

Wimmera River Jeparit, by David Fletcher

Section 1

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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 of 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 2021-22.

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- 1.1.1 Why do we need an environmental watering program?**
- 1.1.2 What do we mean by 'water for the environment'?**
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1.1.1 Why do we need an environmental watering program?

Many of Victoria's rivers and wetlands have been significantly modified, compared to how they were during the tens of thousands of years that Traditional Owners managed them. Water now flows differently through the landscape: it is captured in dams and weirs and diverted by infrastructure — pipelines, pumps, drains, levees and constructed channels — to support homes, farms, irrigators, industries, towns and cities.

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. While this allows communities to grow and thrive, it also means these waterways cannot function as they would naturally.

Reduced river flows and less frequent wetland inundation have disrupted the breeding cycles of native fish, frogs, waterbirds, platypus and other animals. They have restricted the growth and recruitment of native plants and reduced the productivity of waterways. Our waterways still support many 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 they provide. Many rivers and wetlands cannot survive altered water regimes without help. We must actively manage how water flows through these rivers, to protect their health and to support the plants that grow in them and the native animals that need them to live, feed and breed.

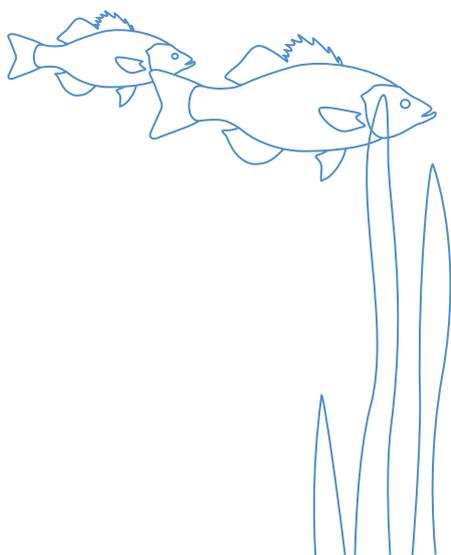
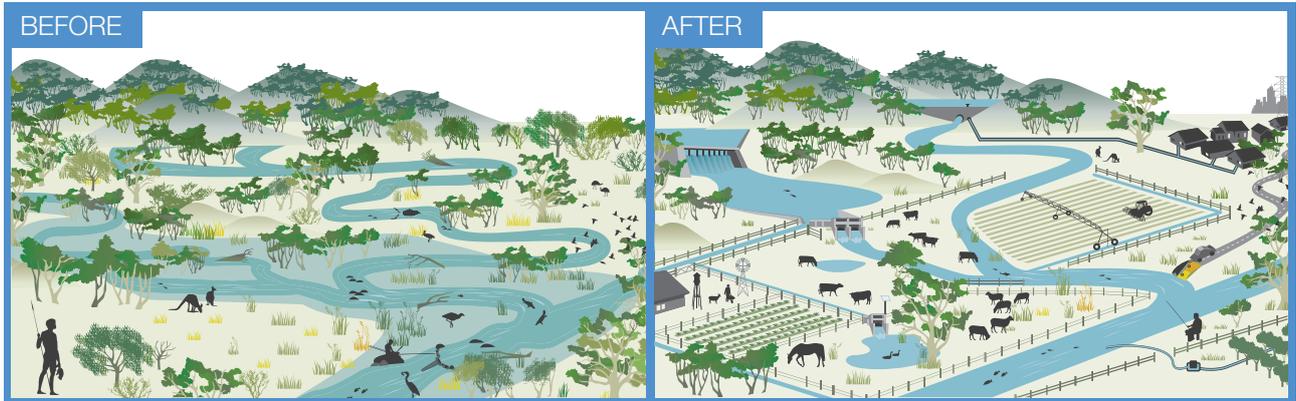


Figure 1.1.1 A typical Victorian river catchment before and after the development of storages, reservoirs, weirs and channels



1.1.2 What do we mean by ‘water for the environment’?

Water for the environment is water that is overseen by environmental water holders and released at a time and rate intended to improve the health of river and wetland systems including their biodiversity, ecological function, water quality and other uses that depend on environmental condition. It’s not the only water that contributes to environmental condition, but it is water that governments reserve specifically to be actively managed to help mitigate the environmental impacts resulting from the modification of rivers and wetlands to supply water for consumptive uses. ‘Environmental flows’ and ‘environmental water’ are other terms to describe water for the environment.

The amount of water for the environment available to be released each year is described in environmental water entitlements, which are legal rights to water that is available in a reservoir or river system or another specified location. Environmental water entitlements have rules and conditions similar to those in other water entitlements used to reserve water for towns, irrigators and industry.

Environmental water holders must make decisions about the best use of this water each year, and the seasonal watering plan is the public preview of the types of decisions that might be made about environmental water entitlements in Victoria under a range of different circumstances throughout the year.

For more information about water for the environment, including how other water sources are considered in the planning and management of this water, see section 1.4.

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

Water for the environment aims to support the habitat, feeding and breeding needs of native aquatic plants and animals. This includes maintaining flows or permanent pools in rivers that would otherwise dry out; maintaining water quality within tolerable limits; providing triggers for fish to migrate; watering wetlands to support carbon and nutrient cycles and to stimulate the growth of plankton, waterbugs or small fish to provide food for larger fish and waterbirds; and watering vegetation to keep it alive or to trigger new growth. To do these things, water for the environment is released into rivers, wetlands and floodplains to mimic some of the flows that would have occurred naturally, before the construction of dams, weirs and channels. This helps maintain the physical, chemical and biological health of our waterways.

Environmental water managers set the timing, duration and volume of water releases to return some of the small- and medium-sized river flows that are essential in the life cycles of native plants and animals. For example, increased river flow in autumn provides a signal for Australian grayling to migrate downstream for spawning: to release their eggs. Breeding waterbirds need wetlands to retain water for long enough for their chicks to grow and fledge, and floodplain forests need to be inundated every few years to ensure iconic tree species (such as river red gums and black box) survive and reproduce. Water for the environment also moves sediment and nutrients through river systems, connects habitats and improves water quality.

By improving the health of rivers, wetlands and floodplains, environmental watering provides many direct benefits to the community: it can enhance places that people visit to relax, play and connect with nature, increase populations of fish species popular with anglers, sustain healthy Country and totem species for Aboriginal communities and improve the quality of water available to irrigators. Or the benefits can be opportunistic: for example, the delivery of an environmental flow can be timed so kayakers and other recreational users of a river know about the flow and can take advantage of it.

1.1.4 What is the Victorian environmental watering program, and who is involved?

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

The environmental watering program is part of the Victorian waterway management program that is overseen by the Minister for Water through the Department of Environment, Land, Water and Planning (DELWP). The Victorian Environmental Water Holder (VEWH) is an independent statutory authority responsible for holding and managing Victoria's environmental water entitlements.

Many public authorities — referred to as program partners — collaborate to deliver the environmental watering program. 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 environmental watering proposals for the rivers and wetlands in their region. Waterway managers also order water for the environment from storage managers, and they monitor the outcomes of releases.

The VEWH decides where water for the environment will be used, carried over or traded, to get maximum benefit for the state's waterways. In northern Victoria, the VEWH works with the Commonwealth Environmental Water Office, the Murray-Darling Basin Authority (MDBA) and the New South Wales and South Australian governments to prioritise and coordinate how and where water for the environment is used to maintain and improve 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 essential 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 environmental values in each region and help monitor the success of environmental watering. Local communities make great use of their local rivers and wetlands, and they bring a wealth of cultural, economic, recreational, social and Traditional Owners' perspectives to the program.

Scientists provide evidence about how water for the environment supports native plants and animals in the short and long terms, and they work with waterway managers to monitor, evaluate and report on environmental watering outcomes.

