatures resulting from climate change impacts.

Between 1963 and 2015, Alcoa operated the Anglesea Power Station, during which time groundwater was extracted for use in power generation, and subsequently released into the Anglesea River. Alcoa's discharge was generally the only flow-source into the river during the summer–autumn period and is likely to have also played a role in buffering acidic events.

Alcoa is responsible for preparing a plan for the rehabilitation of the former Anglesea coal mine, to achieve a safe, stable and sustainable landform. Rehabilitation may involve filling the mine void, which could hold around 16 gigalitres of water. Alcoa is investigating the feasibility of using local groundwater for this. Fit-for-purpose recycled water is also an option, but this would need investment in infrastructure, including a pipeline to Anglesea from the Black Rock Water Reclamation Plant.

In response to the power station closure and releases of water ceasing, a technical investigation determined the main impact would be a reduction in Anglesea River's water levels by approximately one metre in summer. This could expose mudflats and parts of the channel in the lower estuary and Coogoorah Park. This in turn increases the risk of additional acid events in the river by exposing coastal acid sulphate soils in Coogoorah Park. These impacts are likely to be exacerbated by reduced rainfall due to climate change.

Since 2016, water has been extracted from the Anglesea River during winter and spring. The water is stored in a pond on the former Alcoa mine site and released back into the estuary over the drier summer months. This additional flow helped supplement natural inflows, maintaining water levels in the estuary over summer to provide social, economic and environmental benefits for the local community.

Managing the Anglesea River remains a challenge due to the range of natural and anthropogenic effects on the river and its catchment over many decades. We are continuing to work with stakeholders and the community to identify longer-term management interventions to improve the health of the river.

Action 8-7:
Complete a feasibility study of the long-term management options to mitigate waterway health issues of the Anglesea River and estuary

The Victorian Government, in partnership with the local community, will continue to investigate feasible long-term management options to improve the health of the Anglesea River and estuary.

By 2023

Painkalac Creek

Painkalac Creek flows from the Otway Ranges through Aireys Inlet, ending in a coastal lagoon system, which attracts both the spotted green frog and the eastern banjo frog (pobblebonk). Flows in the Painkalac Creek and estuary are modified by the Painkalac Reservoir, which supplied potable water to the towns of Aireys Inlet and Fairhaven until 2016.

When Painkalac Creek Reservoir ceased supplying potable water in 2016, the reservoir became a popular recreation site, and allowed the Corangamite CMA and Barwon Water to work together to coordinate releases from the reservoir for environmental benefits in the creek and estuary.

These releases occur throughout the year to mimic natural flows as much as possible, to prevent downstream reaches of the creek from drying out, help maintain water quality and habitat for fish, frogs and birds, and provide water for recreation.

Painkalac Creek is a great example of agencies working together effectively to provide shared benefits for all users and maximise use of the resource.

Action 8-8: Improve the health of Painkalac Creek

The Corangamite CMA and Barwon Water will continue to work together to achieve environmental benefits in Painkalac Creek through coordinated releases from Painkalac Creek Reservoir.

Ongoing

Gellibrand River

The Gellibrand River is an unregulated river that supplies water to the towns of Warrnambool, Camperdown, Lismore, Cobden and Colac, and ends in a coastal estuary that is part of the Great Otway National Park. The river and estuary are popular places for recreation and tourism and an important cultural area for the Eastern Maar. Summer flows are important for maintaining habitat and water quality for macroinvertebrates and native fish such as Australian grayling and river blackfish and for reducing the risk of fish kills in the estuary after artificial openings. Wannon Water is investigating options to improve summer flows by reducing water extraction and increasing the use of other water resources.

Action 8-9: Improve summer flows in the Gellibrand River

The Victorian Government, Wannon Water, Eastern Maar Aboriginal Corporation and Corangamite CMA will continue to work together to investigate a preferred water supply augmentation option to improve critical water flows in the Gellibrand River through the summer low flow period.

This will be achieved through a combination of:

- assessing the expected environmental outcomes for each option to reduce water extraction from the Gellibrand River (independent expert report)
- completing a quadruple-bottom-line assessment of the preferred options, to identify the best way to improve flows in the Gellibrand River.

Ongoing

8.4 Improving waterway health for rivers in Greater Melbourne

Our plan:

- return additional water to the environment in major rivers in Greater Melbourne to achieve environmental outcomes, without compromising the needs of other water users
- deliver a suite of complementary investments to improve the health and resilience of waterways

Wirribi Yaluk (Werribee River)

The Werribee catchment is the driest in southern Victoria, with comprehensive studies finding that the river has an environmental water deficit of 12 gigalitres per year. Additional water is urgently needed for the environment to prevent further decline and improve water quality, support native fish populations, including galaxiids, and provide habitat for a regionally significant platypus population. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). Water recovery will also help to reduce algal blooms which can affect the use of the river for recreation and events, including canoeing, fishing and kayaking.

Policy 8-4: Return water to the Wirribi Yaluk (Werribee River) in the short term

The Victorian Government will return approximately 2 gigalitres[30] of water for the environment in the Wirribi Yaluk (Werribee River) to improve waterway health by maintaining water quality and providing refuges for fish.

By 2024

Action 8-10: Improve fish passage in the Wirribi Yaluk (Werribee River)

The Victorian Government and Melbourne Water will work together to address barriers to native fish migration by undertaking detailed designs for a fishway at the lower Werribee Diversion Weir, and potential upgrades to the weir to improve the delivery of environmental water.

By 2027

These outcomes will be achieved through:

- completion of the irrigation modernisation projects in Werribee and Bacchus Marsh (see **Section 7.3**).

Policy 8-5: Return water to the Wirribi Yaluk (Werribee River)

The Victorian Government will return up to an additional 10 gigalitres of water to the environment in the Wirribi Yaluk (Werribee River) to improve waterway health by maintaining water quality and providing refuges for fish.

By 2032

These outcomes will be achieved through a combination of:

- reconfiguring the Werribee system (see **Action 4-10**)
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2** and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**)
- substituting river water with manufactured water in the longer-term (see **Policy 4-3**).

