Seasonal Watering Plan

2025-26

VICTORIAN ENVIRONMENTAL WATER HOLDER

VICTORIA State Government

Acknowledgement of Traditional Owners

The Victorian Environmental Water Holder (VEWH) proudly acknowledges Victoria's Traditional Owners and their rich culture and pays our respect to Elders past and present, whose knowledge and wisdom have ensured the continuation of culture and traditional practices.

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it.

We are committed to genuinely partner and meaningfully engage with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

The VEWH sees the meaningful intersection between the aims of the environmental watering program—healthy waterways, healthy communities—and the deep and enduring obligations Traditional Owners have to Country and to Aboriginal people. We deeply value the ongoing contribution that Traditional Owners and Aboriginal knowledge systems are making to planning and managing water for the environment. We recognise that this contribution is largely through frameworks and processes that have not been determined by Traditional Owners, and contribution does not imply endorsement of those frameworks and processes. More can be done to increase Traditional Owners' power and agency and enable progress towards self-determination within the environmental watering program.

Adequately recognising and strengthening the rights of Traditional Owners in water management is critical for achieving self-determination and healthy waterways into the future. The VEWH is committed to an active role in supporting and enabling this within its power and capability.

Cover image: Molesworth Billabong, Taungurung Biik, by Taungurung Land and Waters Council.

Acknowledgement of program partners

The VEWH acknowledges that the seasonal watering plan is based on the significant contributions and hard work of Victoria's catchment management authorities, Melbourne Water and Traditional Owner corporations in consultation with their communities.

Our program partners who contributed to the plan this year are shown below.

Between 2023 and 2025, the VEWH worked closely with five Traditional Owner Nations and together developed new guidelines for Traditional Owners making seasonal watering proposals for the use of environmental water in Victoria to heal Country. We acknowledge:

- Barapa Barapa Wamba Wemba Water for Country Steering Committee
- DJAARA (Dja Dja Wurrung Clans Aboriginal Corporation)
- First People of the Millewa-Mallee Aboriginal Corporation
- Taungurung Land and Waters Council
- Tati Tati Kaiejin.

Contents

SECTION 1:
Introduction

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

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

Information about the Victorian environmental watering program is on the Victorian Environmental Water Holder's (VEWH's) website at **vewh.vic.gov.au** or available from the VEWH on (03) 9637 8951 or by email to **general.enquiries@vewh.vic.gov.au**.

This includes general information such as:

- what water for the environment is
- why water for the environment is important
- what the environmental watering program aims to achieve
- what delivery of water for the environment involves
- how we know if water for the environment is successful
- what environmental water trading is.

You can get more detailed information about water for the environment in your region by contacting your local catchment management authority or Melbourne Water (waterway manager): the contact details are in **section 6.3**.

1.1 The seasonal watering plan

The seasonal watering plan is a statewide plan that guides decisions about delivering water for the environment in Victoria. It outlines how water for the environment may be used across the state under different planning scenarios and tells our program partners, stakeholders and communities what to expect during the water year.

In this section...

This seasonal watering plan publicly describes all the potential watering actions that may be carried out using water available under 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. Decisions about watering actions are finalised throughout the year after the approval of seasonal watering statements and watering authorisations and associated costs by the VEWH, based on water availability, climate, risk and other inputs.

The VEWH releases the seasonal watering plan for the upcoming water year by 30 June each year. The plan is valid for the whole water year from 1 July to 30 June, or until the next seasonal watering plan is released.

1.1.1 What 'seasonal' means

'Seasonal' refers to various climate conditions in a given year, including typical differences between summer, autumn, winter and spring and whether a year is estimated to be drier or wetter than average.

Seasonal conditions affect the health and needs of plants and animals, water quality, water availability and the environmental watering actions that may be delivered in a given year.

When we plan water for the environment, we consider potential seasonal conditions ranging from drought to wet and related water availability scenarios for the year.

This scenario planning enables the VEWH and waterway managers to describe potential environmental flows before the start of the water year and adapt to seasonal conditions as they occur. There is more on how seasonal conditions influence environmental flows planning and delivery in **subsection 1.2.4**.

Sections 2 to 5 of the seasonal watering plan have more details about potential watering actions that may be delivered in each river and wetland system during the year under different climatic conditions.

1.1.2 Developing the seasonal watering plan

Each year, waterway managers scope potential environmental watering actions for their region and prepare seasonal watering proposals for submission to the VEWH.

The proposals look at the priorities and values in regional waterway strategies and draw on environmental water management plans, environmental flows studies, monitoring outcomes and biocultural knowledge of Traditional Owners. Waterway managers also seek further information and advice from Traditional Owners, technical experts, stakeholders and local communities when preparing proposals.

The VEWH reviews the proposed watering actions in each seasonal watering proposal and consolidates accepted watering actions into the annual seasonal watering plan.

The different stages of environmental flows planning are shown in **Figure 1.1.1**. There is more information about environmental flows studies and environmental water management plans at **www.water.vic.gov.au/waterways**.

Figure 1.1.1 Victorian environmental watering program planning framework

Key - Responsibilities

- Waterway managers
- VEWH
- Expert advisors

Regional waterway strategies

- Identify priority river reaches and wetlands and values in each of Victoria's 10 catchment management regions
- Are developed every eight years in consultation with local communities

Guides priorities for

Environmental water management plans

- Provide long-term environmental objectives, desired flow regimes and management arrangements
- Are developed progressively for each system or site that is identified as a long-term priority for environmental watering
- Are updated as required with new information
- Assume current water recovery commitments and targets

Informs

Expert advice

- Environmental flows studies: expert analysis of flows components required to support environmental values and objectives
- Outcomes from monitoring programs (such as the Victorian Environmental Flows Monitoring Assessment Program)
- Traditional cultural and ecological knowledge
- Academic and consultant expertise

Forms basis of

Seasonal watering proposals

- Describe regional priorities for environmental water use in the coming year under various planning scenarios
- Are developed annually

Informs

Community engagement

- Environmental water advisory groups, Traditional Owners, community groups, recreational users, irrigators, environment groups and other relevant stakeholders

Seasonal watering plan (this document)

- Describes statewide potential environmental watering in the coming year under various planning scenarios
- Is developed annually
- Consolidates the seasonal watering proposals the VEWH accepts
- Can be varied at any time, with the same consultative requirements as for the plan's initial development

Decisions communicated through

Seasonal watering statements and watering authorisations

- Communicate decisions about watering activities to be undertaken as water availability scenarios occur throughout the year
- Authorise waterway managers to undertake watering
- Can be released at any time during the year
- May be one or multiple statements for a system

Water for the environment is delivered

1.1.3 Who contributes to the seasonal watering plan

Program partners in the environmental watering program are those with some implementation responsibility, while stakeholders are those organisations or individuals with an interest in the environmental watering program.

