

Seasonal Watering Plan 2019-20





Acknowledgement of Traditional Owners

The VEWH proudly acknowledges Victoria's Aboriginal communities and their rich culture and pays respect to their Elders past and present.

We acknowledge Aboriginal people as Australia's first peoples and as Traditional Owners and custodians of the land and water on which we rely. We recognise the intrinsic connection of Traditional Owners to Country, and we value their ongoing contribution to managing Victoria's landscapes. We also recognise and value the contribution of Aboriginal people and communities to Victorian life and how this enriches us.

The VEWH recognises the intersection between environmental flow objectives and outcomes for Traditional Owners and Aboriginal Victorians. We acknowledge the ongoing contribution that Aboriginal people are making to planning and managing water for the environment and the benefits that have resulted from these partnerships. The contribution of Traditional Owners to this year's seasonal watering plan is detailed in the regional introductions.

For tens of thousands of years, Aboriginal people have occupied Australia. There have been very different clan and Nation boundaries to those that exist today, often embodying deep cultural relationships with the land and waterways. In this seasonal watering plan, the VEWH has endeavoured, using the best-available information, to name the Traditional Owner groups and their Nations that lived in the area we now call Victoria, and who continue to maintain and enhance long-standing culture and tradition. We have also sought and, in some regions, have provided some background on local Aboriginal names for waterways.

We acknowledge that the Traditional Owner groups and their associations with particular areas are not definitive, and there may be multiple names for the waterways covered by the seasonal watering plan. The VEWH does not claim this information to be exact. We provide such information in the spirit of acknowledgement of Traditional Owners past and present and their long-standing connection to Country.

The VEWH embraces the spirit of reconciliation, working towards equity and an equal voice for Traditional Owners.





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Foreword

I'm pleased to introduce the Victorian Environmental Water Holder's (VEWH's) *Seasonal Watering Plan 2019–20*, which outlines the scope of where and when water for the environment may be delivered in the next 12 months.

The plan communicates how the VEWH and its program partners plan to use the water available for the environment to achieve positive ecological outcomes in a range of climate scenarios: from drought to dry and average to wet.

It has been eight years since the VEWH published its inaugural seasonal watering plan, and I noted then that our aim was to work closely with waterway managers and their partners to optimise environmental benefits.

This year's seasonal watering plan demonstrates how those relationships have strengthened. The watering actions in the plan are based on an ever-building bank of rigorous science, and also increasingly on targeted local knowledge gained from key stakeholder groups through the engagement networks of our catchment management authority and Melbourne Water partners.

This pairing of evidence-based decision-making and local experience in the Gippsland, central, western and northern regions aims to achieve the best possible outcomes with water for the environment.

Local knowledge together with river and wetland studies help show us where water for the environment should be prioritised and how it should be used in each waterway system, to get the best ecological benefits we can under prevailing conditions.

Tapping into local knowledge also helps us optimise shared benefits: 95 percent of us enjoy waterways for activities like camping, birdwatching, swimming, boating and fishing.

Increasingly, as our relationships with Traditional Owners build, water for the environment can also help deliver cultural outcomes.

When I welcomed the first VEWH seasonal watering plan in 2011–12, we had been experiencing rainfall and high-flow conditions in the previous 12 months. Now, some eight years on, it is a different climatic story, with the entire state experiencing extended dry conditions. Across Victoria, 2019 has commenced with a very dry autumn and warmer-than-average conditions. Overall, it was Victoria's warmest summer on record. This brings challenges to all water managers, farmers and communities and emphasises how important it is for water for the environment to be efficient, effective and adaptable.

Since its inception, the VEWH has carefully managed its Water Holdings in the Environmental Water Reserve, using the full suite of tools offered to us as an entitlement holder – including trade, carryover and investment – with the aim of optimising environmental outcomes for enduring benefit under all seasonal conditions. We are now able to demonstrate local outcomes from water for the environment.

We are evolving our decision-making about when to trade water, when to supplement watering with complementary actions and how to work with partners to optimise the efficiency of water for the environment within an integrated catchment management framework.

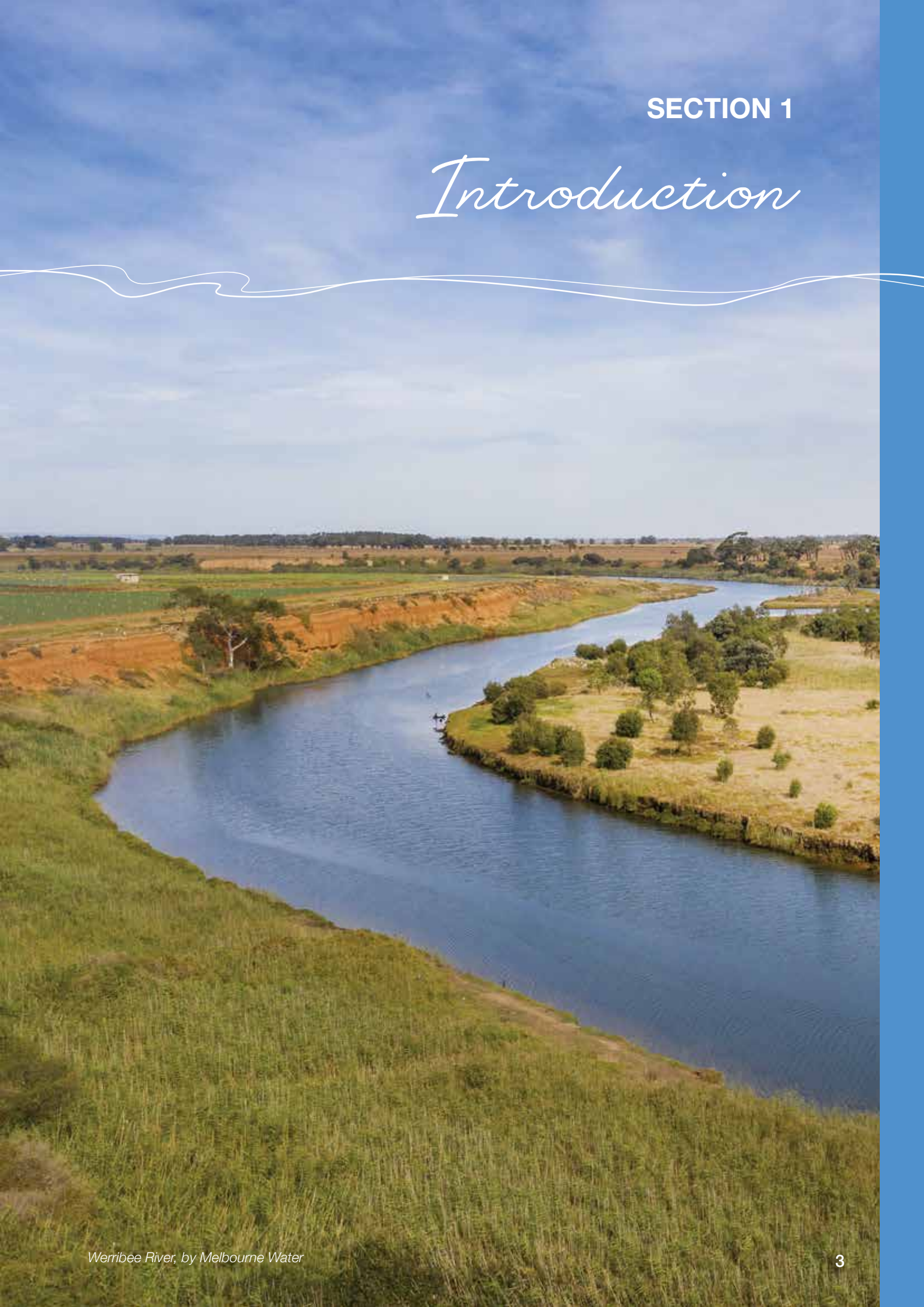
Water for the environment provides significant benefits for Victorian communities and is an integral part of protecting and improving the health of waterways.



Denis Flett
Chairperson, Victorian Environmental Water Holder

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Introduction



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1.1 The Victorian environmental watering program

The Victorian environmental watering program is the ongoing collaborative management of water for the environment used to improve the health of Victoria's rivers and wetlands and the native plants and animals that depend on them.

This seasonal watering plan previews all the potential watering actions that may be delivered across Victoria in 2019–20.

In this section ...

- **Why do we need an environmental watering program?**
- **What do we aim to achieve with water for the environment?**
- **Who is involved in the Victorian environmental watering program?**
- **What is the role of the Victorian Environmental Water Holder?**
- **How does the Victorian environmental watering program fit within broader integrated catchment and waterway management?**
- **How does the environmental watering program consider climate change?**
- **How do we know the environmental watering program is successful?**
- **Where can I find more information about the Victorian environmental watering program?**

the overall productivity of waterways. Our waterways still support a range of native species, but the total abundance of native plants and animals has substantially declined and the aesthetic value and ecosystem services those waterways provide have diminished.

Healthy waterways are essential for the plants and animals that live in them and for the people and industries that rely on clean water and the ecosystem services that waterways provide. Many rivers and wetlands with altered water regimes cannot survive without help. It is necessary to actively manage how water flows through them, to protect their health and support the plants that grow in them and the native animals that live, feed and breed in them.

Water that is managed to improve water regimes to achieve specific environmental outcomes is called 'water for the environment', 'environmental flows' or 'environmental water'. Water for the environment is set aside in storages and released into rivers and wetlands.

The Victorian environmental watering program seeks to collaboratively manage environmental flows to improve the health of river and wetland systems including their biodiversity, ecological function, water quality and other uses that depend on environmental condition.

By improving the health of rivers, wetlands and floodplains, environmental flows also provide benefits to communities.

Healthy rivers and wetlands support vibrant and healthy communities. They sustain people by supplying water for towns, farms and businesses. They also contribute to local agriculture, fishing, real estate, recreation and tourism activity.

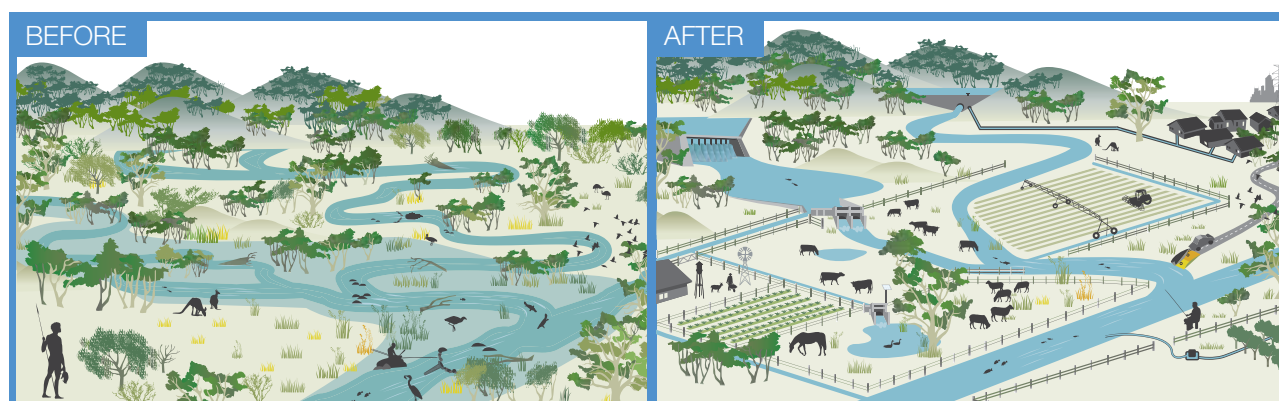
Healthy rivers and wetlands make cities and towns more liveable and support the physical and mental wellbeing of communities. Most of Victoria's towns are located near a river or lake that the community identify with, and many people travel to their favourite waterways for holidays and to pursue recreational activities. Rivers and wetlands provide places for people to play, relax and connect with nature, and they sustain healthy Country for Aboriginal communities.