30 Volume subject to independent verification and audit of water recovery.

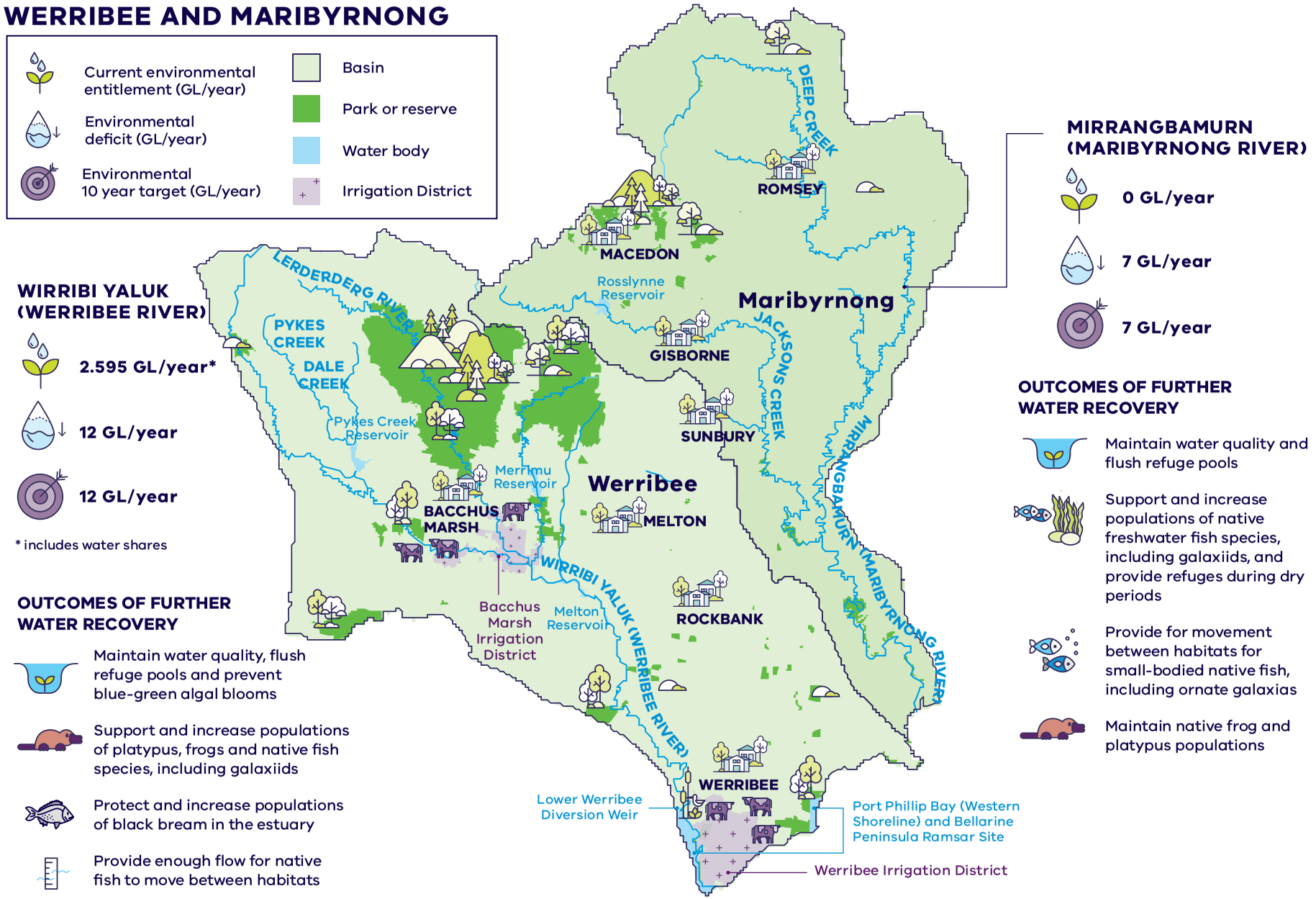


Figure 8.5: Environmental outcomes for the Wirribi Yaluk (Werribee River) and the Mirrangbamurn (Maribyrnong River) – see Appendix D for further detail

Mirrangbamurn (Maribyrnong River)

The Maribyrnong basin has experienced one of the largest percentage declines in inflows across southern Victoria (17 per cent or about 17 gigalitres per year). Like most rivers in the region, there is now less water for the environment, and the river has extended periods of low flows which can affect the river's many values.

Comprehensive studies have found that the Mirrangbamurn (Maribyrnong River) has an environmental water deficit of 7 gigalitres per year. Additional water is urgently needed to flush pools to maintain water quality, allow native fish species, including galaxiids, to breed and move between habitats, and to provide habitat for platypus populations and waterbugs. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**).

Resource risks in the upper Maribyrnong catchment will be reviewed to identify potential impacts caused by small catchment dams (see **Action 4-13**).

Policy 8-6: Return water to the Mirrangbamurn (Maribyrnong River)

The Victorian Government will return up to 7 gigalitres of water to the Mirrangbamurn (Maribyrnong River) to improve waterway health by maintaining water quality and supporting native species to survive.

By 2032

These outcomes will be achieved through a combination of:

- substituting river water with manufactured water in the longer-term (see **Policy 4-3**)
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2**) and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**).

Complementary actions

Action 8-11: Improve the health of the Mirrangbamurn (Maribyrnong River)

The Victorian Government will improve the health of the Mirrangbamurn (Maribyrnong River), increase the effectiveness of environmental water releases and address constraints to their delivery by exploring options to:

- upgrade Rosslynne Reservoir outlet to allow larger releases of environmental water
- remove willows and other weeds and establish vegetation buffers in the upper catchment
- address barriers to fish movement in the upper Mirrangbamurn (Maribyrnong River).

By 2032

Image: Melbourne CBD over the Mirrangbamurn (Maribyrnong River), Wurundjeri Woi-wurrung Country

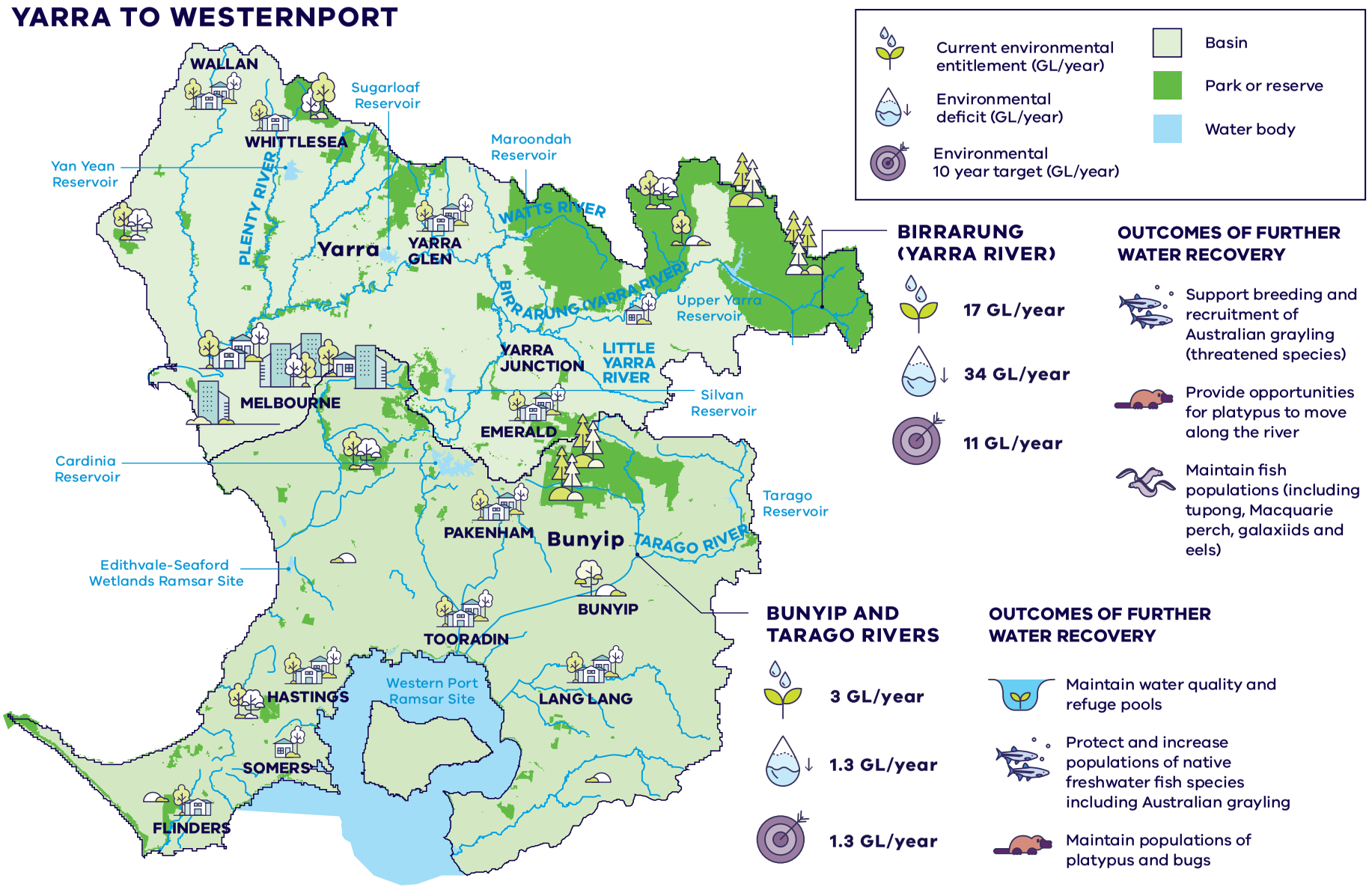


Figure 8.6: Environmental outcomes for the Birrarung (Yarra River) and the Bunyip and Tarago rivers – see Appendix D for further detail

Birrarung (Yarra River)

The Birrarung (Yarra River) is one of the state's most iconic waterways, with significant economic, social and cultural values for locals and visitors to Melbourne. The river provides 70 per cent of Melbourne's drinking water and includes 2,450 hectares of urban parklands and green open spaces. The river supports farming, tourism and recreation and includes numerous places of high cultural significance for the Wurundjeri people, such as the Mount Lofty and the Brushy Creek confluence. The major biodiversity corridor, created by the river and its connected parklands, supports populations of platypus, native fish and koalas, along with more than 150 bird species.