The VEWH's program partners include Victoria's waterway managers, the Department of Energy, Environment and Climate Action (DEECA), other environmental water holders, storage managers and land managers. Traditional Owners also increasingly partner in the environmental watering program.

Waterway managers consult and engage locally about potential actions to deliver water for the environment as seasonal watering proposals are being developed. Levels and methods of engagement vary, depending on different water systems, watering actions and stakeholders across Victoria and regional preferences. Traditional Owners, irrigators, farmers, people living close to or interested in a specific waterway and members of recreational and environmental groups are examples of stakeholders who get involved.

Some regions have formal environmental watering advisory groups for waterway managers and stakeholders to talk about potential environmental flows for the coming year. There can also be one-on-one engagement between waterway managers and interested stakeholders.

Stakeholder engagement can help inform environmental objectives and community priorities and provide advice about cultural, social, recreational and economic values and uses.

Land managers and water storage managers endorse the seasonal watering proposals. Their endorsement ensures that releases of water for the environment align with land and storage management objectives, that they can feasibly be delivered through planned system operations and that risks can be adequately managed.

1.1.4 Changes to the seasonal watering plan

Under the *Water Act 1989* (the Water Act), the VEWH can only authorise the use of water for the environment if it is consistent with the seasonal watering plan. This provides transparency about the planning and management of environmental flows.

The Water Act allows the VEWH to vary the seasonal watering plan to incorporate new knowledge or address circumstances not identified before the start of the water year. There is more information about variations, which are separate attachments to the current seasonal watering plan at **www.vewh.vic.gov.au/annual-planning-and-reporting/seasonal-watering-plan**.

1.1.5 When a formal variation to the seasonal watering plan is not required

There may sometimes be an unforeseen circumstance that calls for the use of water for the environment but that does not require a variation to the seasonal watering plan. This includes:

- making a minor operational adjustment to a specific water delivery action
- using water for the environment for environmental emergency management purposes
- using a small volume of water for the environment for a technical investigation or to maintain infrastructure
- helping to deliver water for the environment held by other water holders for downstream, non-Victorian objectives.

The VEWH cannot anticipate such circumstances or include details about them in this plan. Waterway managers consult the VEWH in all situations where releases of water for the environment do not align with the seasonal watering plan.

Minor operational adjustments

There may occasionally be minor operational adjustments to actions to deliver water for the environment. The targeted river reaches, flow rates, timings, magnitudes and durations detailed in **sections 2 to 5** may need to be adjusted because of changes in predicted rainfall, other water orders, delivery infrastructure constraints, emerging environmental knowledge or the timing of specific ecological triggers (such as bird breeding).

In all cases, actions will still aim to optimise environmental outcomes to meet the seasonal watering plan's objectives.

Any changes to the timing, magnitude or length of a planned watering action must be approved by the VEWH Commission through a formal variation when the proposed action requires additional water or funding to support the delivery, or by the VEWH CEO for minor variations relating to the use of water already allocated in the seasonal watering plan.

Environmental emergency management situations

Water for the environment may be needed for an environmental emergency management situation, like mitigating a toxic water quality event. **Section 1.2.8** describes how environmental watering emergencies are managed and authorised.

Small technical investigations and maintenance

There may be situations where a small volume of water for the environment is used for research and development or for small-scale infrastructure testing or maintenance. These are considered on a case-by-case basis and must aim to improve knowledge and 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, such as for the Coorong, Lower Lakes and Murray Mouth area in South Australia. Sometimes, this water needs to be delivered at a time and flow rate not specified in **section 5** of this seasonal watering plan. The VEWH authorises and makes these deliveries possible if potential harms to Victoria's rivers, wetlands and floodplains are managed appropriately.

1.2 Implementing the seasonal watering plan

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

In this section...

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

- seasonal conditions, weather forecasts and catchment conditions
- river and system operations like unregulated flows, catchment inflows, storage levels, other water users' needs and potential delivery constraints
- environmental or biological factors and triggers like plant and animal responses to natural flows or temperature
- water availability
- risks or costs associated with an action to deliver water for the environment
- opportunities to deliver cultural, social, recreational or economic shared benefits.

The flexibility to respond to these different factors is important because they can greatly influence the environmental outcomes and shared benefits that we can achieve.

1.2.1 How watering decisions are made throughout the year

Many of the uncertainties about seasonal conditions, water availability and the consequential effects of system operating rules become clearer as the water year progresses. This clarity informs decisions about which environmental flows described in the seasonal watering plan go ahead and when. Many on-ground factors do not become clear until close to the anticipated water delivery.

The VEWH takes an adaptive management approach to deciding which watering actions to include in the seasonal watering plan by listening, learning from experience and adapting to what's happening on the ground. We consult with program partners and then review and finalise decisions about watering actions for the year so that water for the environment is used efficiently for the best environmental outcomes across Victoria.

Waterway, storage and land managers advise if watering actions can be delivered in each system during the year or if there are barriers to delivery. Environmental water holders use that information to decide which actions to authorise. All program partners have a role in identifying potential watering actions and implementing the release of water for the environment, as explained in **subsection 1.2.3**.

The VEWH can ask program partners for more technical information or community perspectives if planned watering actions need to change significantly during the season to respond to unforeseen circumstances.

Updated information about recent deliveries of water for the environment is published quarterly at **vewh.vic.gov.au**.

1.2.2 When the VEWH commits and authorises the use of water for the environment

Water is committed and authorised for use through seasonal watering statements and watering authorisations that allow waterway managers to release water for the environment. These are made in line with an approved seasonal watering plan and can occur before or during the water year. They are published at **vewh.vic.gov.au** once approved by the VEWH Commission.

Depending on the nature of the system and the environmental water entitlement being used, the VEWH may make one or multiple statements for a system during the water year. The VEWH confirms with the waterway manager that the required delivery arrangements, including risk management measures, are in place and that any related costs are acceptable and funds are available before issuing a seasonal watering statement or as a condition of it.

Decisions to commit water for the environment need to consider if delivery of the water across different systems requires access to the same environmental or bulk entitlement. One river, wetland or flow component may have to be prioritised over another.

The VEWH may sometimes commit water very close to the anticipated date of release. This may be necessary because of a sudden demand for water caused by environmental, operational or weather conditions. For example, a colonial waterbird nesting event in Barmah Forest may trigger a need for water to maintain shallow flooding long enough for the birds to grow and fly from the nest.

The Commonwealth Environmental Water Holder (CEWH) and the Southern Connected Basin Environmental Watering Committee (for the Living Murray program) commit water for use from their respective environmental water portfolios. The VEWH formally authorises the use of CEWH and Living Murray water through seasonal watering statements/watering authorisations. All CEWH and Living Murray water delivered in Victoria is to be used to carry out actions detailed in this seasonal watering plan, in combination with other water sources or not (see **subsection 1.1.5**).