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

1.1.5 How are Traditional Owners engaged in the environmental watering program?

There is an intersection between the aims of the environmental watering program — healthy waterways and healthy communities — and the deep and enduring obligations Traditional Owners have to Country and their communities.

In many regions of Victoria, Traditional Owners and their representatives have strong relationships with local waterway managers, who are working to embed the involvement of Traditional Owners and their objectives, values, uses and knowledge in the management of environmental flows. Their work is explained in the regional overviews and system sections in this seasonal watering plan.

However, more can be done to increase the contribution of Traditional Owners and provide opportunities for self-determination within and beyond the environmental watering program. The VEWH and its program partners will continue to identify and act on these opportunities.

1.1.6 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 achieve environmental outcomes from the delivery of all water (see section 1.4)
- 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 has four part-time commissioners, who are supported by a small team. The commissioners at the time of publication of this seasonal watering plan were Chris Chesterfield (Chairperson), Peta Maddy (Deputy Chairperson), Rueben Berg (Commissioner) and Jennifer Fraser (Commissioner). Commissioners are appointed by the Governor in Council on the recommendation of the Minister for Water.

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

Integrated catchment management is a holistic way of managing land, water and biodiversity from the top to the bottom of catchments. The environmental watering program is a key element of integrated catchment management in Victoria.

The main Victorian policy documents that influence the VEWH's work are the 2013 *Improving Our Waterways: Victorian Waterway Management Strategy*, the 2016 *Water for Victoria Water Plan* and the sustainable water strategies for the central, northern, Gippsland and western regions. Regional waterway strategies identify priority waterways, which have been determined in consultation with local communities, and they also outline integrated waterway management actions.

Water for Victoria is a plan for a future with less water as Victoria responds to the impacts of climate change and a growing population. Actions in *Water for Victoria* aim to 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 that needs 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, streamside land management, sustainable agriculture, sustainable land use planning and development, integrated urban water management and other waterway management activities (such as providing for fish passage and improving in-stream 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 irrigators, industries 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 releases of water for the environment. In some systems, these restrictions mean only a fraction of the required environmental flows can be released into 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.

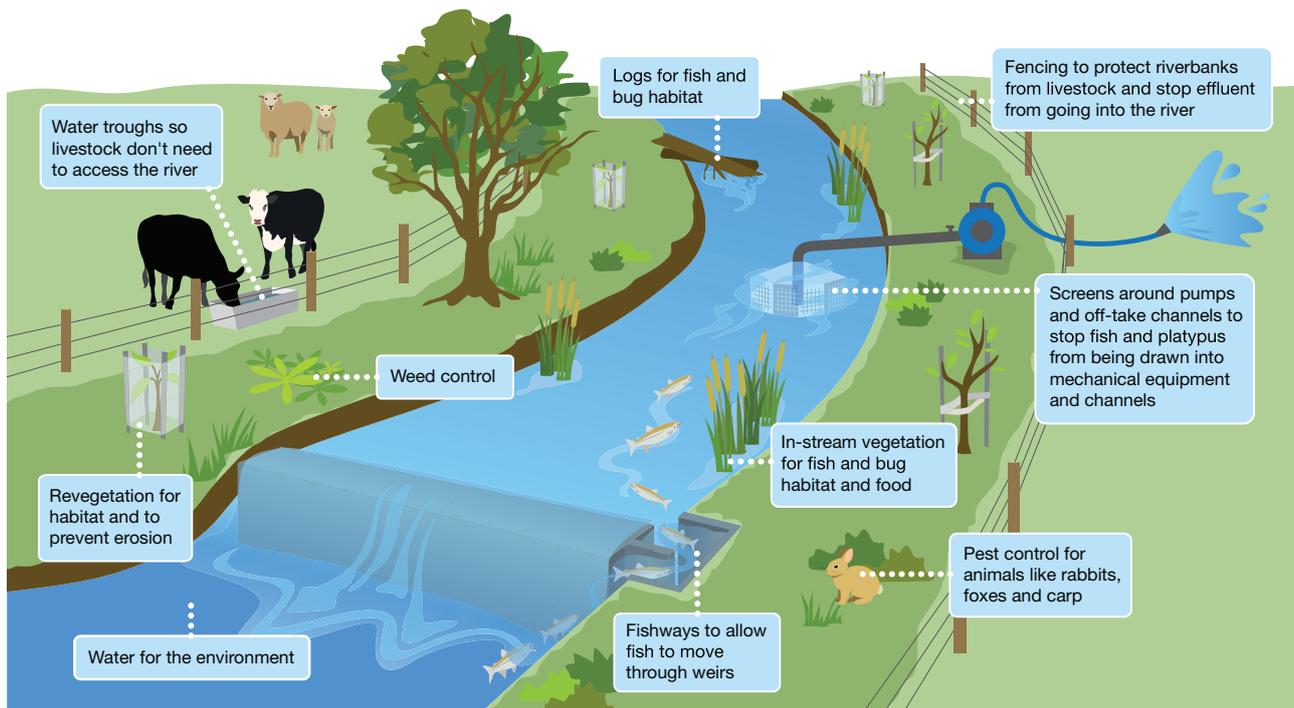
Our Catchments, Our Communities is Victoria's first statewide strategy for integrated catchment management. Its aims are more effective community engagement, better connections between different levels of planning and stronger regional catchment strategies. The strategy also aims to clarify roles, strengthen accountabilities and coordination and improve monitoring, evaluation and reporting. Under this strategy, CMAs are leading 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 projects involving environmental watering actions.

Protecting Victoria's Environment – Biodiversity 2037 is the plan 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 *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 that 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 Example of complementary waterway management activities



1.1.8 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 modelling 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 (see Figure 1.1.3).

Some effects of climate change are already apparent. The *Long-term Water Resource Assessment for Southern Victoria* shows that long-term water availability for the environment has declined by 4-28% in southern basins over the last 10-15 years (see Figure 1.1.4). Reduced rainfall over this period has resulted in less frequent spills from reservoirs and lower rates of catchment run-off to waterways below reservoirs.

Environmental water entitlements on their own are less than what is recommended for intended environmental outcomes; and if a greater proportion of entitlements is used to compensate for reduced spills and run-off, there will be fewer opportunities to release the managed flows needed to improve environmental outcomes. A long-term water resource assessment for northern Victoria is due to begin in 2025.

These observed and forecast changes to streamflows and extreme climatic events threaten not just to reduce the availability of water for the environment but also to decrease water quality and increase the incidence of algal blooms. 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 will also be affected.

Action 3.5 of *Water for Victoria* aims to improve 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 significantly improves environmental outcomes.

Action 3.5 also reaffirms commitments to recover water for the environment in the Thomson, Barwon, Moorabool, Werribee and Maribyrnong systems. Extra water was added to the Thomson environmental entitlement in 2017 and a new environmental entitlement was created for the upper Barwon River in 2019. Work continues to investigate water-recovery options in other systems through the development of a *Central and Gippsland Sustainable Water Strategy*. All water recovered for the environment through these commitments will be managed by the VEWH and its partners to improve the health of the environment in the face of climate change.

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

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 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 must 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, decision-makers 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 have developed guidelines to identify the most important refuge habitats to water during critically dry periods.

Optimising environmental outcomes of operational water releases

The VEWH is working closely with storage managers and river operators to identify how operational releases — water releases made from storages to enable the water distribution system to operate or make water available for consumptive uses — 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 aim is to prevent catastrophic losses and maintain critical refuge habitats to prevent significant declines in 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.