Despite continued investment and collaboration, the health of the Birrarung (Yarra River) is under threat from climate change, urbanisation and population growth. Like most rivers in the region, water availability is declining and there is less water available for the environment.

Comprehensive studies have found that the Birrarung (Yarra River) has an environmental water deficit of 34 gigalitres per year. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). This additional water is urgently needed to prevent the loss of Australian graylings, to allow platypus populations to move along the river and to support native fish.

Policy 8-7: Return water to the Birrarung (Yarra River)

The Victorian Government will return up to 11 gigalitres to the environment in the Birrarung (Yarra River) to improve waterway health, support native species and improve riparian vegetation and billabong habitat.

By 2032

These outcomes will be achieved through a combination of:

- investigating optimisation of Birrarung (Yarra River) system passing flow arrangements (see **Action 4-11**)
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2**) and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**)
- substituting river water with manufactured water in the longer-term (see **Policy 4-3**).

Recovering water in the Birrarung (Yarra River) supports the implementation of the Victorian Government's *Burndap Birrarung burndap umarkoo (Yarra Strategic Plan)*, which is an Australian first and manages the Birrarung (Yarra River) and its parklands as one integrated living entity (Melbourne Water 2022).

Action 8-12: Improve the health of the Kooyongkoot (Gardiners Creek)

The Victorian Government will support a co-ordinating committee to oversee improvements to the health and amenity of Kooyongkoot (Gardiners Creek) in the Yarra catchment, in partnership with Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation.

By 2023

Bunyip and Tarago rivers

The Bunyip and Tarago rivers support several significant and threatened native plant and animal species, including the Australian grayling. The upper catchment supports platypus populations and native fish such as river blackfish and mountain galaxias. The lower catchment has been highly modified, but still contains patches of remnant vegetation and healthy populations of Australian grayling and platypus. Water for the environment is declining, with the greatest impact to flows in the reaches downstream of Tarago Reservoir, where mean annual flows have declined by up to 20 per cent.

Comprehensive studies have found the Bunyip and Tarago rivers have an environmental water deficit of 1.3 gigalitres per year and additional water is urgently needed to maintain water quality and support native species. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve these critical environmental outcomes (see **Appendix D**).

Policy 8-8: Return water to the Bunyip and Tarago rivers

The Victorian Government will return up to 1.3 gigalitres for the environment in the Bunyip and Tarago rivers to protect populations of platypus and native fish and maintain water quality.

By 2032

These outcomes will be achieved through a combination of:

- increasing use of stormwater, recycled water or efficiency measures to reduce take from rivers for cities and towns (see **Policy 4-2**) and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**)
- substituting river water with manufactured water in the longer-term (see **Policy 4-3**).

Image: Bunyip River, Bunruong Country

8.5 Improve waterway health for rivers in Gippsland

Our plan:

- return additional water to the environment in major rivers in Gippsland to achieve environmental outcomes, without compromising the needs of other water users
- deliver a suite of complementary investments to improve the health and resilience of waterways

The major rivers in the Gippsland Region are much larger than those to the west of Melbourne. For example, the long-term water availability in the Thomson–Macalister and Latrobe rivers (750 and 830 gigalitres per year respectively) are around 10 times the size of the Maribyrnong, Werribee and Moorabool rivers (85, 78 and 85 gigalitres per year respectively) and more than three times the size of the Barwon River (233 gigalitres per year). This means they need more water to achieve the same flow objectives than the smaller rivers to the west of Melbourne, such as minimum flows in summer and winter and fresh flows. These large Gippsland rivers therefore have larger deficits and water recovery targets.

Carran Carran (Thomson River)

The Carran Carran (Thomson River) is part of a network of coastal rivers across Gippsland and south-eastern Australia that support populations of nationally significant migratory fish species, including the Australian grayling, tupong and short- and long-finned eel. The reach from the Aberfeldy River confluence to Cowwarr Weir has heritage river status, with largely intact native riparian vegetation communities and fish populations.

Comprehensive studies have found the Carran Carran (Thomson River) has an environmental water deficit of 80 gigalitres per year. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). The additional water is urgently needed to prevent the loss of native aquatic species and support regular breeding of Australian grayling and other native fish.

Policy 8-9: Return water to the Carran Carran (Thomson River)

The Victorian Government will return up to 15 gigalitres of water for the environment in the Carran Carran (Thomson River) to improve waterway health by supporting migratory native fish populations, including the Australian grayling, and providing habitat for platypus.

By 2032

These outcomes will be achieved through a combination of:

- substituting river water with manufactured water in the longer-term (see **Policy 4-3**)
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2**) and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**).

Action 8-13: Thomson River–Rainbow Creek waterway management plan

The Victorian Government has funded a number of high-priority actions under the *Thomson River–Rainbow Creek waterway management plan 2020* and will seek to secure funding for the implementation of the remaining actions to address the risk of waterway avulsion to urban and rural water supplies and waterway health.