Watering authorisations enable the VEWH to order water for delivery. For delivery of water held in Victoria, this includes:

- to non-Victorian sites without a designated Victorian waterway manager on behalf of the CEWH and/or the Living Murray program
- from a Victorian storage/account to a downstream demand on behalf of the CEWH and/or the Living Murray program
- where joint water orders occur with NSW delivery partners.

These 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.

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

The VEWH can withdraw a seasonal watering statement or watering authorisation at any point during the year to address emerging risks, changes in operating conditions, changes in costs or water availability.

The VEWH consults with the relevant waterway manager, storage manager and any other relevant environmental water holder for that river or wetland system before withdrawing a seasonal watering statement or watering authorisation.

A waterway manager or storage manager may decide, in consultation with the VEWH, not to go ahead with delivering water for the environment 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.

1.2.3 How the VEWH prioritises different watering actions when there is not enough available water for the environment

Seasonal conditions can vary greatly between years, affecting the demand for water for the environment for particular sites and the supply of available water for the environment.

There can be a deficit in supply because of large, high-value demands for water for the environment or low water availability.

The VEWH may use tools like carryover and trade to avoid a deficit. If a deficit can't be avoided, the VEWH works with waterway managers and other relevant water holders to prioritise actions to deliver water for the environment. There is more information about trade in the annual VEWH allocation water trading strategy at **vewh.vic.gov.au**.

Criteria used to guide prioritisation decisions

The VEWH considers criteria, shown in **Figure 1.2.1**, when making trade-off decisions and prioritising specific watering actions. Waterway managers provide information in their seasonal watering proposals about how different watering actions meet these criteria and about opportunities for shared benefits.

Figure 1.2.1 Criteria for prioritising actions to deliver water for the environment

PRIORITISATION CRITERIA	TYPES OF FACTORS CONSIDERED
Extent and significance of environmental benefit	• 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	• Evidence that the desired outcomes are likely to be achieved • External threats that may affect getting the desired results
Longer-term benefits	• 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	• 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	• 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	• 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	• Likely environmental benefit compared against: – costs to deliver and manage water – costs of interventions to manage external threats and risks
Efficiency of water use	• Volume of water needed to achieve the desired outcomes • Volume and timing of return flows that may be used at downstream sites • 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 that may be available
AFTER CONSIDERATION OF ABOVE CRITERIA	
Cultural, social, recreational and economic benefits	• Traditional Owner values and uses • Social and recreational values and activities • Economic benefits

When the VEWH decides how to use its available Water Holdings in any given year, it also considers:

- decisions by other water holders about the use of their water for the environment
- decisions by the Victorian and Commonwealth governments about water resource policy
- the resources, knowledge and capability of the VEWH and its program partners
- storage managers meeting their obligations to the environment as part of 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 allocation water to resource activities, strategic projects, complementary works and measures, research and knowledge to improve the performance of the environmental watering program
- services associated with managing Water Holdings and delivering water for the environment.

Decision-making process for potential watering actions

Under the Water Act, the VEWH determines how the Environmental Water Holdings are used to most efficiently and effectively improve environmental values and the health of water ecosystems.

The VEWH independently considers the relative environmental benefit associated with proposed environmental watering actions and may prioritise those with the greatest benefit.

Waterway managers identify their regional priority sites and watering actions. Seasonal watering proposals developed in consultation with program partners, technical experts and the local community outline annual regional priorities for the VEWH to consider.

Waterway managers engage with stakeholders and communities and advise about the extent and significance of actions to deliver water for the environment and the highest priorities in their region.

Storage managers' advice is vital to understanding how practical it is to water at a particular time within potential operational constraints. Storage managers endorse deliveries of environmental flows through their delivery network. They advise on deliveries after considering likely operational and maintenance activities and the risks associated with the watering actions.

Land managers consent to the delivery of environmental flows on their land after considering land management activities, public access and the risks and benefits of the proposed watering actions.

1.2.4 How seasonal conditions affect the use of water for the environment

Climatic conditions influence how water for the environment is managed, just as rainfall patterns influence how people water their gardens and farmers irrigate their paddocks. As explained in **subsection 1.1.1**, seasonal conditions influence what water will be available during the water year and how that water may be best used to realise environmental objectives. Waterway managers consider a range of seasonal conditions when planning environmental watering actions for sites in their seasonal watering proposals. Seasonal planning scenarios describe the range of watering actions that could occur under conditions ranging from drought to wet.

Waterway managers work with program partners to get the best possible outcomes from water for the environment by considering:

- environmental water management objectives under each planning scenario, plus any essential needs for water for the environment
- how rainfall, natural flooding and delivering water for operational and/or consumptive use can help achieve or affect short-term management objectives and longer-term environmental objectives
- how water for the environment can build on natural flows or irrigation deliveries to meet environmental needs
- natural climatic cues that might help produce an environmental outcome: for instance, a drying wetland.

Planning scenarios are presented in the seasonal watering plan as a basis for adaptively managing environmental water use as the season unfolds. For example, watering actions may be delivered in line with a dry scenario at the start of a water year and then shift to being delivered in line with an average or wet scenario if conditions become significantly wetter. They also indicate how much water may be used at different sites and whether the VEWH may need to trade water during the season to meet identified environmental needs.

Figure 1.2.2 shows how different planning scenarios can influence decisions about how water for the environment is managed in a year.

Figure 1.2.2 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 at any time of the year
MANAGEMENT OBJECTIVES	**Protect** • Avoid critical loss • Maintain refuges • Avoid catastrophic events	**Maintain** • Maintain river functioning with reduced reproductive capacity • Maintain key functions of high-priority wetlands • Manage within dry-spell tolerances	**Recover** • Improve ecological health and resilience • Improve recruitment opportunities for key plant and animal species	**Enhance** • 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 floodpath
			• 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

1.2.5 Traditional Owner cultural values and uses, and recreational, social and economic benefits from water for the environment

When preparing their seasonal watering proposals, waterway managers work with Traditional Owners to identify cultural values and uses of waterways and discuss how waterway managers' seasonal watering proposals may contribute to cultural objectives for healthy Country.

The VEWH recognises current government frameworks for managing water for the environment have not been determined by Traditional Owners, and it is committed to progressing Traditional Owner self-determination in the environmental watering program as set out in the Victorian Government's ***Water is Life: Traditional Owner Access to Water Roadmap*** policy and the VEWH position statement that sets out the VEWH's commitment to progress Traditional Owner self-determination. There is more information about this in **subsection 1.2.6**.

Water delivered for the environment improves the health of rivers, wetlands and floodplains and provides many social, recreational and economic benefits. It helps to increase populations of fish species (including those popular with anglers), support bird breeding events that birdwatchers enjoy and boost experiences for the many people who gravitate to healthier waterways for relaxation and wellbeing.

Waterway managers work with Traditional Owners, stakeholders and communities to identify environmental, cultural, social, economic and recreational values and uses of waterways. They consider opportunities to support cultural, social, recreational and economic values and uses when planning environmental water deliveries, as long as the delivery does not compromise environmental outcomes.