1.1.1 Why do we need an environmental watering program?

As Victoria's population has grown, many of its rivers and wetlands have been significantly modified through the construction of dams, weirs and channels to provide water for communities to grow and thrive. In some rivers, up to half of the water that would have naturally flowed in them is removed each year to provide water for homes, farms and industry. As a result, these waterways are not able to function as they would naturally.

Reduced river flows and less frequent wetland inundation have disrupted breeding cycles for native fish, frogs, waterbirds, platypus and other animals; restricted the growth and recruitment of native plants; and reduced

Figure 1.1.1. A typical Victorian river catchment before and after the development of dams, weirs and channels



Before and after the development of dams, weirs and channels

Many of Victoria's rivers and wetlands have been highly modified compared to how they were managed by Traditional Owners for tens of thousands of years. Water now flows very differently through the landscape – it is captured in dams and weirs, diverted by pipelines, pumps, drains, levees and constructed channels to support towns, cities, industry and farming.

Some of our rivers give up more than a third, and sometimes half, of their water for farms, homes and businesses. Instead of flowing naturally, with high flows in winter and low flows in the hotter summer months, many rivers now run higher when water needs to be delivered for farming and urban use.

Such significant changes have affected water quality and interrupted many of the natural river and wetland processes native plants and animals need to survive, feed and breed. Water for the environment is now needed to help mitigate some of these impacts.

1.1.2 What do we aim to achieve with water for the environment?

Water for the environment is released into rivers to mimic some of the flows that would have occurred naturally, before the construction of dams, weirs and channels. This is vital for maintaining the physical, chemical and biological health of rivers.

Managers of environmental flows generally focus on returning some of the small- and medium-sized river flows that are essential in the life cycles of native plants and animals. These flows can move sediment and nutrients through river systems, connect habitats and improve water quality.

The timing, duration and volume of water delivery is designed to support the plants and animals that rely on those flows. For example, fish such as the Australian grayling rely on an increase in river flow in autumn to signal them to migrate downstream for spawning (when fish release eggs). Breeding waterbirds require wetlands to retain water for long enough to allow their chicks to grow and fledge, and floodplain forests require inundation every few years to ensure the survival and recruitment of iconic tree species such as river red gums and black box.

Many wetlands are now either disconnected from the rivers that used to naturally fill them or are permanently connected to rivers or channels. This means that some wetlands do not get enough water, and others get too much.

In wetlands, managers of environmental flows focus on providing the wetting and drying cycles that plants and animals depend on for survival, reproduction and long-term resilience. For example, where wetlands and floodplains have been cut off from natural river flows, environmental watering can reconnect these areas, sometimes via irrigation infrastructure (such as pumps, channels and regulators).

1.1.3 Who is involved in the Victorian environmental watering program?

The Victorian environmental watering program involves a range of groups and organisations. Relationships between local communities, waterway managers, storage managers, land managers, environmental water holders and scientists are the foundation of the program. The program is overseen by the Victorian Minister for Water through the Department of Environment, Land, Water and Planning (DELWP).

Many public authorities collaborate to deliver the program. These authorities are referred to as program partners. Waterway managers (catchment management authorities [CMAs] and Melbourne Water) are the regional planning and delivery arm of the program. In consultation with local communities, waterway managers develop proposals for environmental watering in rivers and wetlands in their region. Waterway managers also order water for the environment from storage managers and monitor the outcomes.

Storage managers (designated water corporations) deliver water for all water users including waterway managers and environmental water holders.

The VEWH makes decisions about where available water for the environment is used, carried over or traded, to get maximum benefit for the state's waterways. In northern Victoria, the VEWH also works with the Commonwealth Environmental Water Office, the Murray-Darling Basin Authority (MDBA) and with the New South Wales and South Australian governments to prioritise how and where water is used and to ensure use of water for the environment is coordinated to optimise the health of the connected waterways of the Murray-Darling Basin.

Public land managers (such as Parks Victoria, DELWP and Traditional Owner land management boards) are closely involved in planning and delivering water for the environment on public land (such as state forests and national parks). Their responsibilities include controlling infrastructure (such as pumps, outlets, gates and channels) and public signage. Some environmental watering also occurs on private land, in partnership with landholders or corporations.

To effectively manage water for the environment, it is important to understand the environmental values of Victoria's rivers and wetlands. This understanding draws on the knowledge of local communities and scientists.

Local communities, including Traditional Owners, help identify the important environmental values in each region and help monitor the success of environmental watering. Local communities are often actively interacting with local rivers and wetlands and bring important cultural, economic, recreational, social and Traditional Owner perspectives to the program.

Scientists provide indispensable advice about how water for the environment will support native plants and animals in the short and long term and work with waterway managers to monitor, evaluate and report on the outcomes of environmental watering.

Citizen scientists are increasingly monitoring the outcomes of environmental watering. In some regions, Birdlife Australia volunteers help monitor environmental watering outcomes at wetlands, and Waterwatch volunteers collect water quality information to inform management decisions for some rivers.

Traditional Owners' connection to Country is central to their sense of identity and cultural continuity. Victoria's waterways are an important part of Country and have been managed successfully by Traditional Owners for thousands of years. We are now increasingly looking to incorporate Traditional Owners' knowledge in how we manage our waterways. For instance, in the western region, Budj Bim and Barengi Gadjin Land Council Aboriginal Corporation rangers are monitoring environmental watering outcomes including the presence of platypus, in the Glenelg River. In the north, Barapa Barapa Traditional Owners are monitoring environmental watering outcomes in Gunbower Forest.

How are Traditional Owners engaged in the environmental watering program?

Traditional Owners and their Nations in Victoria have a deep and enduring connection to Victoria's rivers, wetlands and floodplains, spanning tens of thousands of years. The VEWH and its environmental watering program partners recognise the intersection between environmental flow objectives and Aboriginal environmental outcomes and acknowledge the benefit of genuine, enduring partnerships with Aboriginal people in planning and managing water for the environment.

In many regions of Victoria, Traditional Owner Nations have strong relationships with environmental watering program partners, and they are working to better realise Aboriginal Victorians' aspirations and incorporate Traditional Owners and their objectives and knowledge into environmental flows management. These initiatives and ongoing contributions to the program are highlighted in the regional overviews in this seasonal watering plan.

A small number of potential watering actions have been identified in seasonal watering proposals as involving Traditional Owners in both the planning and potential delivery of the watering action. This objective has been recognised for those watering actions with the following icon:



Watering is planned to be delivered in partnership with Traditional Owners and achieve Aboriginal environmental outcomes

This is the first year that the VEWH has identified watering objectives in this way, and it expects to refine this approach in future years to better capture the environmental watering partnerships of Traditional Owners and environmental watering program partners.

There are certainly more opportunities for the VEWH and its partners to develop enduring partnerships with Traditional Owners who want to participate in the management of water for the environment. The VEWH and its program partners will continue to look for these opportunities and endeavour to develop enduring partnerships with Traditional Owner Nations. The VEWH is funding some projects to help waterway managers and Traditional Owners identify opportunities to better align environmental watering objectives and actions with Aboriginal objectives and to participate in managing water for the environment.

1.1.4 What is the role of the Victorian Environmental Water Holder?

The VEWH is a statutory authority, established by the Victorian Government in 2011. It is responsible for managing Victoria's water for the environment. Set up under the *Water Act 1989*, the VEWH manages environmental entitlements — a legal right to access a share of water available at a location — to improve the environmental values and health of Victoria's rivers, wetlands and floodplains, and the plants and animals that rely on them.

The role of the VEWH is to:

- make decisions about the most effective use of the environmental entitlements including for use, carryover and trade (see subsection 1.4.2)
- commit water and authorise waterway managers to implement watering decisions (see subsection 1.3.2)
- work with storage managers, waterway managers and other environmental water holders to coordinate and optimise environmental outcomes from the delivery of all water (see section 1.4)
- commission targeted projects to demonstrate the ecological outcomes of environmental flows at key sites and to help improve the management of water for the environment
- publicly communicate environmental watering decisions and outcomes
- invest in complementary works and measures, knowledge, monitoring, research and other priority activities in collaboration with DELWP where it improves the ability to manage water for the environment and the performance of the environmental watering program.

The VEWH consists of four part-time commissioners, supported by a small team.

The commissioners in place at the time this seasonal watering plan was published are Denis Flett (Chairperson), Geoff Hocking (Deputy Chairperson), Chris Chesterfield (Commissioner) and Rueben Berg (Commissioner). Commissioners are appointed by the Governor in Council on the recommendation of the Minister for Water.

1.1.5 How does the Victorian environmental watering program fit within broader integrated catchment and waterway management?

The environmental watering program fits within broader Victorian Government policies for integrated catchment management: it is a holistic way of managing land, water and biodiversity from the top to the bottom of our catchments. The Victorian environmental watering program forms part of the Victorian Government's record investment of \$222 million over four years to improve the health of our waterways and catchments.

Key policy documents influencing the VEWH from a Victorian context include *Water for Victoria*, the *Victorian Waterway Management Strategy* and regional sustainable water strategies. Regional waterway strategies also determine priority waterways, in consultation with local communities, and outline integrated waterway management actions.

Water for Victoria is a plan for a future with less water as Victoria responds to the impact of climate change and a growing population. The actions in the plan support a healthy environment, a prosperous economy with growing agricultural production and thriving communities. Implementing the actions in the plan will improve the operation of the water and catchment management sector including the VEWH. *Water for Victoria* recognises that protecting and improving waterway health is a long-term commitment needing coordinated action. The full benefits of strategic, long-term investments in waterway health may not be realised for 30 years or more. *Water for Victoria* identifies 36 priority waterways for large-scale projects over this timeframe and environmental flows are planned for many of these waterways in this seasonal watering plan.

Complementary catchment management activities are often needed to achieve environmental watering outcomes. These include invasive species control, riparian (streamside) land management, sustainable agriculture, sustainable land use planning and development, integrated urban water management and other waterway management activities (such as providing fish passage and improved in-stream habitat, for example through large woody habitat). A lack of fish passage due to dams and weirs continues to be a problem in some Victorian rivers where environmental flows aim to increase the breeding success and recruitment of native fish. Figure 1.1.2 shows examples of complementary waterway management activities in Victorian waterways that receive water for the environment.

In most systems, environmental flows are delivered using existing infrastructure (such as dam outlet gates and water supply channels) built for and still used for the supply of water for agriculture, industry and communities. Permanent and temporary pumps are sometimes also used to deliver water for the environment to wetlands. Capacity limits with these types of infrastructure and the need to avoid flooding private land restrict the size and timing of deliveries of water for the environment. In some systems, these limitations mean only a fraction of the required environmental flows can be delivered to waterways, which significantly reduces the environmental outcomes that can be achieved.