Ongoing

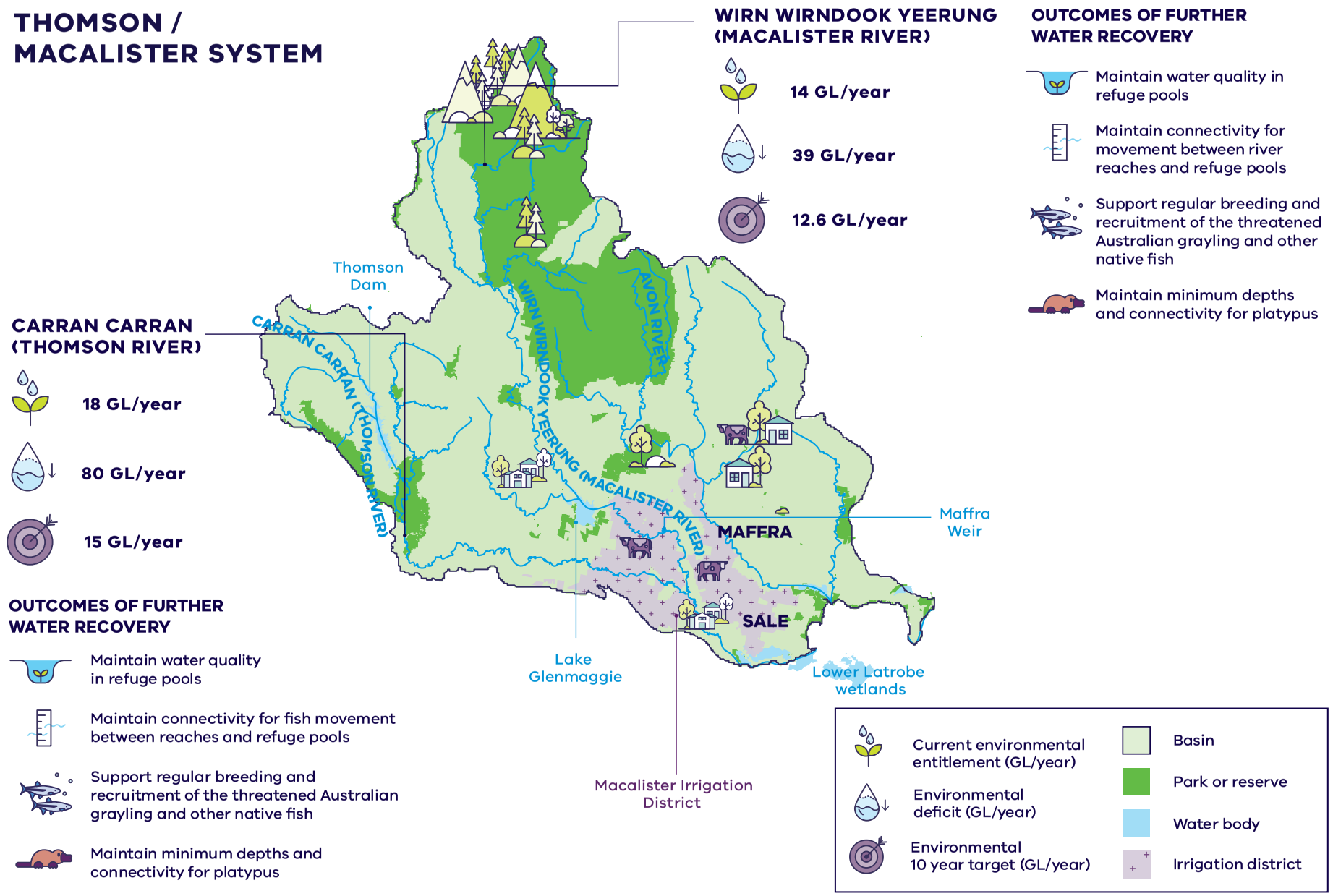


Figure 8.7: Environmental outcomes for the Carran Carran (Thomson River) and the Wirn Wirndook Yeerung (Macalister River) – see Appendix D for further detail

Action 8-14:
Improve flows in the Avon River

West Gippsland CMA and Gunaikurnai Land and Waters Aboriginal Corporation will review and update the environmental water needs of the Avon River to protect environmental and Traditional Owner values and will work with relevant authorities to investigate options to improve critical flows.

By 2032

West Gippsland CMA, Gunaikurnai Land and Waters Aboriginal Corporation and Southern Rural Water will continue to work together to improve knowledge and management of flows in the Avon River and connected groundwater for all uses.

Ongoing

Opportunities to improve environmental flows in the Avon River will be explored during investigations to consider current and future use of land, water, and infrastructure within the MID (see **Action 7-2**).

Wirn Wirndook Yeerung (Macalister River)

The Wirn Wirndook Yeerung (Macalister River) is home to several migratory native fish species, including the threatened Australian grayling, short-finned eel, long-finned eel and tupong. Platypus and rakali (Australian water rats) are widely distributed through the river and its tributaries.

Comprehensive studies have found the river has an environmental water deficit of 39 gigalitres per year and additional water is urgently needed to prevent the loss of critical species and support regular breeding of the Australian grayling and other native fish. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). Improving fish passage at the Maffra Weir – one of the most significant fish barriers in coastal Victoria – is also critical to native fish breeding and migration.

Policy 8-10:
Return water to the Wirn Wirndook Yeerung (Macalister River) in the short term

The Victorian Government will return 1.7 gigalitres[31] of water for the environment in the Wirn Wirndook Yeerung (Macalister River) to improve waterway health maintaining water quality in refuge pools and connectivity for aquatic species.

By 2026

These outcomes will be achieved through:

- completion of Phase 2 of MID2030 (see **Section 7.3**).

31 Volume subject to independent verification and audit of water recovery.

Policy 8-11:
Return water to the Wirn Wirndook Yeerung (Macalister River)

The Victorian Government will return up to an additional 10.9 gigalitres of water for the environment in the Wirn Wirndook Yeerung (Macalister River) to improve waterway health by supporting breeding and recruitment of the threatened Australian grayling and other native fish, and providing habitat for platypus.

By 2032

These outcomes may be achieved through a combination of:

- substituting river water with manufactured water in the longer-term (see **Policy 4-3**)
- potential further irrigation modernisation (see **Chapter 7**).

Complementary actions

Action 8-15:
Build the Maffra Weir fishway (Wirn Wirndook Yeerung (Macalister River))

The Victorian Government will work with Southern Rural Water and West Gippsland CMA to:

- complete the detailed design of the proposed Maffra Weir fishway
- construct a fishway at Maffra Weir. This will improve native fish migration, breeding and diversity in the Wirn Wirndook Yeerung (Macalister River) and the broader Gippsland catchments and significantly improve the effectiveness of the environmental water releases, current and future.

By 2024

By 2027

Image: Wirn Wirndook Yeerung (Macalister River), Maffra West Upper, Gunaikurnai Country

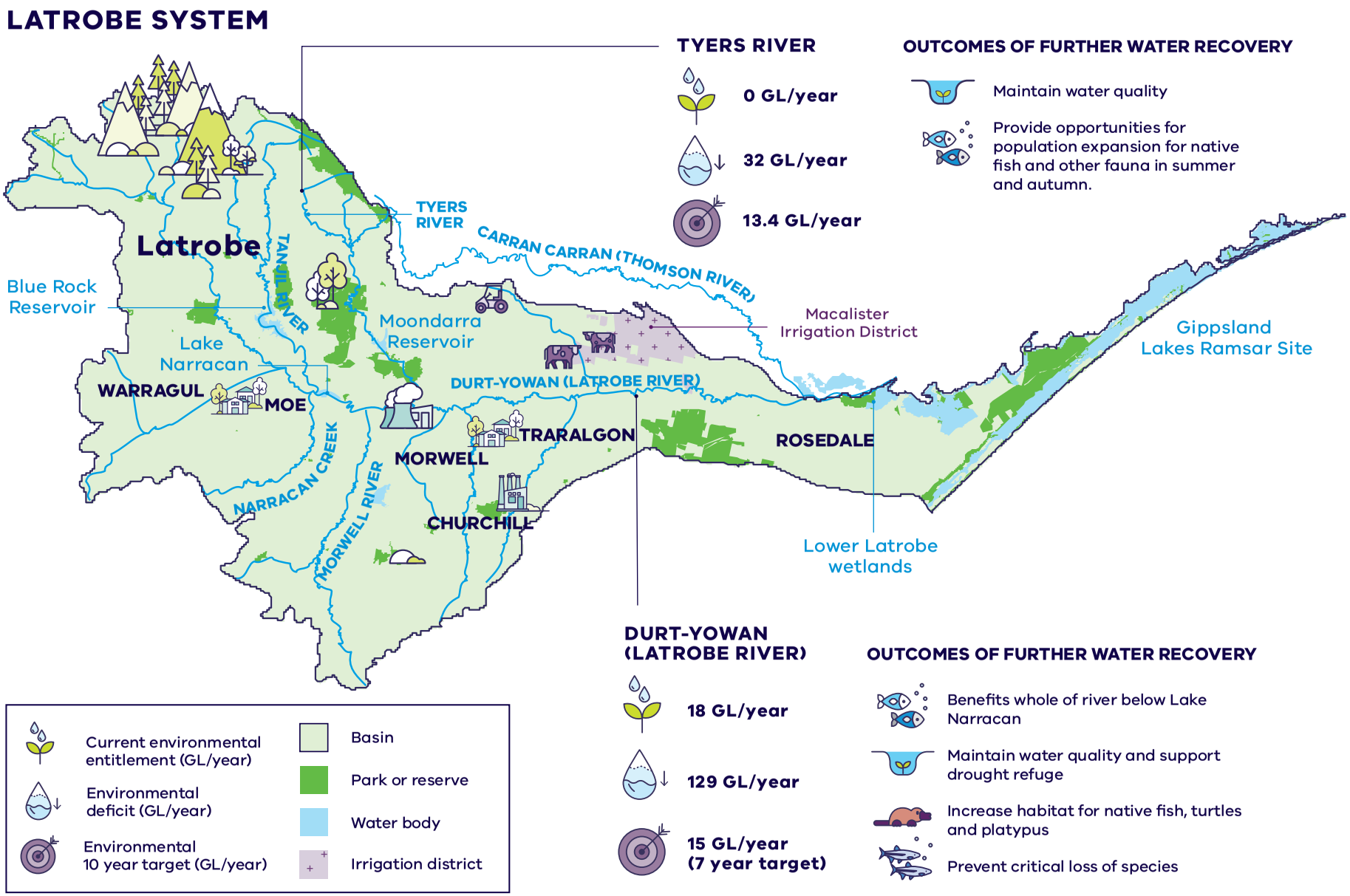


Figure 8.8: Environmental outcomes for the Latrobe system – see Appendix D for further detail

Durt-Yowan (Latrobe River)

The Durt-Yowan (Latrobe River) supports Australian bass, Australian grayling and short- and long-finned eel as well as platypus, rakali (water rats) and freshwater turtles. The Durt-Yowan (Latrobe River) and its tributaries provide an essential source of freshwater to the Gippsland Lakes system, of which the Ramsar-listed lower Latrobe wetlands are an important component.