Longer-term benefits for the environment—and the community—sometimes involve short-term inconvenience. For example, floodplain watering in Hattah Lakes may limit access, which can inconvenience campers in the short term, but the environmental benefits of watering boost tourism and recreational experiences in the longer term and add to the experience of connecting with nature. Where short-term inconveniences may happen, waterway managers work with land managers to limit the disruption to users.

Values and uses considered during planning for environmental flows are shown in each system in **sections 2 to 5**. Specific watering actions planned to align with a social or recreational objective or support Aboriginal cultural values and uses are identified by the icons shown in **Figure 1.2.3**.

Figure 1.2.3 Cultural, social and recreational objectives icons

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Watering will also support water sports activities (e.g. canoeing, kayaking, rowing, swimming, water skiing)

Watering will also support waterbird-related recreational activities

Watering will also support angling activities

Watering will also support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

1.2.6 Self-determination for Traditional Owners in the environmental watering program

This seasonal watering plan largely represents existing legislative requirements to consider Aboriginal cultural values when preparing seasonal watering proposals, which are currently based mainly on engagement conducted by waterway managers.

For the first time, this seasonal watering plan includes proposed watering actions submitted by Traditional Owners directly to the VEWH. This is an early outcome of the Victorian Government's 2022 ***Water is Life: Traditional Owner Access to Water Roadmap***. The roadmap sets out short, medium and long-term policy actions to reform existing government frameworks and processes for the management of water on Traditional Owner Country, including water for the environment. The VEWH is working with Traditional Owners, DEECA and waterway, land and storage managers to progress *Water is Life* policy actions.

1.2.7 How risks are managed

Risk management is essential in managing water for the environment, and program partners consider risks continually during annual and longer-term planning, implementation and review.

The VEWH and its program partners have a risk management framework that addresses interagency risk, respects each partner's practices and documents roles and responsibilities for operating arrangements.

The seasonal watering proposals that are the basis for this seasonal watering plan identify potential risks with specific watering actions proposed for the coming water year. Partners jointly assess risks and identify and commit to mitigation actions when developing proposals to manage the shared risks of delivering water for the environment.

The main shared risks are shown in **Table 1.2.1**. Program partners consider and assess these and other potential risks as the season unfolds and planned watering actions are about to start.

Some risks may only happen at the time of delivery, such as forecast heavy rain that coincides with a planned environmental flow that could increase the risk of nuisance flooding. Program partners review risks immediately before a planned environmental flow and take agreed measures to reduce the risks. They identify and agree on mitigation actions through operational risk workshops and endorsement of seasonal watering proposals and/or delivery plans. Watering actions will not be carried out if unacceptable risks to the public or environment cannot be mitigated.

Table 1.2.1 Main shared risks of delivering water for the environment

Type of risk	Example mitigating actions
Delivering water for the environment contributes to third-party impacts	• Identify and understand the capacities of water systems and monitor water levels at key locations to inform daily water release decisions to reduce potential risks. • Take into account the potential catchment run-off from forecast rainfall before deciding on the timing, duration and volume of releases of water for the environment. • Put a communication plan into action (for example, including media releases, public notices and signage) before environmental flows to make sure people are informed about significant deliveries; this includes early liaison with stakeholders who may be affected. • Restrict access by closing gates and tracks.
Inability to achieve or demonstrate environmental outcomes from delivering water for the environment	• Do intervention monitoring with available resources to identify the environmental response and consider longer-term environmental responses. • Conduct research to better understand responses to water for the environment. • Share the outcomes of monitoring and apply learnings to future deliveries. • Identify complementary works to help achieve the environmental objectives of delivering water for the environment.
Delivering water for the environment has adverse effects on the environment (such as bank erosion and the spread of weeds)	• Plan the timing, frequency, length and variability of environmental flows to limit adverse effects. • Monitor the outcomes of deliveries of water for the environment and adapt future deliveries and/or scientific recommendations and learnings if necessary.

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

1.2.8 How environmental watering emergencies are managed

An emergency watering action is where water for the environment may be necessary to prevent, mitigate or respond to an acute environmental threat.

Common threats are:

- impacts on water quality from low oxygen levels, toxic levels of blue-green algae, high temperatures or high salinity
- falling water levels at a refuge habitat or breeding site that are an immediate risk to native aquatic plants and animals.

Acute environmental threats are unpredictable, so potential emergency watering actions may not be specified in **sections 2 to 5** of this plan. The VEWH has developed a procedure for emergency watering actions to be taken at short notice.

Emergency watering procedure

Emergency actions to deliver water for the environment are usually one or other of the following scenarios:

- the necessary 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 enough for the proposed emergency watering action, or
- there is no authorised seasonal watering statement for the affected system, or there is not enough water available under the seasonal watering statement to cover the proposed emergency watering action.

Under the first scenario, waterway managers can re-prioritise watering actions authorised under the existing seasonal watering statement to allow the emergency watering action without affecting the overall resource.

Under the second scenario, waterway managers must ask for 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 decisions to deliver water and to expedite requests for emergency seasonal watering statements.

1.3 How to read the seasonal watering plan

Four broad geographic areas—Victoria's Gippsland, central, western and northern regions—are represented in **sections 2 to 5** of the seasonal watering plan with regional overviews that include:

- a description of the region
- an acknowledgement of the Traditional Owners of the area
- a record of communities and program partners engaged
- a description of how risks are managed
- a seasonal outlook for the region.

Each region is divided into system sections for waterways and wetlands that can be supplied with water for the environment from an environmental entitlement. Each section presents the system's environmental values, environmental objectives and planned actions for the year.

The system sections include:

- **a system introduction** with the names of the one or more waterway managers, storage managers and/or environmental water holders for the system
- **a system overview** describing the system's location, its waterways and major features
- **environmental values** outlining the main water-dependent species, communities, ecological processes and habitats that rely on healthy waterways and form the basis for environmental objectives. **Figure 1.3.1** provides a summary of the icons used in the plan and the environmental values they represent
- **environmental objectives in the system**, which **Figure 1.3.2** shows, that summarises the outcomes sought for each environmental value in the system. Each objective usually relies on one or more continuing watering actions and complementary actions, like controlling invasive species or installing fishways
- **social, recreational and economic values and uses** considered in planning for environmental flows, along with opportunities to support these values

- **the scope of environmental watering**, which **Figure 1.3.3** shows, that sets out potential actions to deliver water in 2025-26, the expected physical or biological effects of the actions and the longer-term environmental objectives they support. Achieving each environmental objective relies on one or more potential actions and their expected watering effects
- **scenario planning**, which **Figure 1.3.4** shows, indicates in a table the range and priority of potential watering actions planned for achievement in the coming year under different planning scenarios. The text with the table describes the rationale or need for the proposed combination of potential actions under each scenario. Most systems will use the drought, dry, average and wet planning scenarios, but different combinations are occasionally used. **Section 1.2.4** explains how seasonal conditions are considered in planning
- **a Traditional Owner-led watering inclusion** in systems where watering actions have been proposed by Traditional Owners directly to VEWH. This inclusion has a similar structure to the rest of the system section, as described here, but relates specifically to the Traditional Owner-led proposed watering actions. It includes the scope of environmental watering and scenario planning and outcomes for healthy Country being sought through watering.