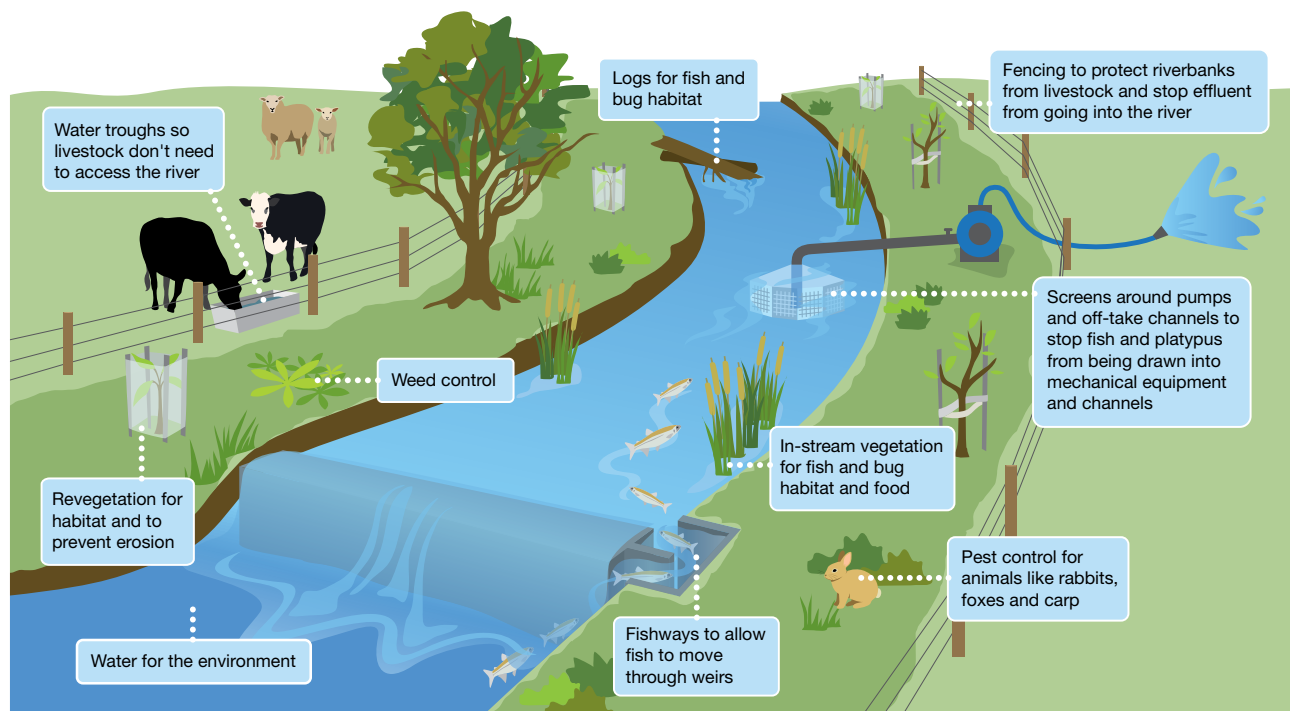
Victoria's environmental watering program is integral to the success of the following three strategies and plans.

Our Catchments, Our Communities is Victoria's first statewide strategy for integrated catchment management. Its aims are more effective community engagement, better connections between different levels of planning and stronger regional catchment strategies. The strategy also aims to clarify roles, strengthen accountabilities and coordination and improve monitoring, evaluation and reporting. Under this strategy, CMAs will lead 10 new integrated catchment management projects across the state, in collaboration with catchment management partners. The Caring for Campaspe and Living Moorabool projects are two which involve environmental watering actions.

Protecting Victoria's Environment – Biodiversity 2037 aims to ensure Victoria has a modern and effective approach to protecting and managing Victoria's biodiversity. Providing water for the environment is essential to supporting Victoria's biodiversity. The plan will be implemented together with the outcomes of reviews of the *Flora and Fauna Guarantee Act 1988* and Victoria's native vegetation clearing regulations.

The *Basin Plan 2012* for the Murray-Darling Basin is another key reform influencing the VEWH's operations, particularly its planning and reporting framework in northern and western Victorian systems which form part of the basin. The VEWH continues to work closely with the Victorian Government and other agencies to implement the Basin Plan.

Figure 1.1.2 Examples of complementary management actions



1.1.6 How does the environmental watering program consider climate change?

Victoria's climate has seen a drying and warming trend over the last two decades, and it is predicted this trend will continue in the future. Climate modelling¹ indicates there will be more extreme events including droughts, floods and heatwaves, and there are expected to be more bushfires. Seasonal shifts in rainfall are expected to continue, with proportionally less rain in the cooler months. Average streamflow is predicted to decline across all parts of Victoria, with some of the greatest declines expected in the south-west and parts of the central and northern regions, as Figure 1.1.3 shows. These predicted changes have significant implications for waterway health, through reduced availability of water for the environment, increased water quality and algal bloom risks. There will also be impacts on the plants and animals that live in and around waterways and rely on well-established flow patterns for successful feeding, breeding and movement through the landscape.

Action 3.5 of *Water for Victoria* focuses on improving the management of environmental flows in a changing climate. It states the Victorian Government's commitment to continue to invest in environmental works and measures for priority environmental watering sites, which will allow better use of the VEWH's existing water. In some instances, the VEWH may be able to opportunistically complement this investment using water-trade revenue, where this optimises environmental outcomes. Action 3.5 also reaffirms commitments to recover water for the environment in the Thomson, Barwon, Moorabool, Werribee and Maribyrnong systems. As these commitments are delivered and resulting environmental entitlements created, this water will be managed by the VEWH and its partners to optimise future environmental outcomes in the face of climate change.

The VEWH and its program partners are addressing the challenges of climate change in the following ways.

¹ Timbal, B. et al. (2016) *Climate change science and Victoria. Victoria Climate Change Initiative (VicCI) report. Bureau of Meteorology, Australia. Bureau Research Report 14, pp 94.*

Setting environmental watering objectives that describe the environmental outcomes that can be achieved under future climatic conditions

Environmental flow studies and environmental water management plans are revised periodically to update environmental watering objectives and their required water regimes. These reviews specifically consider how climate change will affect current environmental values and the types of outcomes that can be achieved in the future. Waterway managers also alter environmental watering objectives for individual systems to include the latest scientific information as it becomes available. The seasonal watering plan presents the most up-to-date environmental watering objectives and the watering actions required to achieve them.

Strengthening decisions about where and how water for the environment is used

During prolonged dry periods (which are more likely in the future), there is not enough water available to meet the needs of all waterways. Rigorous decisions need to be made about where and how to use the available water to optimise environmental outcomes for enduring benefit. Most high-priority environmental watering objectives rely on ecosystem processes that operate beyond individual rivers or wetlands. Therefore, in prioritising sites for environmental watering, decisions are increasingly considering the combination of waterways that need to be watered, to optimise outcomes. Portfolios of waterways are being managed in a coordinated way to support high-value species as well as critical ecosystem services.

For example, coordinated releases from Hume Reservoir, the Goulburn River and Campaspe River have been used to trigger the movement of young golden perch and silver perch throughout northern Victorian waterways. The VEWH and its program partners are also working together to identify the most important refuge habitats to water during critically dry periods.

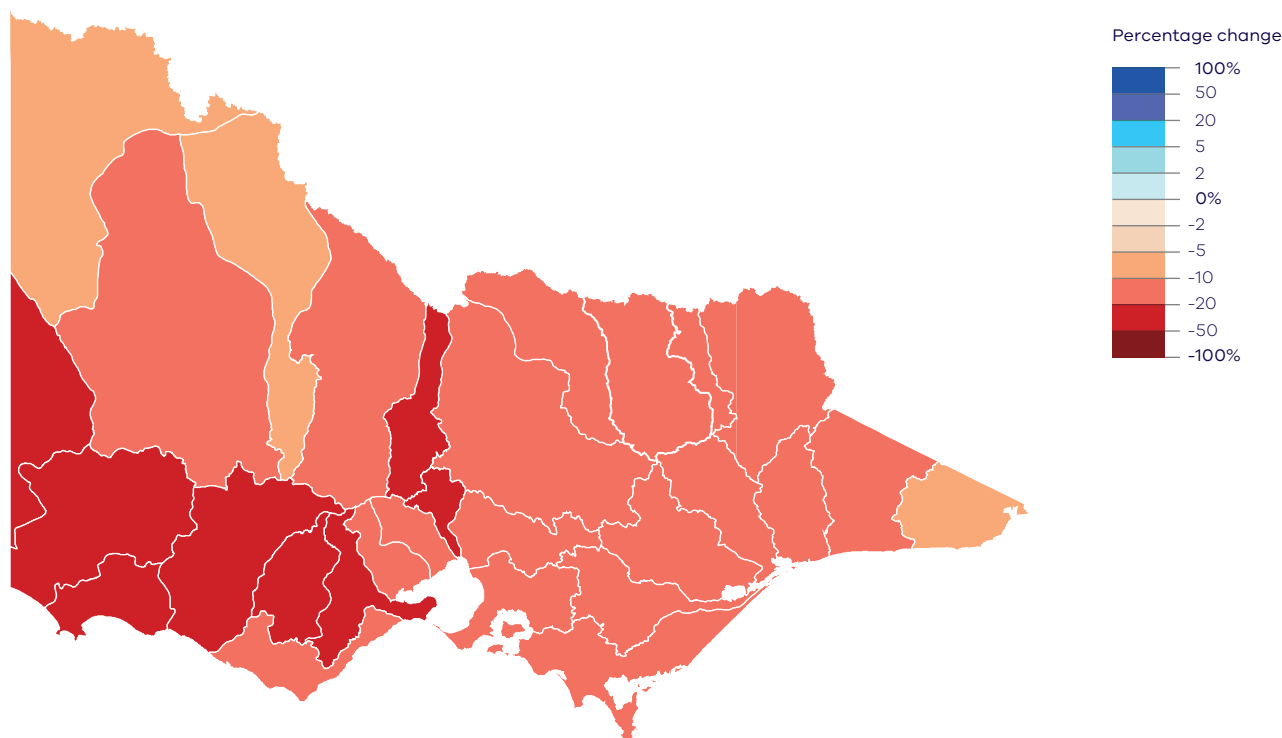
Optimising environmental outcomes of operational water

The VEWH is working closely with storage managers and river operators to identify how operational water can be delivered in ways that meet customer needs and contribute to environmental outcomes. This also helps river operators meet their environmental obligations.

Planning for a range of climatic scenarios each year

Watering requirements can vary considerably between wet and dry years. In drought and dry conditions, the focus is on preventing catastrophic losses and maintaining critical refuge habitats to prevent significant declines of native populations. In wet conditions, the aim shifts to boosting ecological productivity and environmental condition and to increasing populations of native plants and animals. Climatic conditions can change quickly within a year, and the VEWH and its program partners need to be able to respond accordingly. The seasonal watering plan identifies potential watering actions that may be delivered to each system under different climatic scenarios: this is explained in more detail in subsection 1.3.4.

Figure 1.1.3 Projected changes in run-off for 2065 under medium climate change



Source: *Water for Victoria*, 2016

1.1.7 How do we know the environmental watering program is successful?

Effective monitoring is essential for the continued improvement of the environmental watering program. It provides information that can be shared with all stakeholders to demonstrate the outcomes of watering actions, and it identifies what is needed to improve the effectiveness of future watering actions.

The effect of water for the environment in Victoria is directly assessed through large-scale monitoring programs, which measure multiple indicators at multiple sites over multiple years. There are also discrete investigations that examine responses at a single wetland or river reach.

DELWP funds two programs that monitor environmental watering outcomes at a statewide scale. The Victorian Environmental Flows Monitoring Assessment Program (VEFMAP) investigates the effect that environmental flows in Victorian rivers have on native fish and on aquatic and riparian vegetation. The Wetland Monitoring Assessment Program (WetMAP) examines the effect that water for the environment has on native vegetation, waterbirds, fish and frogs in wetlands.

Selected Victorian waterways are monitored as part of three Murray-Darling Basin environmental water monitoring programs. The MDBA funds environmental condition and intervention monitoring activities at Barmah Forest, Gunbower Forest, Hattah Lakes and the Lindsay, Mulcra and Wallpolla islands as part of the Living Murray program. Annual condition report cards that are produced for each site demonstrate the effect of more than a decade of environmental watering at these important icon sites. The Commonwealth Environmental Water Holder (CEWH) funds fish, vegetation, stream metabolism and bank erosion monitoring in the lower Goulburn River as part of its basin-wide Long-term Intervention Monitoring program. The Australian Government along with key research organisations and jurisdictional agencies funds the Environmental Water Knowledge and Research program, which investigates four themes — vegetation, fish, waterbirds and foodwebs — to improve the science that supports the management of water for the environment in the Murray-Darling Basin.