Comprehensive studies have found the Durt-Yowan (Latrobe River) and estuary have an environmental water deficit of 129 gigalitres per year and additional water is urgently needed to maintain water quality and habitat, and support drought refuges. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 7–10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). Water recovery will also support regular breeding of Australian grayling and other native fish species. Improvements to watering infrastructure at the lower Latrobe wetlands is also needed to improve delivery of freshwater flows to the wetlands.

West Gippsland CMA have developed principles and long-term goals for management of the Durt-Yowan (Latrobe River) system which form the vision for the long-term health of the system, including the river and its floodplains, wetlands and estuary.

Policy 8-12: Return water to the Durt-Yowan (Latrobe River) in the short term

The Victorian Government will return up to 7.3 gigalitres of water for the environment in the Durt-Yowan (Latrobe River) to improve waterway health by maintaining water quality in pools and increasing habitat for native fish, turtles and platypus populations in currently deliverable reaches.

By 2027

This outcome will be achieved through:

- reallocating a share of water from the Latrobe 3 — 4 Bench bulk entitlement to contribute towards meeting environmental water recovery targets (see **Action 4-8**).

Policy 8-13: Return water to the Durt-Yowan (Latrobe River)

The Victorian Government will return up to an additional 7.7 gigalitres of water for the environment in the Durt-Yowan (Latrobe River) to improve waterway health in the whole river. This will maintain water quality in refuge pools and increase habitat for native fish, turtles and platypus, pending the outcomes of the Latrobe constraints investigation.

By 2029

These outcomes will be achieved through a combination of:

- reallocating a share of water from the Latrobe 3 — 4 Bench bulk entitlement to contribute towards meeting environmental water recovery targets (see **Action 4-8**)
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2**) and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**)
- opportunities through the development of a vision and plan for the water future of the Latrobe Valley (see **Action 4-15**).

Image: Black Swan, Sale Common, Gunaikurnai Country

Policy 8-14:
Investigate feasibility of delivering additional water to the Durt-Yowan (Latrobe River)

The Victorian Government will undertake a review within five years to assess the feasibility of delivering up to an additional 58 gigalitres of water for the environment in the Durt-Yowan (Latrobe River), given completion of the Latrobe constraints investigation and lower Latrobe wetlands infrastructure upgrades (see **Action 4-14**, **Action 4-15**, **Action 8-17** and **Action 8-18**). This additional water would support breeding and recruitment of Australian grayling and other native fish species, and provide fresh water to the Latrobe estuary and lower Latrobe wetlands.

By 2027

Environmental water recovery targets for the Latrobe River are higher than the targets published in the discussion draft of this Strategy. The discussion draft targets were interim, while further work was undertaken by the West Gippsland CMA and an expert independent panel, and did not include the volumes required for the whole Latrobe system, including the Latrobe estuary or lower Latrobe Ramsar-listed wetlands. The revised targets consider environmental outcomes that can be achieved at a whole-of-river scale if constraints to delivery of environmental water can be addressed.

Complementary actions

Action 8-16:
Improve the delivery of environmental water to the Durt-Yowan (Latrobe River) downstream of Rosedale

The Victorian Government, West Gippsland CMA and Gunaikurnai Land and Waters Aboriginal Corporation will investigate options to remove constraints to the delivery of water for the environment in the Durt-Yowan (Latrobe River) downstream of Rosedale and, pending the outcomes of this investigation, prioritise options for implementation. This will significantly improve the effectiveness of environmental releases into the Durt-Yowan (Latrobe River).

By 2027

Action 8-17:
Improve flows to the lower Latrobe wetlands

The Victorian Government will work with the West Gippsland CMA to upgrade watering infrastructure at the lower Latrobe wetlands to deliver freshwater flows into the wetlands more efficiently. This will improve the health of the wetlands in the medium-term, and allow time to plan for the long-term, in accordance with Australia's international obligations under the Ramsar Convention. The wetlands are a priority site for Gunaikurnai Traditional Owners and the local community.

By 2027

Improving flows to the lower Latrobe wetlands

The lower Latrobe wetlands (Dowd Morass, Heart Morass and Sale Common) are part of the Gippsland Lakes Ramsar site and provide important habitat for a variety of waterbirds of state, national and international conservation significance. The wetlands are also a traditional meeting place for the Gunaikurnai Traditional Owners and support a range of recreational values. Regulation and water extraction from Latrobe, Thomson and Macalister rivers, combined with changes to the surrounding catchment (such as levees, drains and filling natural depressions) have affected how water flows into and through the wetlands.

Rising salinisation levels in the lower Latrobe River and the limited capacity of existing watering infrastructure (flow regulators) also means that it is increasingly difficult to deliver fresh water to the wetlands. Upgrading the existing regulators and constructing three new regulators (see **Figure 8.9**) will enable flows to be delivered effectively and efficiently, meeting environmental water requirements and significantly reducing the annual environmental water deficit for the wetlands by up to 6,000 megalitres per year.

In addition to significantly reducing the water requirements of the wetlands, the works will greatly improve the ability to protect and improve the freshwater-dependent values of the wetlands and allow time to plan for the longer-term, in accordance with Australia's obligations under the Ramsar Convention, by:

- reducing salinity levels in Dowd Morass and Heart Morass by improving freshwater inflows and saltwater outflows.
- providing a more regular water supply to Sale Common– protecting freshwater-dependent flora and fauna to maintain and improve species diversity and refuge value.
- allowing better management of wetting and drying regimes between flood years, improving conditions for wetland vegetation and providing food and habitat for wetland-dependent fauna.

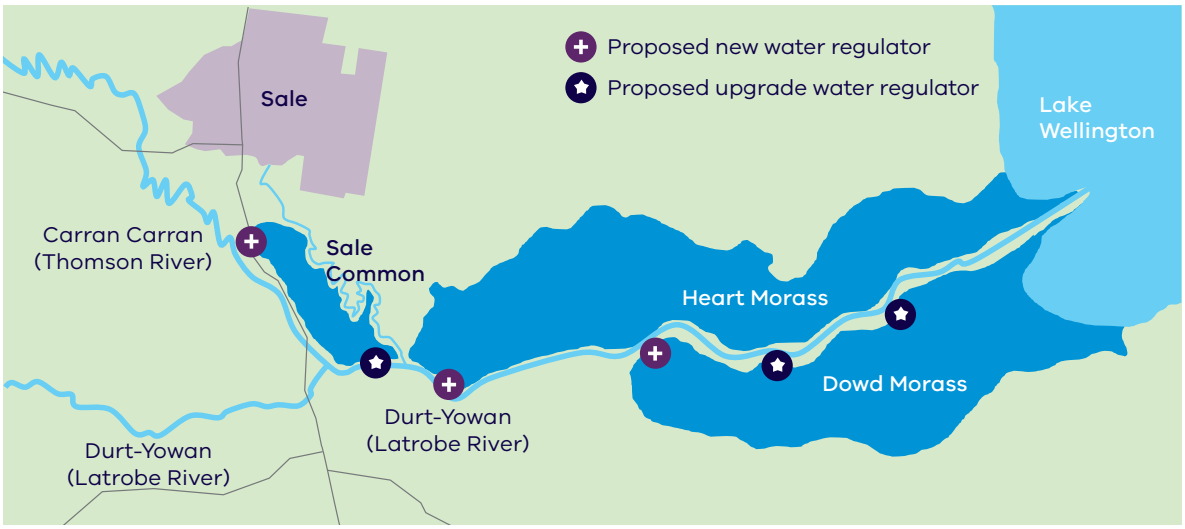


Figure 8.9: Proposed new and upgraded water regulating structures in the lower Latrobe wetlands

Tyers River

The upper reaches of the Tyers River flow through native forest and are relatively intact and ecologically healthy. They support native animals including barred galaxias and river blackfish. Below Moondarra Reservoir, the river is regulated but maintains good quality riverine habitat. Several native migratory fish species are found in the Tyers River including southern shortfin and longfin eel, shorthead lamprey, Australian grayling and tupong.