Figure 1.3.1 Icons used in the plan and the environmental values they represent

A
Frog populations


B
Waterbird populations


CN
Carbon and nutrient cycling and connectivity

F
Fish populations


G
Physical stream characteristics


MI
Macroinvertebrates (waterbugs)


PR
Platypus or rakali (water rat) populations


T
Turtle populations


TA
Terrestrial (land-based) animals


V
Vegetation

WQ
Water quality

Figure 1.3.2 Example environmental objectives table

Environmental objectives in the Macalister system

F1 – Increase the distribution, recruitment and abundance of all native fish, and increase opportunities for the spawning and recruitment of native migratory fish (such as Australian grayling)

G1 – Maintain the form of the riverbank and bed to provide physical habitat for aquatic animals and plants

PR1 – Increase the abundance of platypus and rakali (water rats)

V1 – Maintain emergent (non-woody) and fringing (woody) vegetation in the streamside zone

V2 – Reinstate submerged aquatic vegetation

MI1 – Increase the abundance and number of functional groups of waterbugs

WQ1 – Improve water quality during periods of reduced or no passing flow from Lake Glenmaggie

WQ2 – Improve water quality in the Thomson River estuary

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.

The **Environmental objectives in the system** table uses an icon and a letter/number code for each objective. The icons and codes in that table are then used in the **Potential environmental watering actions, expected effects and environmental objectives** table to set out the environmental objectives of each potential action.

Figure 1.3.3 Example potential actions to deliver water for the environment 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 1.2.3** explains how watering actions are prioritised. The seasonal watering statements issued by the VEWH authorise waterway managers to undertake environmental watering actions described in this table. **Subsection 1.2.2** explains how seasonal watering statements 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 1.3.1** example 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
Summer/autumn low flow (125 ML/day during December to April)	• Maintain habitat and water quality in pools and riffles for waterbugs and fish • Facilitate localised movement between habitat types for small-bodied native fish and platypus • Prevent encroachment into the in-stream channel by invasive plants	F1 PR1 V1 MI1
Summer/autumn fresh(es) (one to two freshes of 230-350 ML/day for seven days during December to March)	• Wet aquatic and fringing vegetation to maintain its condition and support its growth • Wet low-lying benches to prevent encroachment by invasive plants and enable vegetation zonation • Provide velocity and depth diversity and prevent sediment smothering by fine sediments • When delivered in February to March (at 230 ML/day), the fresh also aligns with and supports native fish movement to: – trigger downstream migration of adult short- and long-finned eel and upstream movement of juvenile Australian bass – increase the water depth over riffles to facilitate local movement between habitats for large-bodied native fish	F1 G1 V1

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

The ability of the VEWH 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 experienced from a potential watering action. Each potential watering action will have one or more expected watering effects.

Figure 1.3.4 Example planning scenario table

The predicted volumes of water for the environment that will be available under each scenario for the 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 watering actions the waterway manager proposes to deliver with the predicted supply under each scenario.

The subset of watering actions that may be delivered if opportunities arise. Some of these actions can and should be delivered if more water becomes available through increased allocation or water trade or transfers, or if tier 1 actions are achieved with less environmental water than expected.

Other tier 2 actions are not considered essential to deliver during the year under a planning scenario but are likely to be needed in coming years. They may be delivered during the year if environmental conditions change or to take advantage of operational circumstances.

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Very low streamflow • Reduction in passing flow • Increased surface water loss to groundwater • Irrigation releases likely	• Low streamflow • Some reduction in passing flow • Increased surface water loss to groundwater • Irrigation releases likely	• Average streamflow • Partial freshes naturally provided • Some irrigation releases likely	• Above-average streamflow • Partial or full freshes naturally provided • Irrigation releases unlikely • Tarago Reservoir spills
Expected availability of water for the environment	• 2,100 ML	• 2,500 ML	• 3,600 ML	• 3,900 ML
Tarago River (targeting reach 2)				
Potential environmental watering – tier 1 (high priorities)	• Summer/autumn freshes (five freshes)	• Winter/spring low flow (partial) • Winter/spring fresh (one fresh) • Summer/autumn low flow • Summer/autumn freshes (three freshes)	• Winter/spring low flow • Winter/spring freshes (two freshes) • Spring high flow • Summer/autumn low flow • Summer/autumn freshes (five freshes) • Autumn high flow	• Winter/spring low flow • Winter/spring freshes (two freshes) • Spring high flow • Summer/autumn low flow • Summer/autumn freshes (five freshes) • Autumn high flow
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring fresh (one fresh) • Autumn high flow • Summer/autumn low flow • Winter/spring low flow • Spring high flow	• Winter/spring low flow (full demand) • Spring high flow • Autumn high flow	• N/A	• N/A
Possible volume of water for the environment required to achieve objectives	• 2,000 ML (tier 1) • 3,100 ML (tier 2)	• 2,500 ML (tier 1) • 1,800 ML (tier 2)	• 3,065 ML (tier 1) • 0 ML (tier 2)	• 3,160 ML (tier 1) • 0 ML (tier 2)
Priority carryover requirements for 2026-27	• 0 ML			

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 partner revise the estimates continually throughout the year.

SECTION 2: Gippsland region

2.1 Gippsland region overview

The systems in the Gippsland region that can receive water from the VEWH's environmental entitlements are *Durt-Yowan* (Latrobe River), lower Latrobe wetlands, *Carran Carran* (Thomson River), Heyfield wetlands and *Wirn wirndook Yeerung* (Macalister River). The Snowy River also receives an environmental flow, which the New South Wales Department of Climate Change, Energy, the Environment and Water manages.

Environmental values, objectives and planned actions for delivering water for the environment for each system in the Gippsland region are presented in the system sections that follow.

Traditional Owners in the Gippsland region

Traditional Owners in the Gippsland region have a deep connection to Country that has endured for tens of thousands of years. This includes inherent rights and cultural obligations to Country and community.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is the Registered Aboriginal Party (RAP) under the Victorian *Aboriginal Heritage Act 2006* for the areas incorporating waterways covered by this section of the seasonal watering plan. GLaWAC holds native title on behalf of the Gunaikurnai people and has a Recognition and Settlement Agreement with the Victorian Government.

Other RAPs in the Gippsland region are the Bunurong Land Council Aboriginal Corporation and the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation. Their RAP boundaries do not extend to the waterways managed with water for the environment in the Gippsland region.