The VEWH funds waterway managers to conduct discrete, short-term investigations at individual river reaches or wetlands. These investigations have a primary focus on learning and adaptive management.

A secondary focus of the VEWH's monitoring investment is communications, engagement and reporting to the community. To achieve this, the VEWH helps community groups, citizen scientists and Traditional Owners to observe and report the outcomes of the environmental watering program.

The VEWH and its program partners regularly liaise with the scientists who are monitoring responses on-the-ground and with the organisations responsible for overseeing the larger-scale monitoring programs to ensure that the most up-to-date information is used to inform environmental watering decisions. The VEWH also reports some of the available monitoring results in its annual Reflections report, to increase awareness about environmental watering outcomes among all stakeholders and the community.

1.1.8 Where can I find more information about the Victorian environmental watering program?

There is more information about the program on the VEWH website at vewh.vic.gov.au or from the VEWH on (03) 9637 8951 or by email to general.enquiries@vewh.vic.gov.au.

You can get more detailed information about water for the environment in your region by contacting your local waterway manager using the contact details in section 6.3.

Water for the environment fact sheets

The VEWH's fact sheets answer questions about water for the environment. They are:

- What is environmental water?
- Why is environmental watering important?
- What does environmental watering aim to achieve?
- What does environmental watering involve?
- How do we know if environmental watering is successful?
- What is environmental water trading?

The fact sheets are on the VEWH website, or you can get hard copies by emailing general.enquiries@vewh.vic.gov.au.

1.2 The seasonal watering plan

The seasonal watering plan is a statewide plan that guides environmental watering decisions in Victoria. It provides program partners, stakeholders and communities with a sense of what to expect during the water year.

In this section ...

- **What does ‘seasonal’ mean?**
- **How does the seasonal watering plan fit into the environmental flows planning process?**
- **Who contributes to the seasonal watering plan?**
- **Can the seasonal watering plan be changed?**
- **When isn’t a formal variation required to the seasonal watering plan?**

The plan previews all the potential watering actions that could be implemented using water available under all environmental water entitlements held in Victoria. This includes water available under the VEWH’s environmental water entitlements and water held by other environmental water holders for use in Victoria (see subsection 1.4.1).

The plan for the upcoming water year is released by 30 June each year. The 2019–20 plan and any variations are valid for this water year (1 July 2019 to 30 June 2020) or until the subsequent seasonal watering plan is released.

1.2.1 What does ‘seasonal’ mean?

‘Seasonal’ refers to the variability of climatic conditions in a given year. It includes normal differences between summer, autumn, winter and spring as well as an assessment of whether a year is drier or wetter than average. Environmental watering objectives and water availability may differ depending on seasonal conditions, so it is important that planning for water for the environment considers the range of potential seasonal conditions or water availability scenarios that may unfold, ranging from drought to very wet. This scenario planning provides a guide for the VEWH and waterway managers throughout the year when it comes to deciding what environmental flows to go ahead with. There is more information about how seasonal conditions influence environmental flows planning in subsection 1.3.4.

For each river and wetland system, the potential environmental flows under each seasonal condition or water availability scenario is explained under ‘Scenario planning’ in the relevant section.

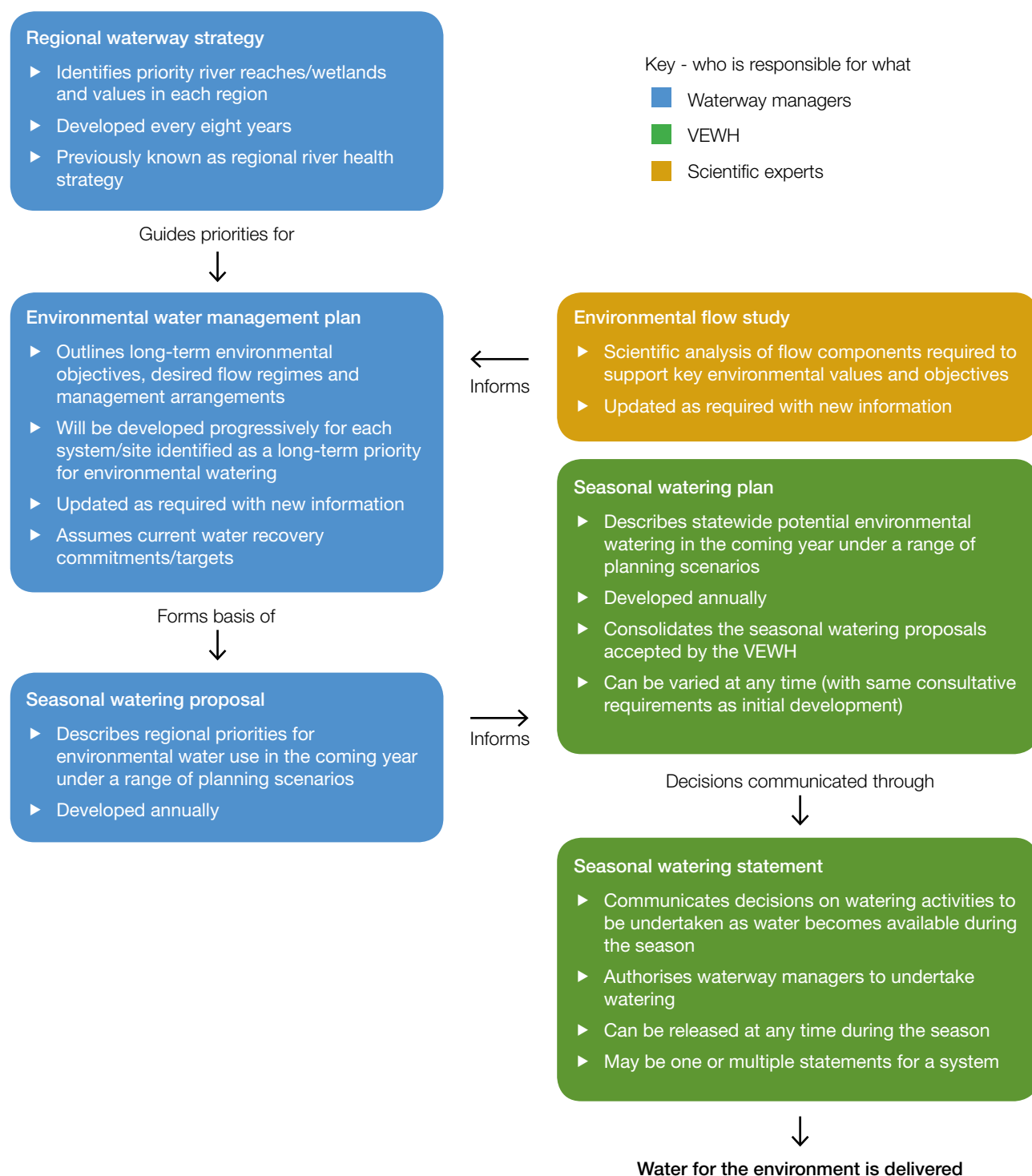
1.2.2 How does the seasonal watering plan fit into the environmental flows planning process?

Each year, waterway managers scope the potential environmental watering actions for their regions for the coming year in seasonal watering proposals. The proposals draw on environmental flow studies and on longer-term plans (such as environmental water management plans, regional waterway strategies and regional catchment strategies). Environmental flow studies and environmental water management plans for Victorian waterways are available on the VEWH’s website at vewh.vic.gov.au. Waterway strategies and regional catchment strategies are published on the relevant waterway manager websites. The seasonal watering proposals incorporate information and advice from local communities including Traditional Owners.

The VEWH reviews the proposed watering actions in each seasonal watering proposal and works with waterway managers to identify the potential watering actions for each region and across the state. This seasonal watering plan is a collated summary of the agreed actions from all the seasonal watering proposals.

The different stages of environmental flows planning – including the different strategies and plans, are shown in Figure 1.2.1. There is more information about each of these strategies and plans at vewh.vic.gov.au.

Figure 1.2.1 Victorian environmental watering program planning framework



1.2.3 Who contributes to the seasonal watering plan?

Stakeholder engagement on potential environmental watering actions occurs during the development of seasonal watering proposals. The level and method of engagement varies across the state, reflecting the differing systems, watering actions and stakeholders. In some regions, formal environmental watering advisory groups provide the opportunity for waterway managers and interested community members to discuss potential environmental flows in their system or locality for the coming year. In other systems, engagement occurs one-on-one between waterway managers and interested stakeholders. The most interested stakeholders tend to be Traditional Owners, irrigators, farmers, members of the community living close to or with an interest in a specific waterway, members of recreational groups and members of local environmental groups.

Land managers and storage managers also consider and endorse, or provide their written support for the seasonal watering proposals – ensuring planned watering aligns with land and storage management objectives, can feasibly be delivered through planned system operations, and risks can be adequately managed.

For each region, there is a summary of the engagement activities waterway managers undertook when developing seasonal watering proposals (see regional overviews in sections 2 to 5).

1.2.4 Can the seasonal watering plan be changed?

Under the Victorian *Water Act 1989*, the VEWH can only authorise use of water for the environment where it is consistent with a seasonal watering plan. This is to ensure transparency about what environmental flows are planned and how they are managed.

To ensure flexibility to adapt to changing conditions, the Act allows the VEWH to vary any section of a seasonal watering plan. Variations may be needed to incorporate new knowledge or to address circumstances that were not identified before the start of the water year.

The VEWH makes all variations publicly available at vewh.vic.gov.au as separate attachments to the original seasonal watering plan. You can email general.enquiries@vewh.vic.gov.au for a hard copy.

1.2.5 When isn't a formal variation required to the seasonal watering plan?

In some instances, there may be unforeseen circumstances that will call for use of water for the environment that does not require a variation to the seasonal watering plan. These include:

- minor operational adjustments to specific environmental watering actions
- water for the environment being used for environmental emergency management situations

- small volumes of water for the environment being used for technical investigations or infrastructure maintenance
- facilitating the delivery of water for the environment held by other water holders for downstream non-Victorian objectives.

As the VEWH cannot anticipate the specifics of these circumstances, it cannot include further details about them in this plan. Waterway managers are required to consult the VEWH in all instances where releases of water for the environment do not align with the seasonal watering plan.

Minor operational adjustments

Minor operational adjustments to environmental watering actions may occur from time to time. For example, the targeted river reaches, flow rates, timing, magnitude and durations detailed in sections 2 to 5 may need to be adjusted slightly due to changes in predicted rainfall or other water orders, delivery infrastructure constraints, emerging ecological knowledge or the timing of specific ecological triggers (such as a bird-breeding event). In all cases, environmental watering actions will still aim to optimise the environmental outcomes achieved, in line with the objectives set out in the seasonal watering plan.

Environmental emergency management situations

Water for the environment may be needed for an environmental emergency management situation. This may include reducing the impact of natural blackwater or bushfire events, preventing fish deaths or mitigating the effects of blue-green algae blooms. It could also include smoothing the transition to or from a high-natural-flow event (for example, supplementing natural flows with water for the environment to provide a more gradual rise and fall, to minimise the threat of riverbanks slumping).

Small technical investigations and maintenance

There may be instances where a small volume of water for the environment may be used for research and development purposes, or for small-scale infrastructure testing or maintenance. Such instances are considered on a case-by-case basis and must aim to enhance knowledge and improve the management of water for the environment. They must not compromise the potential to achieve the environmental objectives in the seasonal watering plan.