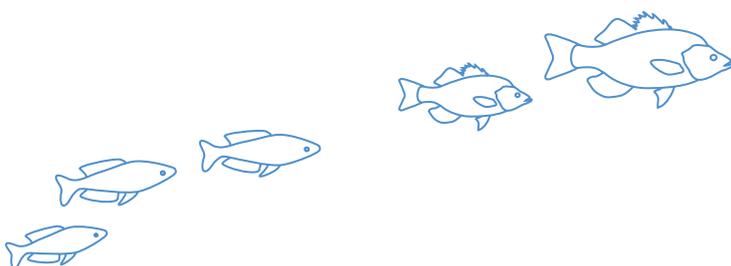
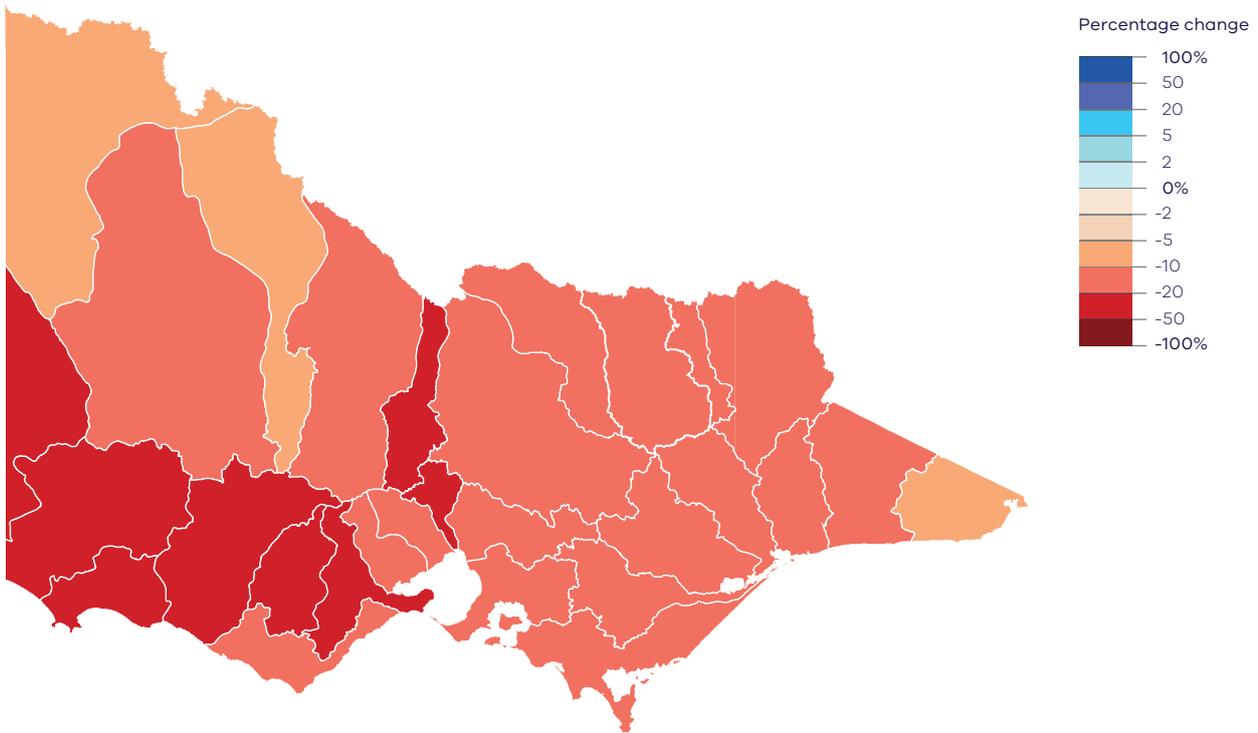
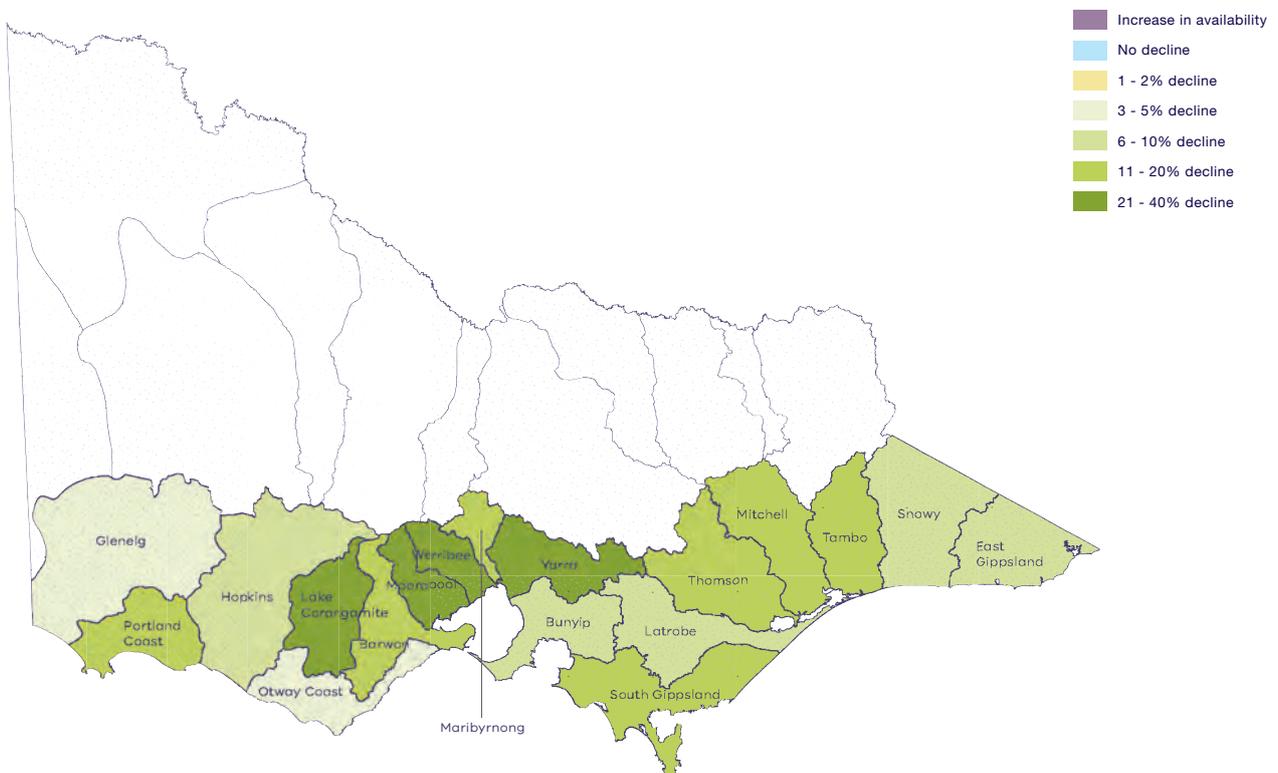


Figure 1.1.3 Projected changes in run-off in 2065, medium climate change scenario



Source: Water for Victoria

Figure 1.1.4 Changes in long-term surface water availability for the environment since 2005, by basin, southern Victoria



Source: Long-term Water Resource Assessment for Southern Victoria

1.1.9 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 aquatic and streamside 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 two 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 (see Figure 1.1.5). The Commonwealth Environmental Water Holder's (CEWH's) Environmental Flow Monitoring Evaluation and Research (Flow-MER) program combines targeted research into the relationship between water regimes and vegetation, fish, waterbirds and food webs with long-term monitoring at seven selected areas throughout the Murray-Darling Basin. The Flow-MER program is monitoring the responses of fish, vegetation, macroinvertebrate, stream metabolism and bank erosion to environmental flows in the lower Goulburn River, which is the only area in Victoria the program is monitoring.

The VEWH and its program partners regularly liaise with scientists who are monitoring responses on the ground and with organisations responsible for overseeing the larger-scale monitoring programs, to ensure 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.

Figure 1.1.5 shows scores by the MDBA of the overall achievement of ecological objectives for the Living Murray program icon sites between 2006-07 and 2019-20. Sites with scores higher in the alphabet have consistently received a large proportion of their water regime for five or more years. See www.mdba.gov.au for details.