Traditional Owners with links to the Snowy River system include the Gunaikurnai, Monero Ngarigo and Bidawal peoples.

Engagement

Program partners engage extensively with Traditional Owners, stakeholders and local communities to understand community priorities for delivering water for the environment in the coming year and to understand how cultural, social, economic and recreational values, uses and objectives may be supported by delivering environmental flows, provided they do not compromise environmental outcomes.

Engagement also informs environmental objectives in regional catchment and waterway strategies, environmental flows studies and environmental management plans.

Table 2.1.1 Program partners and stakeholders that engaged with the West Gippsland CMA to develop seasonal watering proposals and key documents informing the proposals for the Latrobe system, lower Latrobe wetlands and Thomson and Macalister systems (in alphabetical order)

Partner/ stakeholder	Latrobe system	Lower Latrobe wetlands	Thomson system	Macalister system
Community groups and environment groups	• Friends of Latrobe Water • Friends of Tyers Park • Great Latrobe Park • Greening Australia • Trust for Nature	• Birdlife Australia • WaterWatch Volunteers	• Community members • Heyfield Wetlands Committee of Management • Native Fish Australia	• Community members • EcoGipps • Friends of Bellbird Corner • Native Fish Australia
Government agencies	• Gippsland Water • Southern Rural Water • Victorian Environmental Water Holder	• Parks Victoria • Victorian Environmental Water Holder	• Gippsland Water • Melbourne Water • Southern Rural Water • Victorian Environmental Water Holder	• Gippsland Water • Southern Rural Water • Victorian Environmental Water Holder
Landholders/ farmers	• Individual landholders and irrigators • Latrobe River Irrigators	• Field & Game Australia (Heart Morass) • Individual landholders	• Individual irrigators • Individual landholders	• Individual landholders • Macalister Irrigation District irrigators/ diverters
Recreational users	• Recreational users • VRFish	• Field & Game Australia (Dowd Morass and Sale Common) • Recreational users	• Recreational fishing community • Recreational users • VRFish • Whitehorse Canoe Club	• Recreational users • VRFish
Technical experts	• Arthur Rylah Institute		• Arthur Rylah Institute	• Arthur Rylah Institute
Traditional Owners	• Gunaikurnai Land and Waters Aboriginal Corporation	• Gunaikurnai Land and Waters Aboriginal Corporation	• Gunaikurnai Land and Waters Aboriginal Corporation	• Gunaikurnai Land and Waters Aboriginal Corporation

Integrated catchment management

Altered water regimes are one of many threats to the health of Victoria's waterways. Many of the environmental objectives of water for the environment in the Gippsland region are complemented by simultaneously addressing issues such as barriers to fish movement, high nutrient loads, loss of streambank vegetation and invasive species.

Examples of complementary programs that support the outcomes of environmental flows in the Gippsland region include:

- works to protect and improve stream banks along priority reaches of rivers and their tributaries, including fencing to exclude stock, revegetation of riverbanks, willow removal and erosion control
- work with farmers along the Thomson and Macalister rivers on grazing and soil management, and on nutrient and water-use efficiency projects that help to improve water quality and river health
- construction of a fishway on the Thomson River to improve fish passage near the heritage-listed Horseshoe Bend Tunnel, completed in August 2019. The fishway allows Australian grayling (specifically targeted with releases of water for the environment) and other migratory fish to access over 200 km of river habitat from the upper reaches of the Aberfeldy River down to the Latrobe River
- construction of a fishway on the Macalister River to allow fish passage through the Maffra Weir, which is expected to be completed in 2027.

For more information about integrated catchment management programs in the Gippsland region, refer to the West Gippsland and East Gippsland regional catchment strategies and regional waterway strategies.

Risk management

When developing seasonal watering proposals for the Latrobe, Thomson and Macalister systems, environmental watering program partners assessed risks associated with potential environmental water delivery in 2025-26 and identified appropriate mitigating strategies. Risks and mitigating actions are continually assessed by program partners throughout the year (see **subsection 1.2.7**).

In the Snowy system, when weather conditions increase the risk of flooding, the New South Wales Department of Climate Change, Energy, the Environment and Water works with the Bureau of Meteorology, the East Gippsland CMA, New South Wales State Emergency Service and the VEWH to inform the community about the management of planned releases. Releases may be cancelled or rescheduled to limit flood impacts on private land.

Seasonal overview

Following multiple years of above-average rainfall across west Gippsland in which all system water storages filled and spilled, climatic conditions in 2024-25 were drier. Most of the catchment received below-average or very much below-average rainfall between July 2024 and March 2025. Rainfall in east Gippsland during 2024-25 was closer to the long-term average, with no significant floods. Temperatures throughout the Gippsland region were very much above average during 2024-25.

Environmental water delivery in the West Gippsland CMA region was managed in line with the average planning scenario in 2024-25, due to high storage levels and carryover volumes following multiple wet years. Flows from local catchment run-off and planned operational releases from storages for critical dam safety works met some of the planned watering actions during the year. Water for the environment was used to supplement winter and spring low flows and deliver freshes in the Thomson and Macalister rivers in spring, summer and autumn to help fish and other animals move freely between different habitats and maintain aquatic and fringing vegetation. Water for the environment was not used in the Latrobe River from July 2024 to early autumn 2025 because the natural flow met or exceeded flow recommendations. The lower Latrobe wetlands (Sale Common, Dowd Morass and Heart Morass) were filled by the natural flow in winter and spring for a fourth consecutive year and were allowed to draw down naturally in early summer. Water quality remained high in all three wetlands, and they retain excellent freshwater vegetation values. Water for the environment was used to fill Heyfield wetlands in October 2024 and then to top them up in December 2025 following drier conditions to maintain habitat and food resources for frogs and waterbirds.

The Snowy River received high allocations of water for the environment for the fourth consecutive year. Releases from Lake Jindabyne were used to mimic seasonal snow melt patterns to improve the river's environmental and physical conditions.

The Bureau of Meteorology has forecast average rainfall and above-average temperatures for the Gippsland region during winter 2025. Lower storage levels leading into winter mean the likelihood of storage spills is significantly reduced from previous years, but high allocations to environmental entitlements in 2025-26 are still expected in the Gippsland region. Forecast allocations and remaining carryover volumes should be sufficient to deliver high-priority planned watering actions in most planning scenarios during 2025-26.

The environmental watering program in the Gippsland region aims to maintain sufficient flows in dry times to minimise stresses on existing plant and animal populations and deliver greater flows in wetter conditions to improve the condition of and increase recruitment in those populations. In previous years, wet conditions have resulted in strong native fish recruitment in all the Gippsland systems that receive water for the environment. While certain flows may be delivered at a lower magnitude in the drier planning scenarios in 2025-26, the forecast water availability means there should be sufficient supply in most planning scenarios to deliver the flows required to consolidate the last four years' environmental gains and support additional recruitment. Efforts to boost migratory fish populations in the Latrobe, Thomson and Macalister rivers are particularly important because the larvae and juveniles of these species spend time in the ocean and can colonise other coastal rivers.