Facilitating the delivery of water held by other water holders for downstream objectives

Some water held by other water holders is stored in Victorian storages and is sometimes called on to meet downstream demands beyond the scope of this plan (such as for the Coorong, Lower Lakes and Murray Mouth area in SA). Delivery of this water is sometimes needed at a time and flow rate that was not scoped in the seasonal watering plan. The VEWH facilitates and authorises such deliveries, provided the risk of adverse impacts on Victoria's rivers, wetlands and floodplains and other risks are appropriately managed.

1.3 Implementing the seasonal watering plan

The seasonal watering plan scopes potential environmental watering for the coming year, but many factors influence decisions about what water for the environment is committed and delivered.

In this section ...

- **How are watering decisions made throughout the year?**
- **When does the Victorian Environmental Water Holder commit and authorise use of water for the environment?**
- **How does the Victorian Environmental Water Holder prioritise different watering actions when there is not enough water for the environment available?**
- **Do seasonal conditions affect how water for the environment is used?**
- **How are shared cultural, economic, recreational, social and Traditional Owner benefits considered in environmental watering decisions?**
- **How are risks managed?**

Some factors that influence decisions about committing and delivering water for the environment are:

- seasonal conditions, weather forecasts and catchment conditions
- river and system operations (such as unregulated flows, catchment inflows, storage levels, other water users' needs and potential delivery constraints)
- ecological or biological factors and triggers (such as plant and animal responses to natural flows or temperature)
- water availability
- risks associated with an environmental watering action
- the opportunity to deliver shared benefits.

It is important there is flexibility to respond to these different factors, as they can significantly influence the environmental outcomes and shared benefits that can be achieved.

1.3.1 How are watering decisions made throughout the year?

As the season unfolds, many of the uncertainties associated with seasonal conditions, water availability and operational context become clearer and this clarity informs decisions about what environmental flows should proceed. Many on-ground factors do not become clear until very close to the anticipated time of delivering the water.

To guide environmental watering decisions, a flexible and adaptive approach is adopted that involves relevant stakeholders. This process of review and adjustment ensures that water for the environment is used in an efficient and seasonally appropriate manner to optimise ecological outcomes across the state.

Waterway managers, storage managers and land managers provide advice about which watering actions are needed and can be delivered in each region during the year. Environmental water holders use that information to decide which watering actions to authorise. All program partners have a role in identifying potential watering actions and enabling the delivery of water for the environment (as explained in subsection 1.3.3).

If planned watering actions need to be significantly changed during the season to respond to unforeseen circumstances, further scientific or community input may be sought to inform decision-makers.

The VEWH regularly publishes updated information about current and anticipated environmental watering actions on its website at vewh.vic.gov.au.

1.3.2 When does the Victorian Environmental Water Holder commit and authorise use of water for the environment?

The VEWH aims to commit as much water as is sensibly possible, as early as possible, to provide waterway managers with certainty to proceed with the planned environmental watering actions.

The VEWH (like other environmental water holders) can commit its water at any point before or during the water year. The VEWH commits water via seasonal watering statements, which authorise waterway managers to use water for the environment. The VEWH publishes seasonal watering statements on its website at vewh.vic.gov.au.

The VEWH can make a seasonal watering statement at any time of the year. Depending on the nature of the system and the entitlement being used, it may make one or multiple statements for a system during the water year. Before issuing a seasonal watering statement, the VEWH must be sure the required delivery arrangements (including any risk management measures) are in place and any costs it must meet are acceptable.

Where many environmental watering actions across different systems require access to the same environmental or bulk entitlement, decisions to commit water may require more thorough consideration. This may require prioritisation of one river or wetland over another, or prioritisation of one flow component over another. Subsection 1.3.3 has further information about how these decisions are made.

In some instances, the VEWH may commit water very close to the anticipated delivery time. This may be necessary because the water demand arises at short notice due to environmental, operational or weather conditions. For example, a colonial waterbird nesting event in Barnah Forest may trigger a need for water for the environment to maintain shallow flooding long enough for the birds to fledge.

There may also be instances where planned environmental flows are not delivered to a site. For example, an ecological trigger or seasonal conditions could nullify the potential benefit of the planned delivery, or a lack of catchment inflows may mean there is not enough water for the planned watering action.

The CEWH and the Southern Connected Basin Environmental Watering Committee (for the Living Murray program) commit water for use in Victoria with similar logic to that outlined above. The VEWH then formally authorises the use of that water through seasonal watering statements.

Can environmental water holders and waterway managers change their minds after a seasonal watering statement has been issued?

The VEWH may withdraw a seasonal watering statement at any point during the year, in consultation with the waterway manager and storage manager for that river or wetland system. It might do so, for example, to address emerging risks or changes in operating conditions or water availability.

Similarly, a waterway manager or storage manager may decide, in consultation with the VEWH, not to proceed with an environmental watering action after a seasonal watering statement has been issued. This could be due to environmental triggers indicating the water was no longer required, resourcing constraints or new information that the potential environmental or public risk of watering is too high.

1.3.3 How does the Victorian Environmental Water Holder prioritise different watering actions when there is not enough water for the environment available?

The VEWH works with its program partners to make decisions about where its available water and funds for the environment are used, carried over or traded to get maximum benefit for the state's waterways — our rivers, wetlands, estuaries and floodplains — and the wildlife that depend on them.

In implementing this program, it is important to recognise the dynamic nature of the environmental watering program. Seasonal conditions can vary considerably between years, which affects both the requirements of particular sites for

water for the environment (the demand) and the availability of water for the environment (the supply).

A shortfall in supply might arise because of:

- significant, high-value demands for water for the environment
- drought or low water availability.

To meet a shortfall, the VEWH may look to use tools such as carryover and trade (as explained in subsection 1.4.2). If there is still a shortfall of water, the VEWH, in collaboration with waterway managers and other water holders if relevant, must prioritise between environmental watering actions.

Many factors influence prioritisation decisions (such as the likely environmental outcomes, the previous watering history in that river or wetland, environmental or public risk considerations and seasonal conditions in the region). Trade-offs may need to be made about watering actions undertaken in one year or at one site, and water may need to be provided at the expense of watering actions in the next year or at another site. Trade-offs may also need to be made about foregoing watering actions to sell water allocation and use the resulting revenue for complementary works and measures; it may also be used to improve knowledge and capability to deliver better environmental outcomes in the short or longer term.

In deciding to prioritise one environmental watering action or site over another, the VEWH always seeks to optimise environmental outcomes across the state.

What criteria are used to guide prioritisation decisions?

Figure 1.3.1 shows the criteria considered when making the trade-off decisions and prioritising specific watering actions. Waterway managers provide information about how different watering actions meet these criteria, and about opportunities for shared benefits, in their seasonal watering proposals.

In deciding how to use the available Water Holdings in any given year, the VEWH also considers additional factors, such as:

- decisions by other water holders about the use of their water for the environment
- State and Commonwealth government decisions about water resource policy
- the resources, knowledge and capability of the VEWH and its program partners
- storage managers meeting their obligations to the environment associated with the right to harvest and distribute water sustainably
- complementary works and measures being undertaken
- the availability of funds
- the merit of selling available water allocation to fund works or technical investigations to enhance environmental outcomes
- services associated with the management of the Water Holdings and the delivery of water for the environment.

Prioritisation has historically occurred on a site-by-site basis, but many of the ecological processes that underpin waterway health operate at a landscape scale. The prioritisation process is currently evolving to consider the combination of watering actions that are needed across multiple waterways in a region to achieve the best environmental outcomes. The prioritisation criteria shown in Figure 1.3.1 can be equally applied at individual sites or at the broader landscape scale.

Figure 1.3.1 Criteria for prioritising environmental watering actions

Prioritisation criteria	Types of factors considered
Extent and significance of environmental benefit	<ul style="list-style-type: none"> ▶ Size of the area being watered ▶ Expected ecological outcomes ▶ Expected scale of response ▶ Conservation status of the species or community that will benefit ▶ Expected contribution to regional environmental objectives
Likelihood of success	<ul style="list-style-type: none"> ▶ Evidence that the desired outcomes are likely to be achieved ▶ External threats that may affect getting the desired results
Longer-term benefits	<ul style="list-style-type: none"> ▶ Value added to previous watering undertaken at the site ▶ Longer-term environmental benefits expected ▶ Ability to sustain these values into the future
Urgency of watering needs	<ul style="list-style-type: none"> ▶ History of watering at the site ▶ Potential for irreversible damage if the watering does not occur ▶ Risks associated with not delivering the water
Feasibility of the action	<ul style="list-style-type: none"> ▶ Capacity of infrastructure to meet the delivery requirements ▶ System or operational constraints ▶ Flexibility in the timing of delivery ▶ Likelihood that planned management actions will mitigate external threats
Environmental or third party risks	<ul style="list-style-type: none"> ▶ Adverse environmental outcomes that may arise ▶ Third-party risks associated with the event ▶ Effectiveness of mitigation to manage third-party and environmental risks
Cost effectiveness of the watering action	<ul style="list-style-type: none"> ▶ Likely environmental benefit compared against: <ul style="list-style-type: none"> • costs to deliver and manage water • costs of interventions to manage external threats and risks
Efficiency of water use	<ul style="list-style-type: none"> ▶ Volume of water needed to achieve the desired outcomes ▶ Volume and timing of return flows that may be used at downstream sites (see section 1.4.2) ▶ Alternative supply options such as use of consumptive water en route or augmenting natural flows ▶ Risks of spills from storages in the upcoming water year and any carryover water (see section 1.4.2) that may be available
After consideration of above criteria	
Cultural, economic, social and Traditional Owner benefits	<ul style="list-style-type: none"> ▶ Traditional Owner values and aspirations ▶ Recreation, community events and activities ▶ Economic benefits

Who is involved in the prioritisation process?

Waterway managers, environmental water holders, storage managers and communities (including recreational user groups, environmental groups, Traditional Owners and farming groups) all have a role in the process of prioritising environmental watering actions, depending on the nature and scale of the decision being made. There is a list of partners and stakeholders engaged in developing the seasonal watering proposal for each system in this plan.

Waterway managers are best placed to advise about the extent and significance of an environmental watering action and about the highest priorities in their region.

The VEWH and other environmental water holders determine the highest watering priorities across regions. The VEWH's decisions are intended to provide the best possible environmental outcomes for the state. The VEWH makes these decisions in consultation with waterway managers and other program partners as relevant.

Advice from storage managers is generally the key to understanding the feasibility of delivering a watering action, including the flexibility of delivery timing and operational constraints.

Land managers provide consent to deliver environmental flows on their land and will advise on the feasibility of delivery after considering land management activities, public access and the risks and benefits of the environmental watering action.

The annual prioritisation process is informed by longer-term site prioritisation by waterway managers in consultation with their communities. This prioritisation is detailed in plans such as regional catchment strategies, regional waterway strategies and environmental water management plans. These plans draw on community and scientific knowledge and prioritise sites for water for the environment (and other river health activities) that have high cultural, economic, environmental, social and Traditional Owner values.

Additional input from the community about prioritising water for the environment is provided annually where needed.

1.3.4 Do seasonal conditions affect how water for the environment is used?

In the same way that rainfall patterns influence how people water their gardens or paddocks, different climatic conditions influence how water for the environment is managed.

Seasonal conditions drive what water will be available during the water year and the environmental watering objectives to be pursued (as explained in subsection 1.2.1). Waterway managers take seasonal conditions into account when prioritising the water for the environment needed at each site. Seasonal planning scenarios describe the range of watering actions that may occur under drought to very wet climatic conditions.