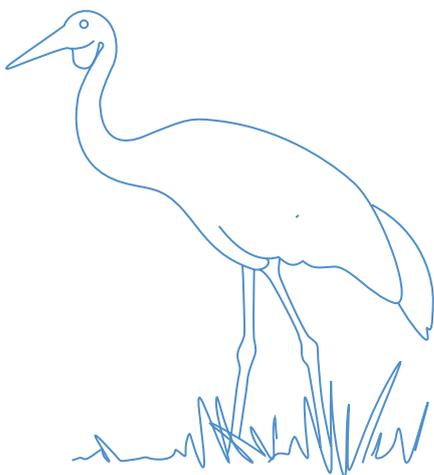


Figure 1.1.5 Environmental condition report card scores, the Living Murray program icon sites, 2006-07 to 2019-20

	Barmah-Millewa Forest	Gunbower Forest	Koondrook-Perricoota Forest	Hattah Lakes	Lindsay, Mulcra and Wallpolla islands	Chowilla floodplain	Lower Lakes, Coorong and Murray Mouth
2019-20	B	B	D	A	B	C	C
2018-19	B	A	D	B	B	B	C
2017-18	A	B	D	A	B	B	C
2016-17	A	B	C	A	B	B	B
2015-16	B	B	D	A	B	C	C
2014-15	B	B	D	A	-	C	B
2013-14	C	B	D	B	C	C	B
2012-13	C	B	D	C	C	C	B
2011-12	C	C	D	B	B	C	B
2010-11	B	B	D	C	C	B	D
2009-10	C	C	D	D	D	C	D
2008-09	D	C	D	D	D	C	D
2007-08	D	D	D	D	D	-	D

Grades



Most (75-100%) of ecological objectives have been met



More than half (50-74%) of ecological objectives have been met



Fewer than half (25-49%) of ecological objectives have been met



Few (0-24%) of ecological objectives have been met



Data not available

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

There is more information about the program on the VEWH's 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: the contact details are 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's 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...

- 1.2.1 What does 'seasonal' mean?**
- 1.2.2 How does the seasonal watering plan fit into the environmental flows planning process?**
- 1.2.3 Who contributes to the seasonal watering plan?**
- 1.2.4 Can the seasonal watering plan be changed?**
- 1.2.5 When isn't a formal variation required to the seasonal watering plan?**

The seasonal watering plan is a publicly available, transparent preview of 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 seasonal watering plan for the upcoming water year is released by 30 June each year. The 2021-22 plan and any variations are valid for this water year — 1 July 2021 to 30 June 2022 — 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 (ranging from drought to wet) and associated water availability scenarios that may unfold during the year. This scenario planning provides a guide for the VEWH and waterway managers throughout the year when it comes to deciding what environmental flows to deliver. 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 and associated 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 their 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's website. 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.

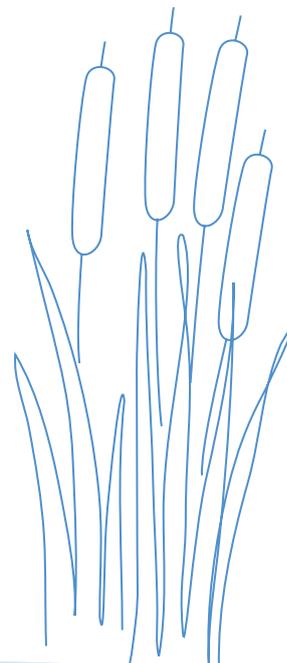
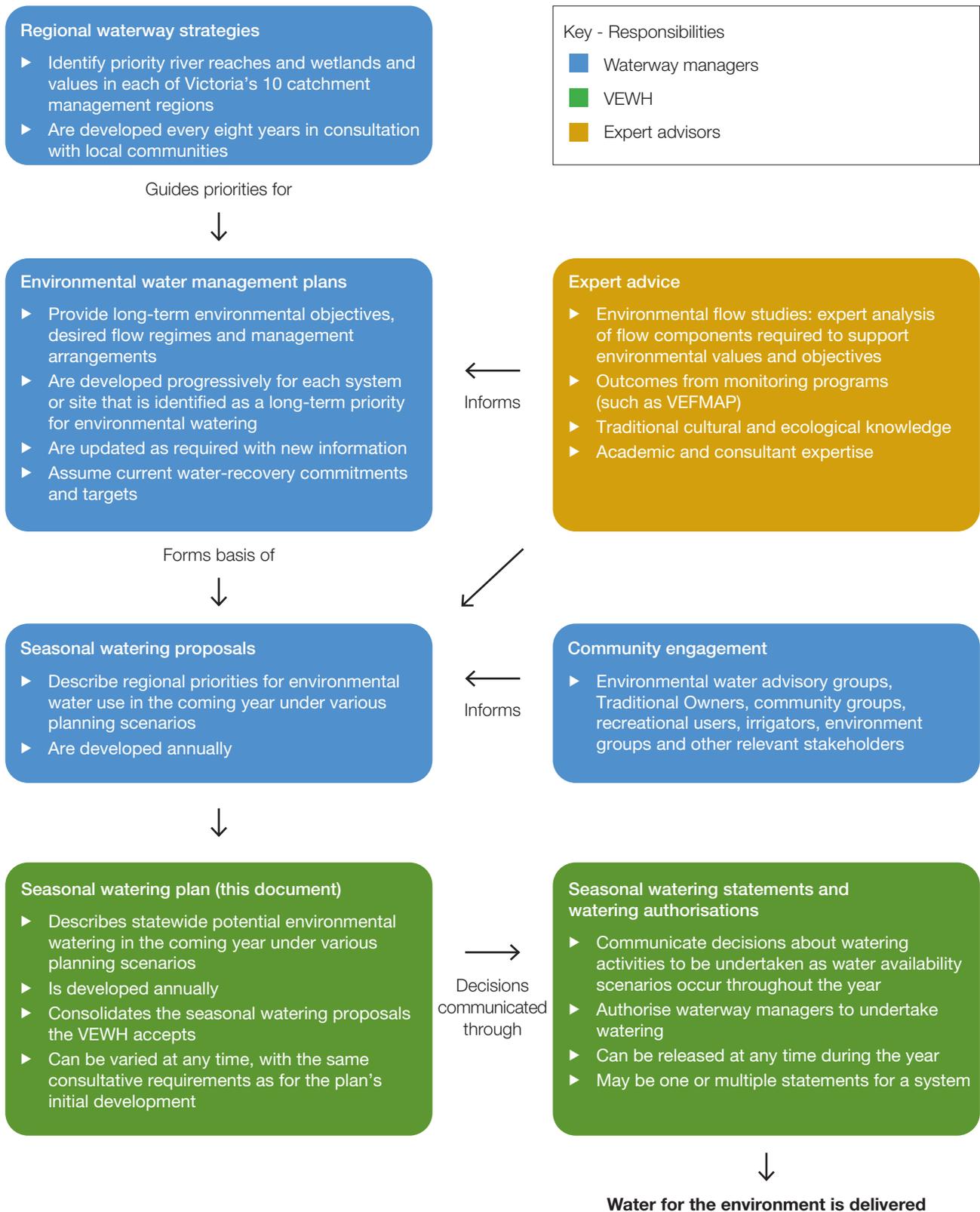


Figure 1.2.1 Victorian environmental watering program planning framework



1.2.3 Who contributes to the seasonal watering plan?

Stakeholder engagement about potential environmental watering actions occurs during the development of seasonal watering proposals. The level and method of engagement vary 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, people 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. This ensures releases of water for the environment align with land and storage management objectives and can feasibly be delivered through planned system operations, and that risks can be adequately managed.

The regional overviews in sections 2 to 5 include a summary of the engagement activities waterway managers undertook when developing seasonal watering proposals.

1.2.4 Can the seasonal watering plan be changed?

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

To enable the flexibility to adapt to changing conditions, the Act allows the VEWH to vary any section of the seasonal watering plan 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 current seasonal watering plan.