Comprehensive studies have found the Tyers River has an environmental water deficit of 32,000 megalitres per year[32] and additional water is urgently needed to maintain water quality and prevent the critical loss of species. Based on these studies, the waterway manager has identified water recovery targets to be met in the next 10 years that will aim to achieve the most critical environmental outcomes (see **Appendix D**). Water recovery will also provide pool habitat to support migratory and resident freshwater fish, macroinvertebrates, aquatic mammals, turtles, and submerged vegetation.

Policy 8-15: Return water to the Tyers River

The Victorian Government will return up to 13 gigalitres of water for the environment in the Tyers River to improve waterway health by preventing the loss of native fish species, macroinvertebrates, and platypus, and providing expansion opportunities for these species in summer and autumn.

By 2032

These outcomes may be achieved through a combination of:

- developing a vision for the reconfiguration of the Latrobe Valley water supply system which could reduce reliance on Moondarra Reservoir for urban and industrial supply (see **Action 4-15**).
- increasing use of stormwater, recycled water or efficiency measures to reduce water extraction from rivers for cities and towns (see **Policy 4-2**) and as sources for environmental flows if appropriate (see **Policy 8-16**, **Action 8-22** and **Action 8-23**).

Environmental water recovery targets for the Tyers River are lower than the targets published in the discussion draft of this Strategy. This change reflects the findings of a review by the West Gippsland CMA and an expert independent panel that the geomorphic outcomes are a lower priority than the other outcomes in the short-medium term.

Complementary actions

Action 8-18: Improve fish passage in Tyers River

The Victorian Government will investigate options to provide fish passage in the Tyers River below Moondarra Reservoir (existing fish barriers between Moondarra and Latrobe confluence) to improve native fish migration and breeding and improve effectiveness of future environmental entitlements.

By 2027

32 Water recovery for the Tyers River may also help meet some of the water recovery targets for the Latrobe River below its confluence with the Tyers River. Analysis would need to be done to quantify this. It would depend on the coincidence of the flows that each target aims to achieve.

South Gippsland waterways

Action 8-19: Improve flows in South Gippsland's flow-stressed waterways

West Gippsland CMA, Gunaikurnai Land and Waters Aboriginal Corporation and Bunurong Land Council Aboriginal Corporation will investigate flows required to protect environmental and Traditional Owner values of flow stressed waterways in priority South Gippsland waterways and will work with relevant authorities to investigate options to improve critical flows in these waterways. Waterways for consideration include Merriman Creek and the Tarra, Agnes, Tarwin and Powlett rivers.

By 2032

Merriman Creek

Action 8-20: Improve fish passage along Merriman Creek

The Victorian Government will investigate options to address constraints to fish passage in Merriman Creek to improve native fish migration and breeding.

By 2027

Nicholson River

The Nicholson River Dam sits on the Nicholson River in East Gippsland. The dam is the only major physical structure interrupting the otherwise unregulated river, preventing native fish from reaching 80 per cent of the upper reaches of the river. The dam is no longer used, and opportunities are being explored for it to be decommissioned.

Decommissioning the dam would improve the health of the river and native fish populations and reduce costs associated with the dam's maintenance and surveillance. Removing most of the dam wall, including its central section down to bedrock level, would immediately improve connectivity and fish passage for native migratory fish including the vulnerable Australian grayling. Improving flows in the Nicholson River, and into the connected Gippsland Lakes, would also support tourism and recreation including fishing and kayaking.

Action 8-21: Decommission the Nicholson River Dam

The Victorian Government, with East Gippsland Water, the East Gippsland CMA and Gunaikurnai Land and Waters Aboriginal Corporation will decommission the Nicholson River Dam to improve waterway health and flows into the Gippsland Lakes.

By 2030

Image: Decommisioned Nicholson River Dam wall, Gunaikurnai Country

Snowy Mountains Hydro Scheme

The Snowy Mountains Hydro Scheme (Snowy Scheme) is an integrated water and hydro-electric power utility that can store up to 5,300 gigalitres of water originating from the headwaters of the Snowy, Murrumbidgee and Murray river catchments. Management of water in the Snowy Scheme is important to Victoria, as water stored and released from the Scheme provides environmental flows to the Snowy and Murray rivers and underpins the reliability of Victorian Murray water entitlements.

The Victorian Government was instrumental in securing intergovernmental agreement to increase flows in the Snowy River in response to the impacts the Snowy Scheme was having on the iconic river's health and the important values it supports. The Victorian Government contributed $150 million towards meeting the recovery targets established under the Snowy Water Inquiry Outcomes Implementation Deed (SWIOID) to return 21 per cent of mean annual natural flows to the Snowy River. Water recovery volumes to support delivery of 21 per cent mean annual natural flows (equal to a long-term average of 212 gigalitres per year) as committed under the SWIOID were met in July 2012.

Each year, the Snowy Advisory Committee provides advice on the timing and pattern of releases to support environmental outcomes. The advisory committee comprises Victorian and New South Wales community representatives, an aquatic ecologist, and natural resource managers from the Victorian and New South Wales governments. It is enabled under New South Wales legislation.

The Victorian Government maintains its commitment to the objectives of the SWIOID to improve the health of the Snowy River and is supporting New South Wales to implement actions arising from the *Ten-year review of the Snowy water licence* (NSW Department of Industry 2018) to ensure that the intent of the objectives set out in the SWIOID will be met.

8.6 Improve water management to benefit the environment

While we need to recover more water for the environment, we also need to maximise the use of water in a system to achieve benefits for all uses, including the environment. This includes:

- temporary trade of water between agencies (see **Action 4-6**)
- more flexibility in the use of passing flows (see **Action 4-11**)
- operating the system as efficiently as possible to enable opportunities for environmental releases to 'piggyback' on consumptive releases to achieve larger flows (see **Section 4.5**).

8.7 Recycled water and stormwater for the environment

Our plan:

- increase the use of recycled water and stormwater for a range of non-drinking uses, to reduce the pressure on river water supplies and return more water to the environment
- where re-use isn't possible, investigate opportunities to use recycled water and stormwater to improve environmental flows and overall waterway health

The role of recycled water and stormwater

Waterways in the Central and Gippsland Region need significant volumes of additional water to prevent further decline and support healthier and more resilient waterways. To return more water to rivers, the region will transition to using more manufactured water for fit-for-purpose uses (see **Chapter 3** and **Chapter 4**). Where substitution is not possible, improvements to the water quality, timing and volumes of urban stormwater flows or releases from wastewater treatment plants could maintain or improve the health of waterways. This will also help to address climate change impacts.

Recycled water for the environment

Recycled water (treated wastewater) can already be discharged into rivers, under certain circumstances, if strict EPA requirements are met. These discharge conditions are effective at mitigating risks but are not targeted to providing ecological benefits.

Recycled water that is released into rivers at the right time, and at the right quality, can help to keep rivers flowing and improve river health, particularly in flow-stressed rivers and during drier periods. For example, the Ballarat South Treatment Plant discharges around 20 megalitres of treated wastewater into the Yarrowee and Leigh rivers each day. This provides important base flow for the rivers, but the water may require further treatment to truly meet the needs of the waterway. We will investigate ways to maximise the environmental benefits of using recycled water in waterways, for example by timing releases to match the recommended environmental flows of the river system.