Waterway managers work with the program partners to decide how to optimise the ecological outcomes they can achieve using water for the environment by considering factors including:

- the environmental objectives under each climatic scenario including consideration of any essential water for the environment needs
- how rainfall, natural flooding or the delivery of water for operational and/or consumptive use may contribute to the achievement of the environmental objectives
- how water for the environment may be used to build on natural flows or irrigation deliveries to meet the environment's needs
- natural climatic cues that might increase the likelihood of achieving an ecological outcome.

Planning scenarios are presented in the seasonal watering plan and provide the basis for the adaptive management of water for the environment as the season unfolds. They also provide an early indication of the amount of water that may be used at different sites and whether the VEWH may need to trade water during the season to meet identified environmental needs (as explained in section 1.4).

Figure 1.3.2 provides an example of how different planning scenarios may influence decisions about how water for the environment is managed in a year.

Figure 1.3.2 Example planning scenarios for a river system under a range of climatic conditions

Planning scenario	Drought	Dry	Average	Wet to very wet
Expected Conditions	No or negligible contributions from unregulated flows. Waterways may stop flowing at times, more likely during summer/autumn	Minor contributions from unregulated reaches and tributaries, more likely in winter/spring	Unregulated flows provide extended low flows and multiple freshes, more likely in winter/spring. Minor storage spills may occur	Extended unregulated high flows, multiple large storage spills and overbank flooding, more likely in winter/spring but possible any time of year
Management Objectives	Protect <ul style="list-style-type: none"> • Avoid critical loss • Maintain refuges • Avoid catastrophic events 	Maintain <ul style="list-style-type: none"> • Maintain river functioning with reduced reproductive capacity • Maintain key functions of high-priority wetlands • Manage within dry-spell tolerances 	Recover <ul style="list-style-type: none"> • Improve ecological health and resilience • Improve recruitment opportunities for key plant and animal species 	Enhance <ul style="list-style-type: none"> • Restore key floodplain wetland linkages • Maximise recruitment opportunities for key animal and plant species
Example watering actions to support management objectives	Provide low flows and trigger-based freshes to maintain water quality in deep refuge pools	Provide summer/autumn low flows to manage water quality and maintain connectivity	Provide year-round low flows to maintain habitat connectivity to support fish movement	Maintain year-round low flows and seasonal freshes to improve the quality of in-stream and bank vegetation and trigger the spawning and movement of native fish
		Extend the duration of flow peaks to freshen water quality in deep pools	Extend the duration and/or magnitude of peaks to provide spawning cues for fish	Maintain connectivity and the exchange of nutrients between the river and floodplain
			Provide seasonal freshes to support the establishment and maintenance of bank vegetation	Slow the recession of natural peaks to avoid bank slumping and erosion
				Top up natural flows if needed, to meet targets for winter low flows and spring peaks

1.3.5 How are shared cultural, economic, recreational, social and Traditional Owner benefits considered in environmental watering decisions?

Environmental flows are essential for maintaining and improving the health of rivers, wetlands and floodplains. By improving the health of rivers, wetlands and floodplains, environmental flows also provide benefits to communities. Community benefits may be direct (for example, water for the environment can increase populations of popular angling fish species, sustain healthy Country and totem species for Aboriginal communities and improve water quality to the benefit of irrigators) or opportunistic (for example, timing the delivery of an environmental flow to increase opportunities for kayakers and telling the public about the flow so they can take advantage of it).

In planning for environmental flows, the primary purpose is to optimise environmental benefits. Year by year and case by case, the VEWH and its partners consider opportunities raised by communities to use water for the environment to provide additional cultural, economic, recreational, social and Traditional Owner benefits. Where possible, these opportunities are incorporated into watering decisions, if they do not compromise environmental outcomes.

Shared community benefits of water for the environment can sometimes be actively optimised by making decisions around the storage, delivery and use of water for the environment to support community events (such as local fishing, waterskiing or rowing competitions).

When planning for and delivering environmental flows, the VEWH and its program partners look for opportunities to achieve shared community benefits in both the short and longer term, where environmental outcomes are not compromised. Longer-term community benefits may sometimes require short-term community inconvenience. For example, floodplain watering in Hattah Lakes may limit access and therefore inconvenience campers for a short period, but the environmental benefits of the watering will likely improve tourism and recreational opportunities in the forest over the longer term. In such cases, waterway managers work closely with land managers to limit disruption to park users as much as possible.

Waterway managers work with communities to identify the cultural, economic, recreational, social, and Traditional Owner values of waterways through regional catchment strategies, regional waterway strategies, environmental water management plans and seasonal watering proposals. Some of the upcoming opportunities for each region are summarised in sections 2 to 5. Program partners will continue to work with stakeholders to look for opportunities to achieve shared community benefits from water for the environment throughout the year.

1.3.6 How are risks managed?

Risk management is an integral part of managing water for the environment. Program partners consider risks continually during long-term and annual planning, implementation and review.

The VEWH, in collaboration with its program partners, has developed a risk management framework that addresses interagency risk, respects the risk management practices of each partner, and documents roles and responsibilities in operating arrangements. The key elements of the framework are described in Table 1.3.1.

The seasonal watering proposals on which this seasonal watering plan is based identify potential risks associated with the specific watering actions proposed for the coming water year. A collaborative approach is the best way to manage the shared environmental watering risks; so, as part of developing the proposals, partners jointly assess risks and identify and commit to mitigation actions.

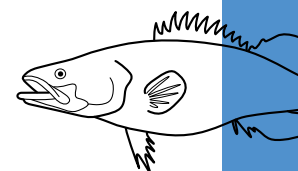
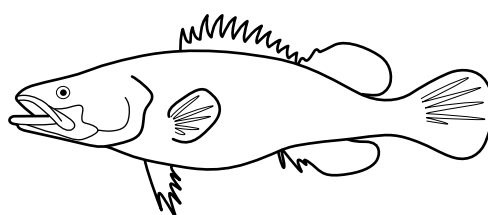
Table 1.3.1 shows the main shared risks of environmental watering. Program partners consider and reassess these and other potential risks as the season unfolds and planned watering actions are due to commence.

Some risks may only eventuate at the time of delivery. For example, forecast heavy rain that coincides with a planned environmental flow could increase the risk of nuisance flooding. Program partners review risks immediately before a planned environmental flow and implement measures or actions required to mitigate the risks as agreed with all relevant program partners. Watering actions will not be implemented if unacceptable risks to the public or the environment cannot be mitigated.

Even with best-practice risk management controls, there may be unintended impacts from environmental flows or situations where environmental flows cannot be delivered as planned. In those situations, program partners work together to respond to incidents and then learn and adapt their management of risks. The VEWH has developed an agreed approach to incident management to help program partners report, investigate and respond to risks.

Table 1.3.1 Main shared risks of environmental watering

Type of risk	Example mitigating actions
Environmental watering contributes to third-party impacts	<ul style="list-style-type: none"> Identify and understand water system capacities and monitor water levels at key locations to inform daily water release decisions and ensure impacts do not eventuate. Consider potential catchment run-off from forecast rainfall before deciding on the timing of releases of water for the environment. Implement a communication strategy which may include media releases, public notices and signage before environmental flows, to ensure people are informed of significant deliveries of water for the environment and can adjust their behaviour accordingly. This includes early liaison with potentially affected stakeholders. Restrict access by closing gates and tracks.
Inability to achieve or demonstrate ecological outcomes from environmental watering	<ul style="list-style-type: none"> Undertake intervention monitoring within available resources to identify the ecological response. Conduct research to better understand responses to water for the environment. Communicate the outcomes of monitoring and incorporate learnings into future environmental watering. Consider the need for complementary works to help achieve environmental watering outcomes as part of integrated catchment management, and the likely timeframe for ecological responses to all management actions.
Environmental watering has negative effects on the environment (for example blackwater, bank erosion and the spread of weeds)	<ul style="list-style-type: none"> Plan the timing, frequency, duration and variability of environmental flows to limit negative effects. Monitor environmental watering outcomes and adapt future deliveries and/or scientific recommendations if necessary.



1.4 Managing available water for the environment

Environmental entitlements are held in 15 water supply systems across Victoria. Sections 2 to 5 detail where water made available under these entitlements may be delivered in 2019–20.

In this section ...

- **How much water is available to use as part of the Victorian environmental watering program?**
- **What options are available to effectively and efficiently manage water for the environment?**

To the extent possible, the VEWH and other environmental water holders try to avoid water supply shortfalls by efficiently using water for the environment and by using tools such as carryover and trade. If there is still a shortfall of water, the VEWH in collaboration with waterway managers (and other water holders if relevant) will prioritise environmental watering actions.

1.4.1 How much water is available to use as part of the Victorian environmental watering program?

VEWH environmental entitlements

Water for the environment is made available under the environmental entitlements held by the VEWH.

Table 1.4.1 shows the entitlements held by the VEWH as at 31 May 2019, including those held in trust for the Living Murray program. The VEWH's environmental entitlements can be viewed at waterregister.vic.gov.au/water-entitlements/bulk-entitlements.

Figure 1.4.1 Proportion of water entitlements in Victoria held by private users (e.g. farmers, industry), water corporations or environmental water holders at 30 June 2018.

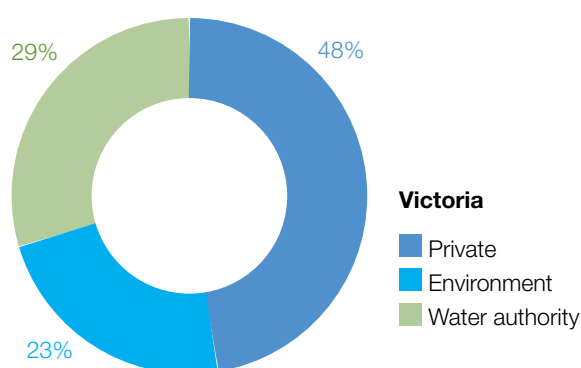


Figure 1.4.1 shows the proportion of water entitlements held in Victoria by private users (e.g. irrigators, industry), water corporations (e.g. for household supply) and environmental water holders (VEWH, Commonwealth Environmental Water Holder).

It is based on the total volume of surface water entitlements recorded in the Victorian Water Register at 30 June 2018. VEWH has incorporated its storage share volumes for some entitlements (e.g. Barwon, Latrobe systems) that are not represented volumetrically in the Water Register. The data does not include water entitlements that are not accounted for in the Water Register, such as minimum or unregulated flows and other rules-based environmental water like the Barmah-Millewa Environmental Water Account or River Murray Increased Flows.

Where possible, the proportion of water entitlements held by each user group is shown in each system section. For some systems, the way water entitlements have been accounted for in the Victorian Water Register or the connected nature of some water supply systems across multiple river basins, means that it is not possible to represent water entitlements proportionally for individual basins.

The water available to use under these entitlements varies from year to year depending on entitlement rules, seasonal conditions (including rainfall and run-off in the catchments) and the water already available in storages.