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 purposes
- 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 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, timings, magnitudes 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 environmental outcomes, in line with the objectives set out in the seasonal watering plan. Significant changes to the timing, magnitude or duration of a planned watering action must be approved by the VEWH Commission via a formal variation.

Environmental emergency management situations

Water for the environment may be needed for an environmental emergency management situation, for example to mitigate a toxic water-quality event. Section 1.3.7 describes how environmental watering emergencies are managed and authorised.

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 may be required to meet downstream demands beyond the scope of this plan (such as for the Coorong, Lower Lakes and Murray Mouth area in South Australia). 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 harm to 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...

- 1.3.1 How are watering decisions made throughout the year?**
- 1.3.2 When does the Victorian Environmental Water Holder commit and authorise the use of water for the environment?**
- 1.3.3 How does the Victorian Environmental Water Holder prioritise different watering actions when there is not enough water for the environment available?**
- 1.3.4 Do seasonal conditions affect how water for the environment is used?**
- 1.3.5 How are economic, recreational, social and Aboriginal cultural values and uses considered in environmental watering decisions?**
- 1.3.6 How are risks managed?**
- 1.3.7 How are environmental watering emergencies 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 or costs associated with an environmental watering action
- the opportunity to deliver shared benefits.

It is important there is the 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?

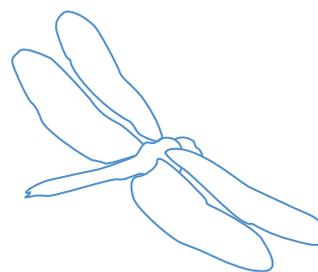
As the season unfolds, many of the uncertainties associated with seasonal conditions, water availability and operational context become clearer, and this clarity informs decisions about what environmental flows should proceed. Many on-ground factors do not become clear until very close to the anticipated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

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 the 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 release 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 associated costs are acceptable.

Where 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 1.1.3 has further information about how these decisions are made.

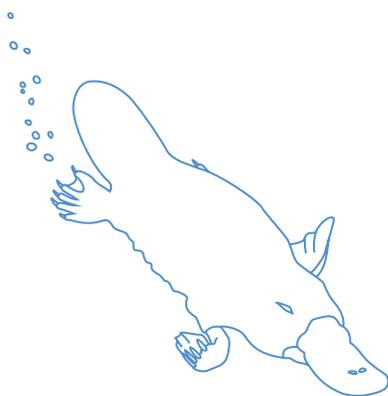
In some instances, the VEWH may commit water very close to the anticipated date of release. This may be necessary because demand for the water arises at short notice, due to environmental, operational or weather conditions. For example, a colonial waterbird nesting event in Barmah Forest may trigger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

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 explained above. The VEWH formally authorises the use of that water through seasonal watering statements. When water in Victorian accounts held by the CEWH and the Living Murray program is needed for delivery to non-Victorian sites, the VEWH enables the water use through a watering authorisation. Watering authorisations generally include the same conditions and requirements as seasonal watering statements, but the water must be ordered and delivered by the VEWH instead of a waterway manager.

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

The VEWH may withdraw a seasonal watering statement or watering authorisation at any point during the year, in consultation with relevant environmental water holders and 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 available water for the environment (and funding) is used, carried over or traded, to maximise benefits 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 environmental water requirements of particular sites (the demand) and the availability of water for the environment (the supply).

A deficit in supply might arise because of:

- large, high-value demands for water for the environment
- low water availability.

To avoid a deficit, the VEWH may look to use tools such as carryover and trade (as explained in subsection 1.4.2). Where a deficit is unavoidable, the VEWH in collaboration with waterway managers and other water holders if relevant must prioritise environmental watering actions.

Prioritisation decisions are informed by factors including such as likely environmental outcomes, the previous watering history in a specific river or wetland, environmental and public risks, seasonal conditions and the delivery of cultural and recreational benefits. Potential watering actions might be prioritised within a site, between sites and/or over multiple years. Trade-offs may also be made between delivering watering actions and selling water allocation to fund complementary works and measures or to improve knowledge and capability that will result in better environmental outcomes.

In deciding to prioritise one environmental watering action or site over another, or to prioritise a water sale over delivery, 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 the VEWH considers when making 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 (as explained in subsection 1.4.1) 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 governments' 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 to pay the costs of water delivery and/or storage
- the merit of selling available water allocation to fund works or technical investigations to enhance environmental outcomes
- services associated with the management of 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, land managers and communities (including Traditional Owners, recreational user groups, environmental groups and farming groups) all have a role in the process of prioritising environmental watering actions, depending on the nature and scale of the decisions 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.

The advice of storage managers is important to understand the feasibility of delivering a watering action at a particular time, given potential operational constraints.

Land managers consent to the delivery of environmental flows on their land, and they advise about 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 generally prioritise sites (for watering and other river health activities) that have high economic, environmental, social and Aboriginal cultural 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 outcomes they can achieve using water for the environment by considering factors including:

- environmental objectives under each climatic scenario including consideration of any essential needs for water for the environment
- how rainfall, natural flooding or the delivery of water for operational and/or consumptive use may contribute to the achievement of 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 under a range of climatic conditions

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	No or negligible contributions from unregulated flows; waterways may stop flowing at times, more likely in 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 the year
Management objectives	<ul style="list-style-type: none"> • Avoid critical loss • Maintain refuges • Avoid catastrophic events 	<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 	<ul style="list-style-type: none"> • Improve ecological health and resilience • Improve recruitment opportunities for key plant and animal species 	<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 and/or magnitude of flow peaks to freshen water quality in deep refuge 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 economic, recreational, social and Aboriginal cultural values and uses considered in environmental watering decisions?

By improving the health of rivers, wetlands and floodplains, environmental watering provides many direct benefits to the community: it can enhance places that people visit to relax, play and connect with nature, increase populations of fish species popular with anglers, sustain healthy Country and totem species for Aboriginal communities and improve the quality of water available to irrigators. Or the benefits can be opportunistic: for example, the delivery of an environmental flow can be timed so kayakers and other recreational users of a river know about the flow and can take advantage of it.

Waterway managers work with communities to identify the cultural, economic, recreational, social and Aboriginal cultural values and uses of waterways and to consider them in regional catchment strategies, regional waterway strategies, environmental water management plans and seasonal watering proposals. Where possible, opportunities to support these values and uses are incorporated into watering decisions, provided they do not compromise environmental outcomes.

The community values and uses considered during planning for environmental flows in 2021-22 are summarised in each system section (sections 2 to 5). Specific watering actions planned to align with a social or recreational objective or to be delivered in partnership with Traditional Owners to support Aboriginal cultural values and uses are identified by the icons in Figure 1.3.3.

Longer-term community benefits may sometimes require short-term inconvenience. For example, floodplain watering in Hattah Lakes may limit access and so inconvenience campers for a short time, but the environmental benefits of the watering are likely to improve tourism and recreational opportunities in the longer term. In such cases, waterway managers work closely with land managers to limit disruption to users as much as possible.

Program partners continue to work with stakeholders to look for opportunities to achieve shared community benefits from water for the environment throughout the year.

Figure 1.3.3 Cultural, social and recreational objectives icons

Icon	Objective
	Watering planned and/or delivered in partnership with Traditional Owners to support Aboriginal cultural values and uses
	Watering planned to support water sports activities (e.g. canoeing, kayaking, rowing, swimming, water skiing)
	Watering planned to support waterbird-related recreational activities
	Watering planned to support angling activities
	Watering planned to support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

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 inter-agency risk, respects the risk management practices of each partner and documents roles and responsibilities in operating arrangements.

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 to mitigate the risks as agreed with relevant program partners. Watering actions will not be implemented if unacceptable risks to the public or the environment cannot be mitigated.