Action 8-22: Develop guidelines for using recycled water for the environment

The Victorian Government will work with EPA to develop EPA guidelines for using recycled water for the environment, with the aim of improving the overall health of waterways while protecting human health.

By 2023

Stormwater for the environment

In highly urbanised catchments, stormwater drainage systems are generally designed to move large volumes of stormwater as quickly as possible into creeks and rivers and away from the source to reduce the risk of flooding. Uncontrolled and untreated stormwater flows harm waterway health by carrying pollutants into waterways and disrupting natural flow patterns. However, if stormwater is harvested, treated to an appropriate standard and released when needed, it not only prevents harm but also provides benefits to the environment, such as maintaining flows in flow-stressed waterways.

The opportunities to use stormwater for the environment may be limited, due to the need for large storages, which will require suitable land and significant infrastructure investment. IWM plans for the Sunbury and Melton growth areas identified stormwater for the environment as potential options. We will use these case studies to better understand the benefits and identify the tools required to enable the use of stormwater for the environment, and also explore options in the Yarrowee and Leigh rivers (see **Action 8-6**). Where IWM plans in other areas identify opportunities to use stormwater for the environment, we will work with the relevant project partners on a case-by-case basis, applying the learnings from Sunbury and Melton.

Policy 8-16: Stormwater for the environment

The Victorian Government supports the controlled release of stormwater by an authority, where the authority can demonstrate that it:

- is safe and suitable
- improves waterway health (including flows)[33]
- aligns with advice provided by the waterway manager for timing and volume
- has been identified as a viable option in a catchment-scale or region-specific IWM plan.

33 when compared to the base case/current downward trajectory

Action 8-23: Stormwater for the environment

The Victorian Government will work with Melbourne Water and other project partners to investigate harvesting and using stormwater for the environment, to improve waterway health and provide flows in stressed rivers. We will use the Sunbury and Melton growth areas to explore the possible benefits and enabling policy requirements.

By 2025

8.8 Managing nutrient and sediment loads in waterways and bays

Our plan:

- protect water quality in our waterways and bays by managing nutrient loads and sediments in Victoria's largest marine bays: Port Phillip Bay, Western Port, Lake Wellington and Corner Inlet and Nooramunga

Runoff from urban, agricultural and industrial land carries sediment, nutrients and contaminants that can damage the health of our waterways and bays. High levels of sediment and nutrients can cause algal blooms and fish deaths, and prevent the safe use and enjoyment of waterways and bays, as well as increase the burden of treatment for drinking water. While regulation and ongoing investment by government, industry and the community has helped to manage nutrient loads and protect the health of our waterways and bays, we cannot take this health for granted.

The role of Traditional Owners in self-determining objectives and indicators to protect the Traditional Owner cultural values of waterways and bays is discussed in **Chapter 6**.

Managing nutrient loads in Port Phillip Bay and Western Port

Managing nutrient loads in Port Phillip Bay and Western Port remains a high priority to protect these precious natural assets and their immense social, economic, environmental and cultural value to Victoria. Nutrients are considered a key threat because they are one of the main causes of algal blooms, which pose a risk to marine life and human health. Marine pollutant load objectives for Port Phillip Bay, Western Port and the Western Treatment Plant in Werribee will continue to guide action and investment to ensure the protection of water quality and beneficial uses (see **Table 8.1**). The Port Phillip Bay Environmental Management Plan 2017–2027 (DELWP 2017b) represents the Victorian Government's ongoing commitment to ensuring that Port Phillip Bay remains healthy and resilient over the coming decade.

To continue to protect the water quality of receiving waters (downstream of major storages), in response to population growth and land-use change, we need to ensure that:

- seasonal levels of nitrogen remain low, to reduce the risk of algae blooms
- nitrogen loads from sewage treatment plants that discharge into Port Phillip Bay (directly or indirectly via waterways) do not increase
- pollution loads (nitrogen and suspended solids) from the Yarra and Maribyrnong rivers do not exceed 70 per cent of total annual average loads from all waterways discharging into Port Phillip Bay.

Action 8-24: Marine pollution load objectives for Port Phillip Bay and Western Port

The Victorian Government will implement plans and undertake management actions to help reach the marine pollutant load objectives specified in the *Environment Reference Standard* (Victoria Government Gazette No. S245, 2021) for Port Phillip Bay and for Western Port.

Ongoing

Table 8.1: Marine pollutant load objectives for Port Phillip Bay and Western Port.[34]

Geographic area	Indicator	Objective (annual average)
Port Phillip Bay	Total nitrogen from surrounding waterways	1,500 to 2,200 tonnes
	Nitrogen from the Western Treatment Plant	3,100 tonnes (based on a rolling three year average)
	Total nitrogen from the Yarra and Maribyrnong rivers	Contribution of total nitrogen load not to exceed 70% of total annual average load from all surrounding waterways
	TSS* from surrounding waterways	60,000 to 70,000 tonnes
	TSS from the Yarra and Maribyrnong rivers	Contribution of TSS load not to exceed 70% of annual average load from all surrounding waterways
Western Port	TSS	28,000 tonnes

*TSS – total suspended solids (measure of turbidity)

Managing nutrient loads in the Gippsland Lakes, and Corner Inlet and Nooramunga

Protecting water quality in the Gippsland Lakes, and Corner Inlet and Nooramunga is vital to supporting regional tourism and jobs and the social, recreational and cultural uses of these natural assets. Elevated levels of nutrients in the Gippsland Lakes lead to regular algae blooms that can threaten the use of the lakes for fishing, boating and water sports. Algae blooms are monitored regularly in the lakes – and every week in summer – to inform government and agency action to reduce the risk to human health and the environment.

Intensive agriculture contributes to nutrient loads and sediment runoff into Lake Wellington – the largest lake in the Gippsland Lakes system. The Sustainable Irrigation Program provides information and incentives to irrigators in the nearby MID, and surrounds, to reduce the offsite effects of irrigation and support best practice through land and water management planning and implementation (see **Chapter 7**). The implementation of the Gippsland Lakes Ramsar Site Management Plan is also helping to reduce nutrient loads from dryland and waterway sources entering Lake Wellington.

Marine pollutant load objectives for Lake Wellington, Corner Inlet and Nooramunga require annual loads of pollution to be progressively reduced (see **Table 8.2**).

34 This table is an excerpt from Table 5.21 in the *Environment reference standard* (*Victoria Government Gazette*, No. S245, 26 May 2021).

Action 8-25:
Marine pollution load objectives for Lake Wellington

The Victorian Government will develop and implement plans to help reach the marine pollutant load objectives outlined in the *Environment reference standard* (*Victoria Government Gazette* No. S245, 2021) for Lake Wellington, including through the *Lake Wellington land and water management plan* (West Gippsland CMA 2018) and the *Gippsland Lakes Ramsar site management plan* (East Gippsland CMA 2015).

Ongoing

Action 8-26:
Marine pollution load objectives for Corner Inlet and Nooramunga

The Victorian Government will develop and implement plans to help reach the marine pollutant load objectives outlined in the *Environment reference standard* (*Victoria Government Gazette* No. S245, 2021) for Corner Inlet and Nooramunga, including through the *Corner Inlet water quality improvement plan* (West Gippsland CMA 2013)

Ongoing

Table 8.2: Marine pollutant load objectives for Lake Wellington, Corner Inlet and Nooramunga.[35]

Geographic area	Indicator	Objective (annual average)
Lake Wellington	Total phosphorus	100 tonnes
Corner Inlet (excluding Nooramunga Marine and Coastal Park)	Total nitrogen	90 tonnes
	Total phosphorus	16 tonnes
	TSS	1,800 tonnes
Nooramunga Marine and Coastal Park	Total nitrogen	68 tonnes
	Total phosphorus	6 tonnes
	TSS	1,730 tonnes

35 This table is an excerpt from Table 5.21 in the *Environment reference standard* (*Victoria Government Gazette*, No. S245, 26 May 2021)

Image: Seagulls flying over Lake Wellington, Gunaikurnai Country

Protecting water quality in waterways and bays

In Victoria, water quality in our waterways and bays is managed by councils, waterway managers and water corporations and regulated by the EPA. The Department of Health regulates agencies in the provision of safe drinking water, from catchment to tap, to protect water quality. Many environmental and community groups also help to improve water quality through monitoring, weed control, revegetation and litter collection.