Environmental water delivery in the lower Latrobe wetlands in 2025-26 will aim to consolidate and, where possible, improve the environmental gains achieved in recent years. This will involve keeping Sale Common, Dowd Morass and Heart Morass at least partially full during winter and spring and allowing a natural partial drawdown during the warmer months in all planning scenarios.

The water year for the Snowy system starts in May and finishes in April the following year, which differs from how water is managed in the other Gippsland systems. In March 2025, the Snowy Advisory Committee endorsed the total volume for release and daily release targets for the Snowy River from May 2025 to April 2026. The agreed daily releases will not vary unless the flow increases the risk of flooding downstream or operational constraints prevent delivery.

2.2 Latrobe system

Waterway manager – West Gippsland Catchment Management Authority

Storage manager – Southern Rural Water

Environmental water holder – Victorian Environmental Water Holder

The Latrobe system includes *Durt-Yowan* (Latrobe River) and lower Latrobe wetlands: Sale Common, Heart Morass and Dowd Morass.

2.2.1 Latrobe River

System overview

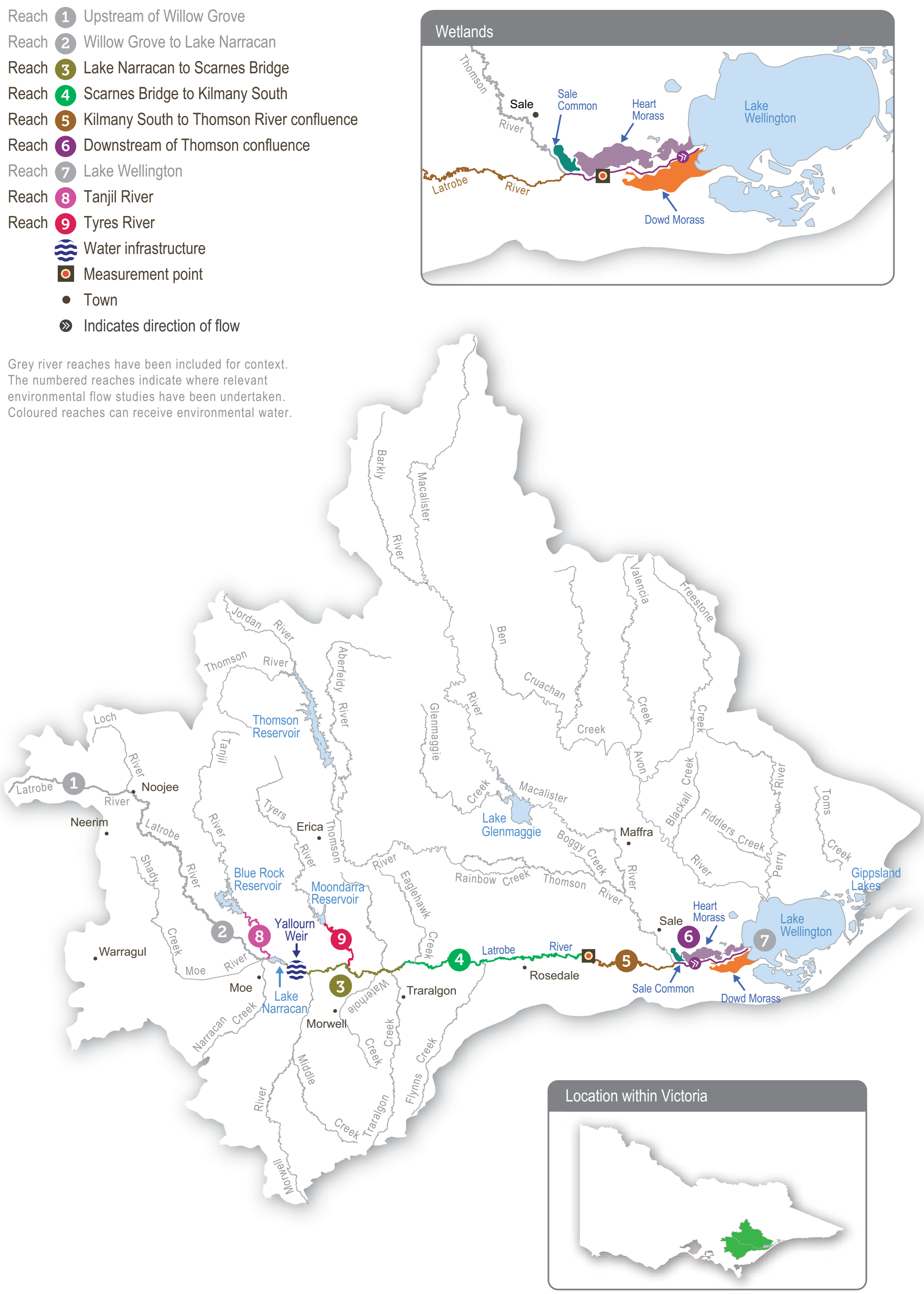
***Durt-Yowan* (Latrobe River) originates near the Baw Baw Plateau and passes through relatively flat to undulating plains, largely cleared for agriculture, before flowing into Lake Wellington (the westernmost point of the Gippsland Lakes) (Figure 2.2.1). Notable tributaries include the Tanjil River, Narracan Creek, Morwell River, Tyers River, Traralgon Creek and *Carran Carran* (Thomson River).**

Water for the environment is supplied to the Latrobe River from Blue Rock Reservoir on the Tanjil River and Lake Narracan on the Latrobe River. Both reservoirs also supply water for irrigation, urban supply, electricity generators and a paper mill in the Latrobe Valley.

The Latrobe River from Kilmany to the Thomson River confluence (reach 5) is a high-priority reach for delivering water for the environment because it contains endangered plant communities with good potential for rehabilitation. Capacity constraints within reach 5 mean that some of the larger freshes required to meet environmental objectives in reaches 4, 5 and 6 cannot be delivered without flooding private land. Until this can be resolved, environmental flows will be managed to within-channel levels. Where possible, flows in the Latrobe River are coordinated with freshes in the Thomson River to meet targets for the Latrobe River estuary.

Options to deliver water for the environment to the Latrobe River via the Tyers River are being investigated in 2025-26. These options include a physical transfer of water from Blue Rock Reservoir to Moondarra Reservoir via existing infrastructure operated by Gippsland Water or a temporary administrative transfer arrangement. Delivering water via the Tyers River would increase the proportion of the Latrobe catchment that could receive water for the environment without compromising outcomes in the main target reaches of the Latrobe River. If adopted, these options are expected to benefit native in-stream and streamside vegetation and non-migratory fish within the Tyers River.