Table 1.3.1 Main shared risks of environmental watering

Type of risk	Example mitigating actions
Environmental watering contributes to third-party impacts	<p>Identify and understand the capacities of water systems and monitor water levels at key locations to inform daily water release decisions to ensure impacts do not eventuate.</p> <p>Consider potential catchment run-off from forecast rainfall before deciding on the timing of releases of water for the environment.</p> <p>Implement a communication strategy that 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.</p> <p>Restrict access by closing gates and tracks.</p>
Inability to achieve or demonstrate ecological outcomes from environmental watering	<p>Undertake intervention monitoring within available resources to identify the ecological response.</p> <p>Conduct research to better understand responses to water for the environment.</p> <p>Communicate the outcomes of monitoring and incorporate learnings into future environmental watering.</p> <p>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.</p>
Environmental watering has negative effects on the environment (for example blackwater, bank erosion and the spread of weeds)	<p>Plan the timing, frequency, duration and variability of environmental flows to limit negative effects.</p> <p>Monitor environmental watering outcomes and adapt future deliveries and/or scientific recommendations if necessary.</p>

Even with best practice risk management controls, there may be unintended effects 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.

1.3.7 How are environmental watering emergencies managed?

An emergency watering action is where water for the environment may be required to prevent, mitigate or respond to an acute environmental threat. Common threats are to water quality from low oxygen levels, toxic levels of blue-green algae, high temperatures or high salinity and if water levels drop at a refuge habitat or breeding site and pose an immediate risk to native aquatic biota.

Due to the unpredictability of acute environmental threats, potential emergency watering actions may not be specifically described in sections 2 to 5 of this seasonal watering plan. The VEWH has developed an emergency watering procedure to allow unplanned emergency environmental watering actions to be taken at short notice.

Emergency watering procedure

Emergency environmental watering actions typically fall into two scenarios:

- where the required watering action is not described (adequately or at all) in the current seasonal watering plan, but there is a valid seasonal watering statement with water available that covers other watering actions for the affected system and authorises a total volume that is sufficient for the proposed emergency watering action
- where there is no authorised seasonal watering statement for the affected system or there is insufficient water available under the seasonal watering statement to cover the proposed emergency watering action.

Under the first scenario, waterway managers may reprioritise watering actions authorised under the existing seasonal watering statement to allow an emergency watering action to be delivered without impacting the overall resource. Under the second scenario, waterway managers must request an emergency seasonal watering statement from the VEWH before water for the environment can be used for an emergency watering action. The VEWH has administrative processes to support emergency environmental watering decisions and to expedite requests for emergency seasonal watering statements.

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 2021-22.

In this section...

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

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 VEW. Table 1.4.1 shows the entitlements held by the VEW as at 12 April 2021, including those held in trust for the Living Murray program. The VEW's environmental entitlements can be viewed at waterregister.vic.gov.au/water-entitlements/bulk-entitlements.

Table 1.4.1 Environmental entitlements held by the VEW (as at 12 April 2021)

System	Entitlement	Volume (ML)	Class of entitlement
Gippsland region			
Latrobe	Blue Rock Environmental Entitlement 2013	18,737 ¹	Share of inflow
	Latrobe River Environmental Entitlement 2011	n/a ²	Unregulated
Thomson	Bulk Entitlement (Thomson River – Environment) Order 2005 ³	10,000 8,000 ¹	High reliability Share of inflow
Macalister	Macalister River Environmental Entitlement 2010	12,461	High reliability
		6,230	Low reliability
Central region			
Yarra	Yarra Environmental Entitlement 2006 ³	17,000	High reliability
		55	Unregulated
Tarago	Tarago and Bunyip Rivers Environmental Entitlement 2009	3,000 ¹	Share of inflow
Werribee	Werribee River Environmental Entitlement 2011 ³	n/a ¹	Share of inflow
		734 361	High reliability Low reliability
Moorabool	Moorabool River Environmental Entitlement 2010 ³	7,086 ¹	Share of inflow
Barwon	Barwon River Environmental Entitlement 2011	n/a ²	Unregulated
	Upper Barwon River Environmental Entitlement 2018	2,000 ¹	Share of inflows
Western region			
Glenelg and Wimmera	Wimmera and Glenelg Rivers Environmental Entitlement 2010 ^{3,4}	40,560	High reliability
		1,000	Lower reliability

System	Entitlement	Volume (ML)	Class of entitlement
Northern region			
Victorian Murray	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999	45,267	High reliability
		8,523	Low reliability
		49,000	Unregulated
	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999 – Barmah-Millewa Forest Environmental Water Allocation	50,000	High reliability
		25,000	Low reliability
	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999 – Living Murray	9,589	High reliability
		101,850	Low reliability
		34,300	Unregulated
Environmental Entitlement (River Murray – NVIRP Stage 1) 2012	1,223 ⁵	High reliability	
Bulk Entitlement (River Murray – Snowy Environmental Reserve) Conversion Order 2004	29,794	High reliability	
Water shares – Snowy Environmental Reserve	14,671	High reliability	
	6,423	Low reliability	
Water shares – the Living Murray program	12,267	High reliability	
Goulburn	Goulburn River Environmental Entitlement 2010	26,555	High reliability
		5,792	Low reliability
	Environmental Entitlement (Goulburn System – Living Murray) 2007	39,625	High reliability
		156,980	Low reliability
	Environmental Entitlement (Goulburn System – Northern Victoria Irrigation Renewal Project (NVIRP) Stage 1) 2012	1,682 ⁵	High reliability
	Bulk Entitlement (Goulburn System – Snowy Environmental Reserve) Order 2004	30,252	High reliability
		8,156	Low reliability
	Water Shares – Snowy River Environmental Reserve	8,321	High reliability
17,852		Low reliability	
Water shares – the Living Murray program	5,559	High reliability	
Silver and Wallaby Creeks Environmental Entitlement 2006	n/a	Passing flow only	
Broken	Water Shares	90	High reliability
		19	Low reliability
Campaspe	Environmental Entitlement (Campaspe River – Living Murray Initiative) 2007	126	High reliability
		5,048	Low reliability
	Campaspe River Environmental Entitlement 2013	20,652	High reliability
		2,966	Low reliability
Loddon	Bulk Entitlement (Loddon River – Environmental Reserve) Order 2005 ^{3,4}	10,970	High reliability
		2,024	Low reliability
	Environmental Entitlement (Birch Creek – Bullarook System) 2009 ^{3,4}	100	n/a ⁶
Water Shares – Snowy River Environmental Reserve	470	High reliability	

Further detail about the Water Holdings can be obtained from the Victorian Water Register (www.waterregister.vic.gov.au).

1 Water is accumulated continuously according to a share of inflows to these entitlements (i.e. the Blue Rock 9.45%, Thomson 3.9%, Tarago 10.3%, Werribee 10.0%, Moorabool 11.9% and upper Barwon River 3.8%). This volume represents the maximum that can be stored at any time, except for Werribee because the VEWH entitlement does not include a storage share in the Werribee system. The actual volume available in any year varies according to inflows.

2 Water available under these entitlements is dependent upon suitable river heights rather than a permitted volume.

3 The entitlement includes passing flows in addition to a volumetric entitlement.

4 The entitlement includes unregulated water in addition to a volumetric entitlement.

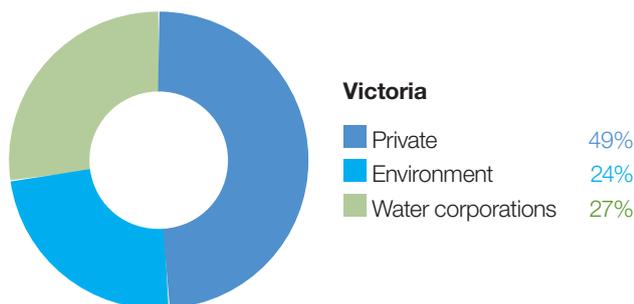
5 This entitlement volume is the mitigation water savings from GMW Connections Project Stage 1, as verified in the latest audit.