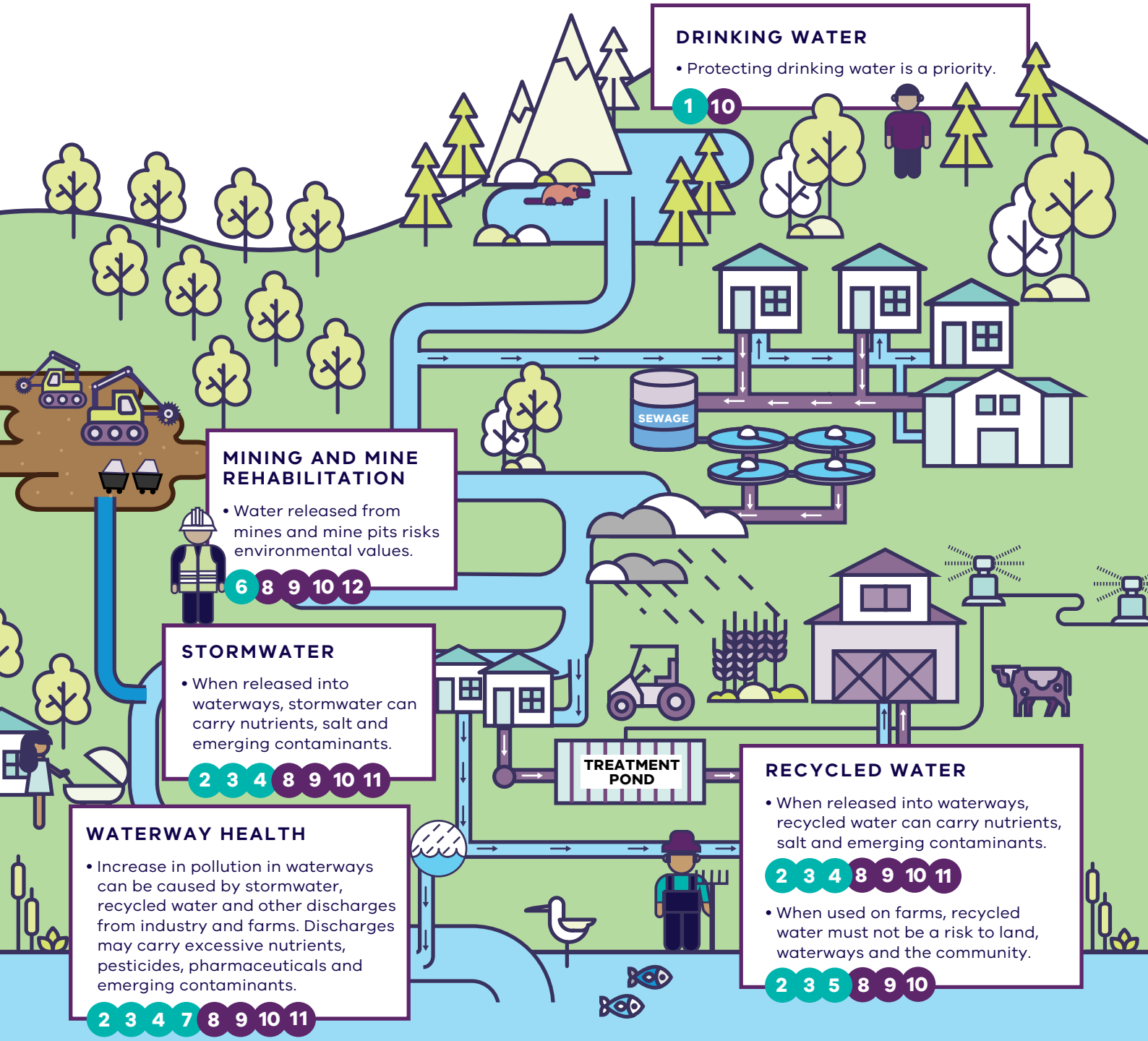
Protecting water quality helps to improve waterway health (reducing pollution and managing discharges into waterways) and minimising the impacts of recycled water on land and waterways (see **Figure 8.10**).

This Strategy contributes to protecting water quality by:

- recognising that safe and affordable drinking water is essential to the health and wellbeing of all Victorians. It acknowledges that climate change causes more frequent bushfires, floods, power outages and algal blooms, which can impact the quality and supply of our drinking water. Therefore, appropriate actions need to be taken to protect drinking water quality, from catchment to tap, and to protect public health
- committing to greater use of desalinated water, recycled water and stormwater to enable more water to be retained in rivers. This will reduce the amount and improve the quality of recycled water and stormwater discharges into waterways and supply fit-for-purpose water to ensure the available supply of potable water for drinking purposes (see **Policy 4-3**)
- returning a total of up to 99.5 gigalitres of water to the environment in major rivers in the region over the next 10 years, which will maintain flows under a drying climate (see **Section 8.1**, **Section 8.3**, **Section 8.4** and **Section 8.5**)
- continuing to develop and update Victoria's regulatory framework for recycled water use, including standards for water quality (see **Section 3.4**)
- continuing to invest in improvements to agricultural water-use efficiency and best-practice land and water management to reduce off-site effects of irrigation (see **Chapter 7**)

We will continue to work with agencies, the water sector and the community to build on the existing statutory frameworks, guidelines and legislation that aim to protect and improve water quality by:

- working with the EPA to develop guidelines for using recycled water for the environment, with the aim of improving the overall health of waterways (see **Action 8-22**)
- being guided by the Department of Health and the Safe Drinking Water Act and *Safe Drinking Water Regulations 2015* and supporting water agencies to meet their obligations around safe drinking water and safe and appropriate uses of recycled water
- better understanding the potential risks from emerging contaminants in recycled water and continuing to support the water sector and the EPA to progress a proportional, risk-based approach to managing emerging contaminants (see **Policy 3-5**, **Policy 3-6** and **Action 3-11**)
- continuing to participate and contribute to national water quality and waste management guidelines and processes.



WHAT THIS STRATEGY WILL DO

1. Recognise that safe and affordable drinking water is essential to health and wellbeing.
2. Greater use of desalinated water, recycled water and stormwater will enable more water to stay in rivers and apply standards for water treatment to ensure high-quality stormwater entering our waterways.
3. Continue to develop and update Victoria's regulatory framework for recycled water use, including release of recycled water into waterways.
4. Support the water sector and the EPA to progress a risk-based approach to managing emerging contaminants in recycled water.
5. Commit to upgrades to irrigation systems and provide education and support for farmers to manage water quality on farms.
6. Support the Latrobe Valley region water transition.
7. Review passing flow rules to support water quality for in-stream flows.

WHAT OTHERS DO

8. CMAs and water corporations manage waterway health.
9. Water industry-led investigations into emerging contaminants (EPA, DELWP).
10. Legislation, guidelines and standards for safe drinking water, waterway health and recycled water re-use (DH, EPA, CMAs and water corporations).
11. Land-use planning reforms supporting greater use of stormwater (DELWP, local government authorities, councils).
12. Legislation, regulations, guidelines and region-specific strategies (such as the Latrobe Valley Regional Rehabilitation Strategy (DJPR and DELWP 2020)) to ensure mining and mine rehabilitation are conducted in a safe and sustainable way to protect people, property, infrastructure and the environment (Earth Resources Regulation, DJPR).

Figure 8.10: How water quality community concerns are managed through the Strategy and other avenues

Image: Royal spoonbills and Cormorants perched on tree in Wangangarra / WyYung (Mitchell River), Gunaikurnai Country