Table 1.4.1 Environmental entitlements held by the VEWH (as at 31 May 2019)¹

System	Entitlement	Volume (ML)	Class of entitlement
Central region			
Barwon	Barwon River Environmental Entitlement 2011	N/A ²	Unregulated
	Upper Barwon River Environmental Entitlement 2018	2,000 ³	Share of inflow
Moorabool	Moorabool River Environmental Entitlement 2010 ⁴	7,086 ³	Share of inflow
Tarago	Tarago and Bunyip Rivers Environmental Entitlement 2009	3,000 ³	Share of inflow
Werribee	Werribee River Environmental Entitlement 2011	N/A ³	Share of inflow
Yarra	Yarra Environmental Entitlement 2006 ⁴	17,000 55	High Unregulated
Gippsland region			
Latrobe	Lower Latrobe Wetlands Environmental Entitlement 2010	N/A ²	Unregulated
	Blue Rock Environmental Entitlement 2013	18,737 ³	Share of inflow
Macalister	Macalister River Environmental Entitlement 2010	12,461 6,230	High Low
Thomson	Bulk Entitlement (Thomson River – Environment) Order 2005 ⁴	10,000 8,000 ³	High Share of inflow
Northern region			
Campaspe	Environmental Entitlement (Campaspe River – Living Murray Initiative) 2007	126 5,048	High Low
	Campaspe River Environmental Entitlement 2013	20,652 2,966	High Low
Goulburn	Goulburn River Environmental Entitlement 2010	8,851 3,140	High Low
	Environmental Entitlement (Goulburn System – Living Murray) 2007	39,625 156,980	High Low
	Environmental Entitlement (Goulburn System – NVIRP Stage 1) 2012	36,624 ⁶	High
	Bulk Entitlement (Goulburn System – Snowy Environmental Reserve) Order 2004	30,252 8,156	High Low
	Water Shares – Snowy River Environmental Reserve	8,321 17,852	High Low
	Water Shares – Living Murray program	5,559	High
	Silver and Wallaby Creeks Environmental Entitlement 2006 ⁴	N/A	Passing flow only
Loddon	Bulk Entitlement (Loddon River – Environmental Reserve) Order 2005 ⁴	10,970 2,024	High Low
	Environmental Entitlement (Birch Creek – Bullarook System) 2009 ⁴	100	N/A ⁷
	Water Shares – Snowy River Environmental Reserve	470	High

Table 1.4.1 Environmental entitlements held by the VEWH (as at 31 May 2019)¹ continued...

System	Entitlement	Volume (ML)	Class of entitlement
Murray	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999	29,782 3,894 40,000	High Low Unregulated
	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999 – Barmah–Millewa Forest Environmental Water Allocation	50,000 25,000	High Low
	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999 – Living Murray	9,589 101,850 34,300	High Low Unregulated
	Environmental Entitlement (River Murray – NVIRP Stage 1) 2012	27,031 ⁶	High
	Bulk Entitlement (River Murray – Snowy Environmental Reserve) Conversion Order 2004	29,794	High
	Water shares – Snowy Environmental Reserve	14,671 6,423	High Low
	Water Shares – Living Murray program	12,267	High
Western region			
Wimmera and Glenelg	Wimmera and Glenelg Rivers Environmental Entitlement 2010 ^{4,5}	40,560 1,000	Pipeline product Wetland product

¹ While the VEWH does not hold any entitlements in the Maribymong system, water allocation was purchased in this system together with Melbourne Water in all years between 2013–14 and 2018–19 inclusive.

² Use of these entitlements depends on suitable river heights, as specified in both the Latrobe and Barwon environmental entitlements (rather than a permitted volume).

³ Water is accumulated continuously according to a share of inflows (Blue Rock Reservoir 9.5 percent, Tarago Reservoir 10.3 percent, Werribee system 10.0 percent, Moorabool system 11.9 percent, Thomson Reservoir 3.9 percent, West Barwon Reservoir 3.8 percent). The actual volume available in any year varies according to inflows. Entitlement volumes presented in this table indicate the entitlement share of storage.

⁴ In addition to volumetric entitlement, the entitlement also includes passing flows.

⁵ In addition to volumetric entitlement, the entitlement also includes unregulated water.

⁶ This entitlement volume is equal to one-third of the total water savings from the Goulburn-Murray Water Connections Project Stage 1, as verified in the latest audit (including mitigation water).

⁷ Allocation against this entitlement is made subject to specific triggers, as specified in the entitlement.

Water donations

The VEWH may receive water donations from individuals, community groups and other organisations. This water could be used for environmental watering in the water year it was donated (including for actions identified in the seasonal watering plan), or it could be carried over for use in the future (see subsection 1.4.2 for more information about carryover). Some donors may identify a specific use for the water they donate (such as environmental watering in a specific wetland or to protect a certain tree species). In these instances, the VEWH would consider the costs and benefits of each donor proposal before agreeing to accepting a donation.

Water available from other environmental water holders

In northern and western Victoria, the VEWH coordinates with other environmental water holders to deliver environmental outcomes at the broader Murray-Darling Basin scale. One of the VEWH's important roles is to

coordinate with Murray-Darling Basin environmental water holders (the CEWH and program partners in New South Wales and South Australia) to optimise the benefits of all water for the environment in Victorian waterways. The seasonal watering plan considers the use of all water for the environment held in Victorian river systems.

Usually, when Commonwealth water is to be delivered in Victoria, the CEWH transfers the agreed amount of water to the VEWH. That amount then becomes part of the Victorian environmental Water Holdings until used or transferred back.

Table 1.4.2 shows the environmental water entitlements held by the CEWH in Victoria. The CEWH also holds water in New South Wales and South Australia, and both New South Wales and South Australia also hold water, which could potentially be made available for environmental watering in Victoria.

Table 1.4.2 Environmental water entitlement held in Victoria by the Commonwealth Environmental Water Holder (as at 31 May 2019)

System	Volume (ML)	Class of entitlement
Broken	534 4	High-reliability water share Low-reliability water share
Campaspe	6,624 395	High-reliability water share Low-reliability water share
Goulburn	285,205 42,467	High-reliability water share Low-reliability water share
Loddon	3,356 527	High-reliability water share Low-reliability water share
Murray	362,307 35,413	High-reliability water share Low-reliability water share
Ovens	123	High-reliability water share
Wimmera-Mallee	28,000	Low-reliability product

Water for the environment and non-government agencies

In 2007, the Murray–Darling Wetlands Working Group (MDWWG) and the Nature Conservancy (both non-government organisations) partnered to own and manage the Environmental Water Trust. To date, the MDWWG has been very active in wetland protection and management in New South Wales through partnerships with state and federal governments. In 2017–18 and 2018–19, the MDWWG partnered with Goulburn Broken CMA to deliver water for the environment to wetlands in Victoria for the first time. The MDWWG is currently focusing its efforts on wetlands that are on private land, and given the deliveries are outside the Victorian Water Holdings, they are not covered by this seasonal watering plan.

For more information about the MDWWG and the Environmental Water Trust, see murraydarlingwetlands.com.au and environmentalwatertrust.org.au.

1.4.2 What options are available to effectively and efficiently manage water for the environment?

Other water sources

Water for the environment is not the only type of water that can support river, wetland and floodplain health. Waterway managers and environmental water holders in consultation with storage managers consider the potential for environmental watering objectives to be met by other sources of water. The timing of environmental releases can be coordinated with other sources of water to achieve greater benefits than an environmental release alone could produce. Other sources of water can include:

- **system operating water** (including passing flows), which maintains a minimum flow for operational and/or environmental purposes in many rivers, to which water for the environment can be added
- **heavy rainfall** (resulting in unregulated flows), which can naturally meet an environmental objective, so water available under environmental water entitlements is not needed or could be added to extend a natural flow

- **alterations to the timing and route for delivery of consumptive water**, which can achieve environmental objectives without detriment to consumptive water users: water for the environment is sometimes used to cover any additional losses associated with the altered delivery of consumptive water.

These types of water are considered in the development and implementation of the seasonal watering plan to ensure effective system operations and efficient use of water for the environment, and to achieve the greatest benefit to the environment.

Return flows

In some systems, water for the environment delivered through upstream sites can be used again downstream. This helps to ensure water for the environment is used efficiently and effectively to achieve the greatest environmental benefits.

This reuse policy, known as return flows, is available in many systems across northern Victoria. It makes use of water for the environment more efficient, and it helps reduce the volume of water that needs to be recovered for the environment from consumptive water users.

The VEWL's access to return flows is enabled through rules in its environmental water entitlements. Reuse of return flows is also available to the CEWH and the Living Murray when the VEWL delivers water on their behalf.

Where possible, return flows are reused to provide benefits at Victorian environmental sites. If not needed in Victoria, the VEWL, Living Murray and CEWH return flows will continue to flow across the border to SA where they will be used to provide environmental benefits at sites such as the Coorong, Lower Lakes and Murray Mouth area.

Carryover

Some entitlements allow the VEWL to carry over unused water to the following water year. This means that water allocated in one year can be kept in storages for use in the following year, subject to certain conditions.

Carryover provides flexibility and enables water for the environment to be delivered when it is of the greatest value to the environment. For example, carryover can help ensure environmental water holders can meet high winter and spring demands when there is a risk there will be little water available under entitlements at the beginning of the water year.

Carryover can also be used to set water aside to maintain key refuge areas and avoid catastrophic events in drought periods.

Water trading

Water trading allows the VEWL to smooth out some of the variability in water availability across systems and across years. Under certain circumstances, it can enable the VEWL to move water to the systems where it is most needed. The VEWL can trade water allocated to its entitlements by:

- administrative water transfers between the VEWL's entitlements
- administrative water transfers with other water holders
- purchasing water allocation
- selling water allocation.

Administrative water transfers are the most common trades the VEWH undertakes. These occur between the VEWH's entitlements (or accounts) to move water to where it is most needed. Other environmental water holders also transfer their water to the VEWH for delivery in Victoria. These types of water trades are often referred to as administrative water transfers as there is no financial consideration associated with the trade.

The VEWH can also buy or sell water allocation where it is in line with its statutory objectives: essentially, if it optimises environmental outcomes in Victorian waterways.

The VEWH has bought or sold a small amount of water allocation each year since it was established in 2011. Water has been purchased to enhance environmental outcomes in systems where insufficient water for the environment was available. Water has also been sold to raise revenue for investment in projects which optimise environmental watering outcomes.

The VEWH can sell water to invest in complementary works, measures, technical studies or other priorities, where these projects optimise environmental watering outcomes for enduring benefit. The VEWH consults with DELWP where these projects have government policy or program implications.

The VEWH can use revenue raised from the sale of a water allocation to:

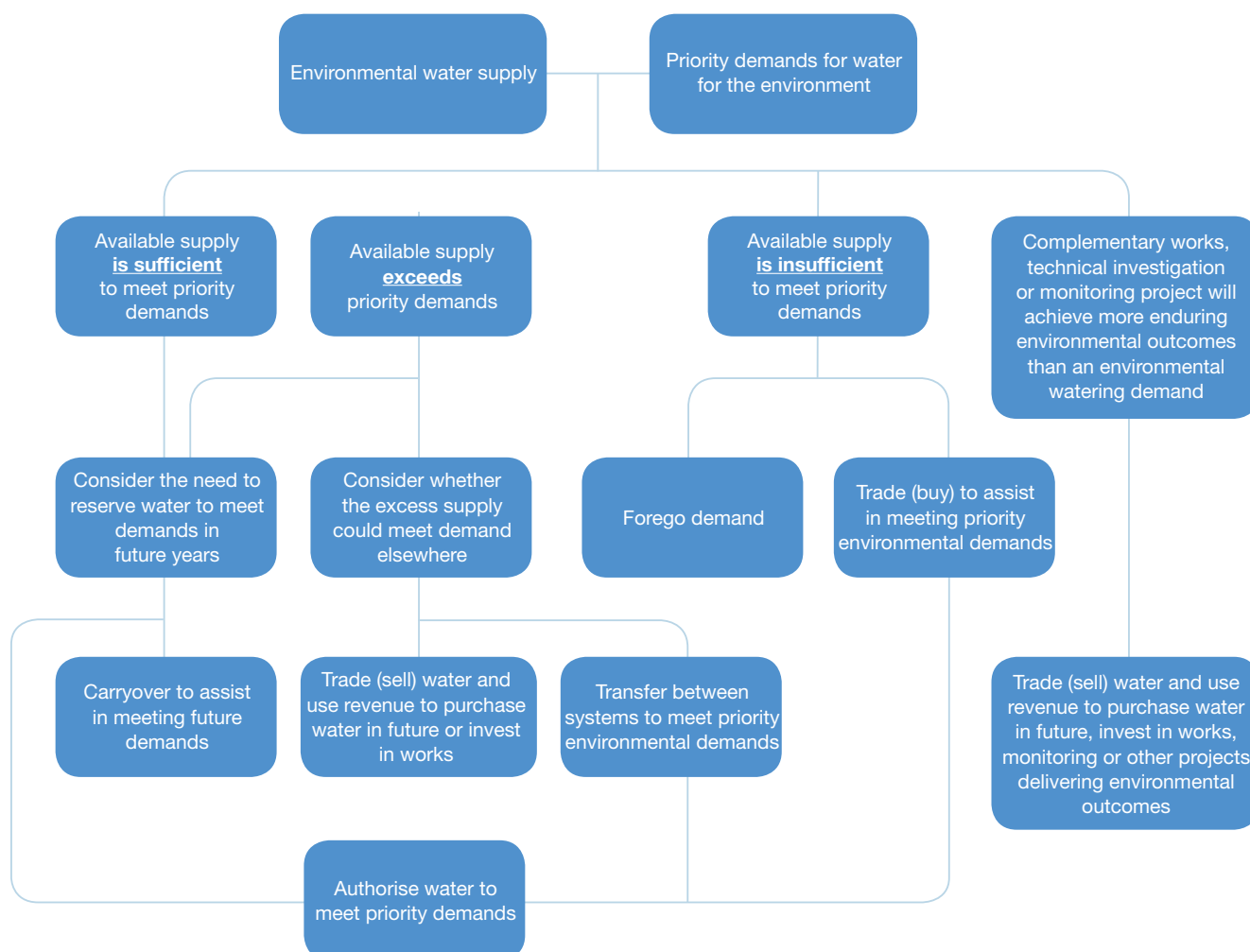
- purchase water to meet shortfalls in any Victorian system
- invest in monitoring or technical studies that will improve future management of water for the environment
- invest in structural works and other on-ground activities that will improve the performance of Victoria's environmental watering program.