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

Figure 1.4.1 shows the proportion of water entitlements held in Victoria by private users (such as irrigators and other businesses), water corporations (for household supply) and environmental water holders: the VEWH and the CEWH. Water entitlement proportions for individual systems are presented in sections 2 to 5 of this seasonal watering plan where possible.

The proportions in Figure 1.4.1 are based on the total volume of surface water entitlements recorded in the Victorian Water Register at 30 June 2020. 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. The VEWH has incorporated its storage share volumes for some entitlements (such as for the Barwon and Latrobe systems) that are not represented volumetrically in the register. The proportions do not include water entitlements that are not accounted for in the register (such as passing flows and other rules-based environmental water like the Barmah-Millewa Environmental Water Account or River Murray Increased Flows).

Figure 1.4.1 Proportions of Victorian water entitlements, at 30 June 2020



Where possible, the proportion of water entitlements held by each user group is shown in each system section in the seasonal watering plan. 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 some systems.

Water donations

The VEWH may receive water donations from individuals, community groups and other organisations. This water can be used for environmental watering in the water year in which it was donated including for actions identified in the seasonal watering plan, or it may 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 specified 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 accept the 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 28 February 2021

System	Volume (ML)	Class of entitlement
Broken	534	High-reliability water share
	4	Low-reliability water share
Campaspe	6,624	High-reliability water share
	395	Low-reliability water share
Goulburn	317,557	High-reliability water share
	42,467	Low-reliability water share
Loddon	3,356	High-reliability water share
	527	Low-reliability water share
Murray	362,360	High-reliability water share
	35,413	Low-reliability water share
Ovens	123	High-reliability water share
Wimmera	28,000	Low-reliability water share

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. Since 2017-18, the MDWWG has partnered with some CMAs in northern Victoria to deliver water for the environment to wetlands on private land. These deliveries are outside the Victorian Water Holdings and are therefore 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?

The VEWH and other environmental water holders use various tools (such as carryover, trade and the ability to use return flows or coordinate with other water deliveries) to meet required environmental demands as efficiently as possible. However, where the demand for environmental water exceeds the available supply, the VEWH (in collaboration with waterway managers and other water holders where relevant) must prioritise environmental watering actions.

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 environmental benefits. 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 may partly or wholly meet an environmental objective
- **alterations to the timing and route of 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.

Return flows

In some systems, water for the environment delivered through upstream sites can be used again downstream.

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. Moreover, re-using water at multiple sites helps to support important ecological processes (such as transporting nutrients, plants and animals between waterways).

The VEWH'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 program, when the VEWH delivers water on their behalf.

Where possible, return flows are reused to provide benefits at Victorian environmental sites. If not needed in Victoria, VEWH, Living Murray and CEWH return flows will continue to flow across the border to South Australia 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 VEWH 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 VEWH to smooth out some of the variability in water availability across systems and years. Under certain circumstances, it can enable the VEWH to move water to the systems where it is most needed. The VEWH can trade water allocated to its entitlements by:

- administrative water transfers between the VEWH'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. There is no financial consideration associated with administrative water transfers, except for administrative fees that a water corporation may charge.

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 nine out of the 10 years 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 has typically only sold water where it was not required for a foreseeable environmental demand.

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

- purchase water to meet critical environmental demands in any Victorian system
- invest in monitoring or technical studies that will improve the 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.

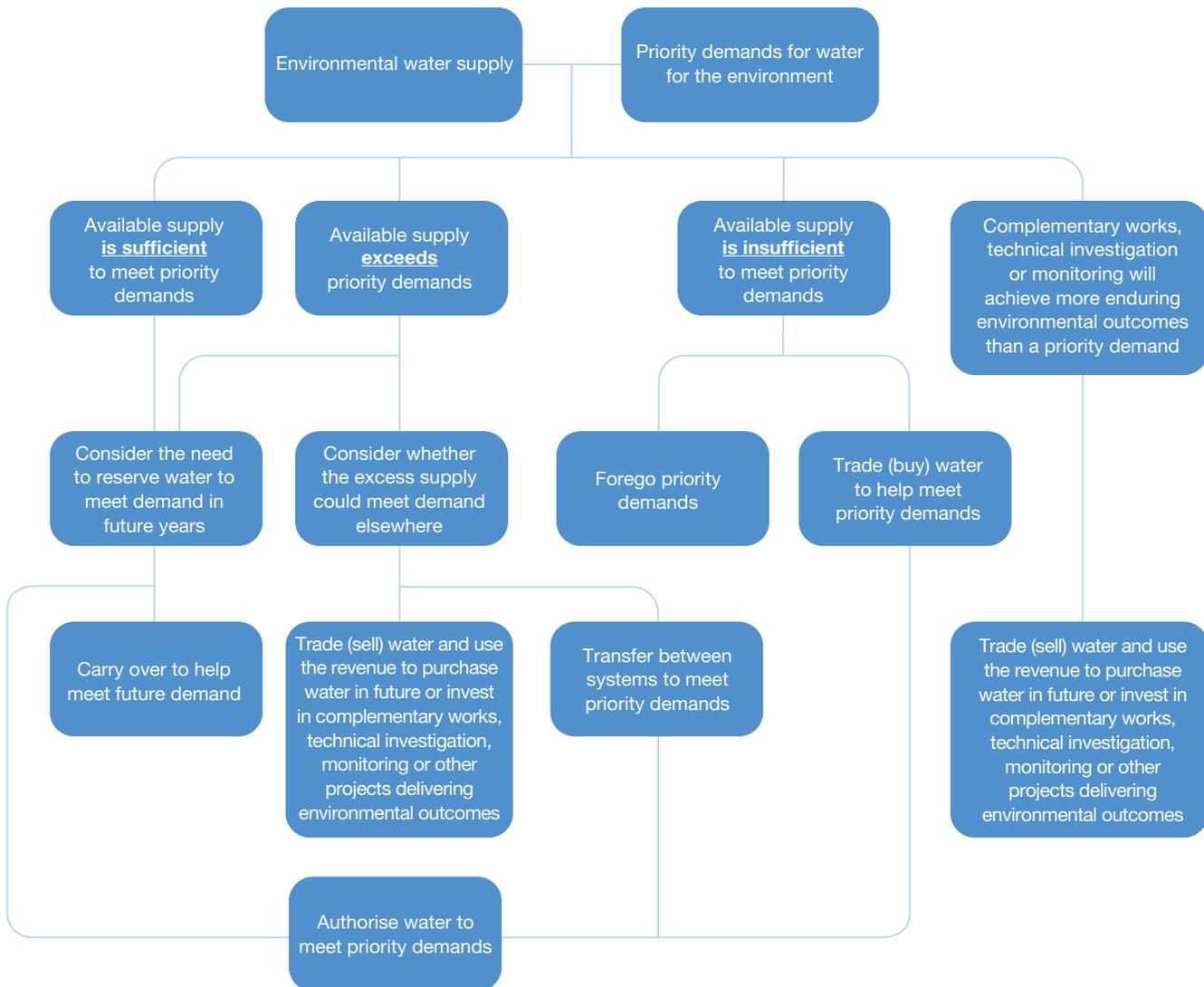
There may be occasions when the VEWH decides to sell water to invest in complementary works, measures, technical studies or other priorities, rather than use it or carry it over. This may occur if projects are shown to optimise environmental watering outcomes for an enduring benefit, beyond what could be achieved with delivering the equivalent volume of traded water in a single year. The VEWH consults with DELWP where these projects have government policy or program implications.

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.

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 shows the key considerations that guide the VEWH’s use, carryover and trade decisions. The VEWH regularly assesses its water demand and supply position throughout the year.