Subject to the approval of the Minister for Water, the VEWH can also trade its water entitlements (referred to as a permanent trade). However, the VEWH has not undertaken permanent trades to date.

Figure 1.4.2 shows the key considerations that guide the VEWH's use, carryover and trade decisions.

There is more information about the VEWH's trading activity including its annual trading strategy, on its website at vewh.vic.gov.au.

Figure 1.4.2 Key considerations guiding use, carryover and trade decisions



1.5 How to read the seasonal watering plan

Under the Victorian *Water Act 1989*, the VEWH can only authorise use of water for the environment where it is consistent with a seasonal watering plan. This is to ensure transparency about what environmental flows are planned and how they are managed.

The plan must ensure that the scope, objectives and potential watering activities for each waterway are clear and enable decisions about possible water use to be made effectively and transparently.

Sections 2 to 5 of the seasonal watering plan represent four broad geographic regions of Victoria: the Gippsland, central, western and northern regions. Each regional overview includes:

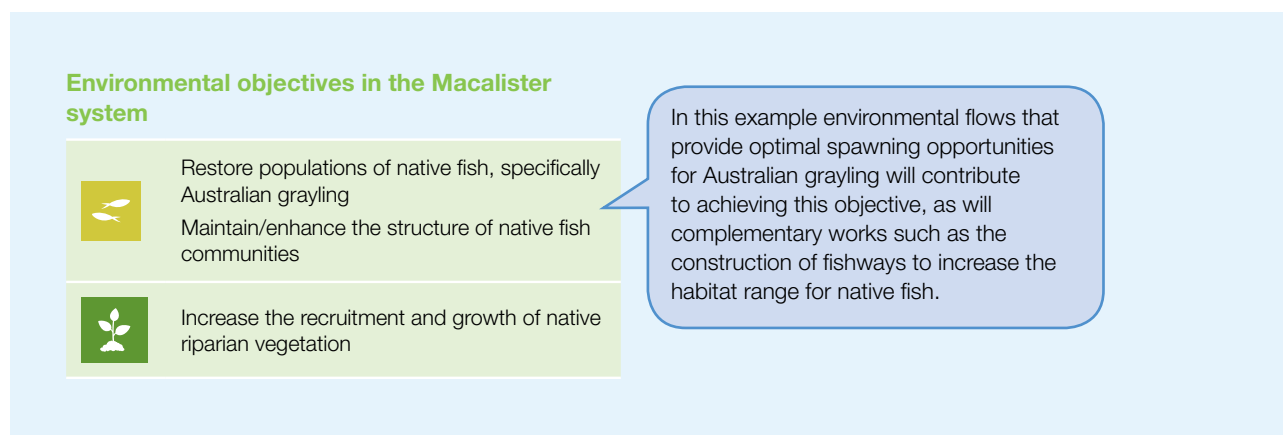
- a description of the region
- acknowledgement of the role of Traditional Owners in the area
- a description of how communities and program partners are engaged
- examples of community benefits of environmental watering
- examples of integrated catchment management in the region
- a description of how risks are managed.

Each region is divided further into system sections for waterways and wetlands that are supplied with water for the environment from an environmental entitlement. The environmental values, recent conditions, environmental watering objectives and planned actions for the year are presented in each system.

Each system section includes:

- **a system introduction page**, which includes:
 - information about the waterway manager, storage manager and environmental water holders relevant to the system
 - images of the system and some of its important environmental values
 - an interesting fact about the system or an Aboriginal name or definition for the system
 - a pie chart showing the proportion of water entitlements in the system for environmental, urban, industry and irrigation uses
- **a system overview**, which describes the location of the system, its waterways and major features
- **environmental values**, which outlines the primary water-dependent species, communities, ecological processes and habitats that rely on healthy waterways and form the basis for environmental objectives
- **recent conditions**, which describes the factors that will be considered when planning environmental flows in the coming year (such as the past watering regime, climate and rainfall, water availability, system operations, monitoring results and environmental observations)
- **environmental objectives**, which summarises the measurable outcomes that are sought for each environmental value in the system. Each objective will likely rely on ongoing implementation of one or more watering actions as well as complementary actions (such as control of invasive species or installation of fishways). Target outcomes may take years or several decades to achieve.

Figure 1.5.1 Example environmental objectives table





Scope of environmental watering

This information describes the potential environmental watering actions that may be delivered in 2019–20, their functional watering objectives (that is, the intended physical or biological effect of the watering action) and the longer-term environmental objective they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological functions.

Figure 1.5.2. Example potential environmental watering actions and objectives tables

Potential environmental watering actions describe the timing, magnitude, duration and frequency of environmental flows to rivers or the timing of releases to wetlands. Subsection 1.3.3 explains how watering actions are prioritised. The seasonal watering statements issued by the VEWH authorise waterway managers to undertake environmental watering actions described in this table. Subsection 1.2.2 explains how seasonal watering statements fit into the environmental watering planning framework.

Environmental objectives are those listed in the environmental objectives table for each system (as the Figure 1.5.1 example above shows). Each environmental objective will be supported by one or more watering actions and functional watering objectives.

Potential environmental watering action	Functional watering objectives	Environmental objectives
Macalister River reaches 1 and 2		
Winter to summer low flow (up to 90 ML/day in June to December)	<ul style="list-style-type: none"> • Provide hydraulic habitat for fish by increasing water depth in pools • Provide fish passage for local movement through minimum depth over riffles • Provide permanent wetted habitat for water bugs through minimum water depth in pools • Provide connectivity throughout the river for local movement of platypus and water rats, as well as protection from predation, access to food sources and maintain refuge habitats • Provide flows with low water velocity and appropriate depth and to improve water clarity and enable establishment of in-stream vegetation • Provide sustained wetting of low-level benches (increasing water depth) to limit terrestrial vegetation encroachment 	
Summer-autumn low flow (35-90 ML/day in January-May)	<ul style="list-style-type: none"> • Maintain water depth in pools and hydraulic habitat for native fish. • Maintain permanent wetted habitat in pools and riffles for waterbugs • Maintain shallow, slow-flowing habitat to enable establishment of in-stream vegetation • Maintain a minimum depth in pools to allow for turnover of water and slow water quality degradation • Expose and dry lower channel features for re-oxygenation 	

A **functional watering objective** is the physical or biological effect that a potential watering action aims to achieve. Each potential watering action will have one or more functional watering objectives.

Scenario planning

This information indicates the range and priority of potential environmental watering actions that might be delivered in the coming year under different climate and water availability scenarios. For example, it may show which environmental flows may be most important if there is less water for the environment available in a dry year, compared to an average year where there is more water available. The climate scenarios considered are drought, dry, average and wet. Section 1.3.4 explains how seasonal conditions are considered in planning. Potential environmental watering actions are listed in order of priority.

Figure 1.5.3. Example scenario planning table

Assumed volume of water for the environment that will be available over the entire year: the assumed supply.

Tier 1a denotes the high-priority potential environmental watering actions that could be achieved with the assumed supply.

Tier 1b denotes high-priority potential environmental watering actions that are unlikely to be achieved with the assumed supply. These actions may be achieved with natural or unregulated flows, or additional water may need to be transferred or traded into the system to meet demand for these watering actions. If tier 1b actions are not delivered, there may be a decline in environmental condition and the ability to meet environmental objectives in the medium and long terms may be compromised. Section 1.4.2 explains the VEW's options for efficiently managing water for the environment.

Tier 2 potential environmental watering actions have been identified as being necessary to support overall environmental objectives, but they are not essential to deliver this year. Delivering tier 2 watering actions in the coming year will likely provide an environmental benefit, but not delivering them will not result in a significant decline.

The volume that is planned to be kept in storage to achieve high-priority watering actions the following year. For the seasonal watering plan, predictions of volumes of water available and carryover are made before the beginning of a water year and are based on the best-available information. They are estimates only, and the VEW and its program partners revise these estimates continually throughout the water year.

Planning scenario	Drought	Dry	Average	Wet
Expected river conditions	<ul style="list-style-type: none"> No unregulated flows Passing flows at reduced 	<ul style="list-style-type: none"> Possible spills from in spring, minor flood levels may occur Passing flows at may be reduced 	<ul style="list-style-type: none"> Regular spills from in spring, minor to moderate flood levels may occur 	<ul style="list-style-type: none"> Large and frequent spills from moderate to major flood levels may occur
Expected availability of water for the environment	<ul style="list-style-type: none"> 11,600 ML 	<ul style="list-style-type: none"> 14,900 ML 	<ul style="list-style-type: none"> 16,900 ML 	<ul style="list-style-type: none"> 21,400 ML
Potential environmental watering – tier 1a (high priorities)	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2) 1 spring fresh (reach 2) 	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2) 	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2) 1 spring fresh (reach 2) 	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2) 1 spring fresh (reach 2)
Potential environmental watering – tier 1b (high priorities)	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2) 	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2) 	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2) 	<ul style="list-style-type: none"> Autumn/winter low flow (reach 1 & 2) Spring low flow (reach 1 & 2)
Potential environmental watering – tier 2 (additional priorities)	<ul style="list-style-type: none"> 1 winter fresh 	<ul style="list-style-type: none"> 1 winter fresh 	<ul style="list-style-type: none"> Increase duration of spring fresh 	<ul style="list-style-type: none"> 1 winter fresh
Possible volume of water for the environment required to meet objectives	<ul style="list-style-type: none"> 10,700 ML (tier 1) 4,000 ML (tier 2) 	<ul style="list-style-type: none"> 13,400 ML (tier 1) 4,000 ML (tier 2) 	<ul style="list-style-type: none"> 15,600 ML (tier 1) 1,200 ML (tier 2) 	<ul style="list-style-type: none"> 19,000 ML (tier 1) 4,000 ML (tier 2)
Priority carryover requirements	<ul style="list-style-type: none"> 900 to 1,800 ML 			