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

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

Information in the system sections includes:

- **a system introduction page**, which includes:
 - the names, if applicable, of the one or more waterway managers, storage managers and/or environmental water holders for 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
- **a table of environmental objectives in the system**, which summarises the measurable outcomes that are sought for each environmental value in the system. Each objective will likely rely on the 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 is an example of this table
- **Traditional Owner and recreational values**, which have been considered as part of the planning for environmental flows, including opportunities to support these values provided environmental outcomes are not compromised
- **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)
- **scope of environmental watering**, which is a table of potential environmental watering actions in 2021-22, their expected watering effects (that is, the intended physical or biological effect of the watering action) and the longer-term environmental objective they support. Achievement of each environmental objective relies on one or more potential environmental watering actions and their expected watering effects. Figure 1.5.2 is an example of this table
- **scenario planning**, which indicates in table form the range and priority of potential environmental watering actions that might be delivered in the coming year under different climate and water availability scenarios. The text accompanying the table describes the rationale or need for the proposed combination of potential environmental watering actions under each scenario. For example, the table 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, and the text will explain why those flows are important. The climate scenarios considered in most cases are drought, dry, average and wet but occasionally more or fewer scenarios are used. Section 1.3.4 explains how seasonal conditions are considered in planning. Figure 1.5.3 is an example of the scenario planning table.

Figure 1.5.1 Example environmental objectives table

Environmental objectives in the Macalister system	
	Increase the distribution, recruitment and abundance of native fish
	Improve native emergent (non-woody) and fringing (woody) vegetation in the streamside zone
	Increase the abundance and number of functional groups of waterbugs
	Increase the abundance of platypus and rakali (water rats)

In this example, environmental flows that provide optimal spawning opportunities for Australian grayling will contribute to achieving this objective, as will complementary works such as the construction of fishways to increase the habitat range for native fish.

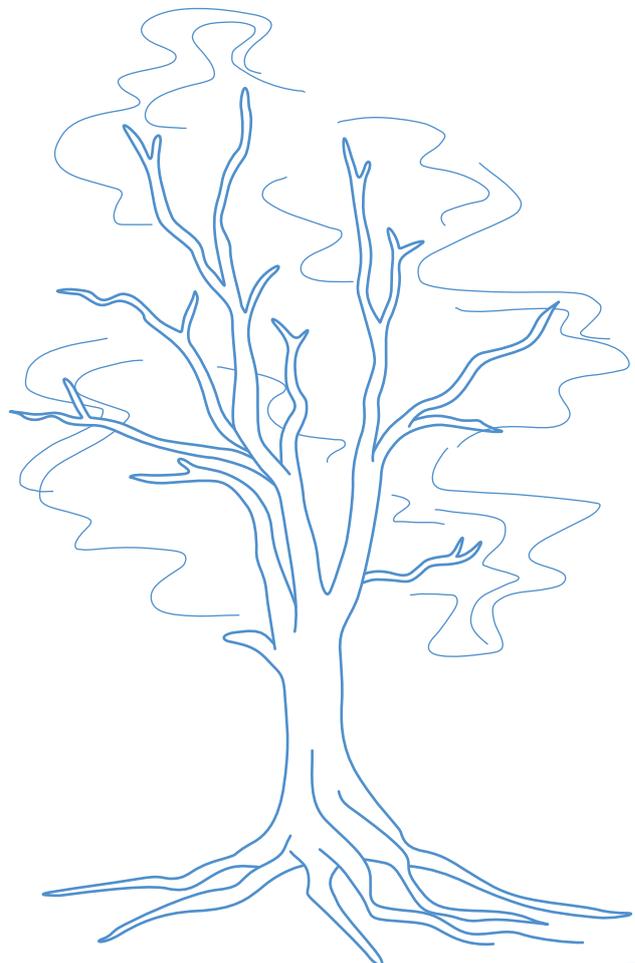


Figure 1.5.2 Example potential environmental watering actions and objectives table

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 VEVH authorise waterway managers to undertake environmental watering actions described in this table. Subsection 1.3.2 explains how seasonal watering statements and watering authorisations 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	Expected watering effects	Environmental objectives
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 	   

These example icons demonstrate which potential watering actions may be modified to increase benefits to Traditional Owner values or recreational opportunities, provided environmental outcomes are not compromised.

The ability of the VEVH and its partners to modify flows to deliver these benefits will depend on the weather, climate considerations, the available water and the way the system is being operated to deliver water for other purposes.

An **expected watering effect** is the physical chemical, biological or behavioural effect expected from a potential watering action. Each potential watering action will have one or more expected watering effects.

Figure 1.5.3 Example scenario planning table

Planning scenario	Drought	Dry	Average	Wet
Expected river conditions	<ul style="list-style-type: none"> No unregulated flows Passing flows reduced 	<ul style="list-style-type: none"> Possible spills from storages in spring, minor flood levels may occur Passing flows may be reduced 	<ul style="list-style-type: none"> Regular spills from storages in spring, minor to moderate flood levels may occur 	<ul style="list-style-type: none"> Large and frequent spills from storages, moderate to major flood levels may occur
Predicted supply of water for the environment	• 1,000 ML	• 1,500 ML	• 6,000 ML	• 8,000 ML
Potential environmental watering – tier 1 (high priorities)	Tier 1a (can be achieved with predicted supply)			
	<ul style="list-style-type: none"> Summer/autumn low flow Summer fresh (one fresh) 	<ul style="list-style-type: none"> Summer/autumn low flow Summer/Autumn low flow (one fresh) 	<ul style="list-style-type: none"> Winter/spring low flow Winter spring fresh (two freshes) Winter/spring high flow (one high flow) Summer/autumn low flow Summer/autumn fresh (three freshes) 	<ul style="list-style-type: none"> Winter/spring low flow Winter spring fresh (four freshes) Winter/spring high flow (two high flows) Summer/autumn low flow Summer/autumn fresh
	Tier 1b (supply deficit)			
	<ul style="list-style-type: none"> Winter spring low flow Summer/autumn fresh (one fresh) 	<ul style="list-style-type: none"> Winter/spring low flow Winter/spring fresh (one fresh) Summer/autumn fresh (two freshes) 	<ul style="list-style-type: none"> Winter/spring fresh (two freshes) Spring high flow (one high flow) 	<ul style="list-style-type: none"> Winter/spring high flows (two high flows) Autumn high flow (one high flow)
Potential environmental watering – tier 2 (additional priorities)	• N/A	• N/A	• Autumn high flow (one high flow)	• N/A
Possible volume of water for the environment required to achieve objectives	<ul style="list-style-type: none"> 800 ML (tier 1a) 2,000 ML (tier 1b) 	<ul style="list-style-type: none"> 1,300 ML (tier 1a) 2,500 ML (tier 1b) 	<ul style="list-style-type: none"> 4,200 ML (tier 1a) 2,000 ML (tier 1b) 1,200 ML (tier 2) 	<ul style="list-style-type: none"> 6,200 ML (tier 1a) 1,200 ML (tier 1b)
Priority carryover requirements	• 200 to 1,800 ML			

Predicted volume of water for the environment that will be available over the entire year.

Potential watering actions that are required this year given current environmental conditions and the planned environmental watering strategies under each planning scenario.

The subset of tier 1 watering actions that the waterway manager proposes to deliver with predicted supply under each planning scenario.

The remaining tier 1 watering actions that the waterway manager does not expect to be able to deliver if predicted supply is exhausted on tier 1a actions.

Potential watering actions that are generally not required every year to achieve intended environmental objectives but are needed on occasion to meet long-term condition outcomes. At the time of seasonal watering plan development, tier 2 potential watering actions are not considered necessary to deliver in the current year under specific planning scenarios, but are likely to be needed in coming years and may be delivered in the current year if environmental conditions change or to take advantage of operational circumstances.

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 the volume of water available and carryover are made before the beginning of the water year and are based on best available information. They are estimates only, and the VEWH and its program partners revise the estimates continually throughout the year.