Figure 2.2.1 Latrobe system



Environmental values

The upper reaches of the Latrobe River flow through state forest and are relatively intact and ecologically healthy. They have continuous stands of river red gums and intact streamside vegetation, and they support native animals, including barred galaxias, river blackfish, Gippsland spiny crayfish and nankeen night herons.

Below Lake Narracan, the Latrobe River is regulated and highly degraded due to historic river management practices. Most large woody habitat has been removed from the river, and many sections have been artificially straightened. These practices have caused significant erosion and widened the channel, reducing the quality and quantity of habitat for aquatic plants and animals.

There is endangered and vulnerable vegetation in all but the most modified sections of the Latrobe River. The banks along the lower reaches support stands of swamp scrub, characterised by swamp paperbark and tea tree. Mature river red gums grow adjacent to the lower Latrobe wetlands and provide nesting habitat for sea eagles and other birds of prey that hunt in the wetlands. The Latrobe River supports native estuarine and freshwater fish, including black bream, Australian bass, Australian grayling and short- and long-finned eel. The river also provides habitat and supports feeding and breeding conditions for platypus, rakali (water rats) and freshwater turtles.

The Latrobe River and its tributaries provide an essential source of freshwater to the Gippsland Lakes system, of which the lower Latrobe wetlands are an important component.

Environmental objectives in the Latrobe River

F1 – Increase native fish (migratory, resident and estuary) populations

G1 – Increase in-stream geomorphic diversity

MI1 – Increase the abundance of waterbugs

PR1 – Increase the extent of the platypus and rakali (water rat) populations

T1 – Maintain the abundance of freshwater turtle populations

V1 – Improve the condition and increase the extent and diversity of submerged, emergent and streamside native vegetation

V2 – Reduce the extent and density of invasive plants

WQ1 – Avoid adverse water quality conditions (such as high salinity) in the lower reaches of the Latrobe River and its estuary

Traditional Owner cultural values and uses

The Gunaikurnai have had a continued connection to Country for tens of thousands of years, including with the waterways in the Latrobe system. For the Gunaikurnai as Traditional Owners, there are immense challenges to heal, protect and manage Country, which has been drastically altered since colonisation.

> "As Gunaikurnai, we see our land (*Wurruk*), waters (*Yarnda*), air (*Watpootjan*) and every living thing as one. All things come from *Wurruk*, *Yarnda* and *Watpootjan*, and they are the spiritual life-giving resources, providing us with resources and forming the basis of our cultural practices. We have a cultural responsibility to ensure that all of it is looked after."
>
> – ***Water is Life: Traditional Owner Access to Water Roadmap 2022*** – *Gunaikurnai Nation Statement*

This cultural landscape depends on culture and Traditional Owner management.

The objective for the Latrobe system is to provide and maintain healthy Country. Healthy Country includes the importance of place and the entire ecosystem's health, including maintaining water quality, controlling pest species and maintaining a natural, seasonal flow regime and overbank flood events.

Water is Life acknowledged that cultural water is not environmental water. Until Traditional Owners manage cultural water flows, environmental objectives for environmental water delivery should take a cultural landscape approach. Environmental watering requirements should therefore consider the following points to support cultural values and uses:

- collaboration with Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) regarding the timing of the delivery of water for the environment to support a seasonal flow regime and wet and dry periods that embody healthy Country
- maintain freshwater supply to the *Durt-Yowan* (Latrobe River) estuary, Dowd Morass, Sale Common, Heart Morass and associated freshwater habitats
- provide connectivity between reaches and onto floodplains and maintain water quality to support cultural values and uses of significance to the Gunaikurnai.

The Latrobe system supports many keystone species important to the Gunaikurnai. *Borun* (pelican) and *Tuk* (musk duck) are the father and mother in the Gunaikurnai creation story. If *Borun* and *Tuk* are living and breeding within the Latrobe system, it is a sign that Country is healthy. If they are not, flows should be provided to promote the required habitat and ecosystem services. *Yeerung* and *Djeetgun* (fairy-wren) are also totem species. While they are not considered water-dependent and environmental flows may not directly support them, a diversity of flows supporting shrubs and streamside vegetation will provide habitat for fairy-wren. For example, when flooding inundates wetlands, bush birds (including *Yeerung* and *Djeetgun* and other species) are known to increase in abundance and diversity.

Other birds are important for *woorngan* (hunting) and food, including *nalbong* (water hens), *gidai* (black swans), *boyangs* (eggs) and *koortgan* (ducks except for *Tuk*). *Gidai* require submerged and softer emergent vegetation to make nest mounds, placing them on a small island or floating them in deeper water. *Gidai* breed in late winter to early spring after the water level rises. Actions that fill the large wetlands and support the growth of *loombrak* (water ribbon) and submerged aquatic plants will support *gidai*. Ensuring that the lower wetlands and floodplain depressions (for example, billabongs) receive freshwater flows in winter/spring will provide the conditions for submerged and emergent aquatic plants to grow and provide food and nesting materials for the waterbirds.

GLaWAC is developing a strategic Water Plan that aligns with the *Gunaikurnai Whole-of-Country Plan*. GLaWAC's Water Team and Community engagement through the completion of Aboriginal Waterway Assessments and on-Country sessions have played a vital role in understanding cultural water values. These engagement sessions will continue in 2025-26, expanding to include Traditional Owner engagement that includes the proposed Sea Country Indigenous Protection Area. The assessments go beyond looking at rivers in isolation to reflect on a holistic approach to Gunaikurnai Country. Feedback from these sessions and assessments will contribute to developing the future Water Plan, due by the end of 2025.

With the West Gippsland CMA agreeing to host GLaWAC's Aboriginal Water Officers in 2025, we see this as an opportunity to increase the understanding and involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program, a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria,*** the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 2.2.1**, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing and water skiing)
- riverside recreation and amenity (such as birdwatching and game hunting)
- socioeconomic benefits (such as commercial fishing, tourism and improved water quality for domestic, irrigation and stock use).

Planned environmental flows may be modified to align with a community benefit so long as environmental outcomes are not compromised. This is indicated in **Table 2.2.1** by an icon, as pictured below and also explained in **Figure 1.2.3**. The West Gippsland CMA works with the storage manager to make sure releases of water for the environment do not affect Lake Narracan's water levels during water skiing events held between January and March.

Watering planned to support water sports activities (e.g. water skiing)

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.2.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 2.2.1 Latrobe River potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Latrobe River (targeting reach 5)		
Winter/spring low flow (620 ML/day during July to November 2025 and June 2026)	• Wet benches to maintain habitat, support the growth of emergent aquatic plants and limit the encroachment of terrestrial vegetation • Maintain oxygen levels in pools and maintain sediment (sands and silts) in suspension to prevent pools from filling and depositing on substrates, helping to maintain habitat for waterbugs, turtles, platypus and rakali (water rats) and breeding substrate for river blackfish • Maintain longitudinal connectivity to allow movement/dispersal of native fish, turtles, platypus and rakali (water rats)	F1 G1 MI1 PR1 T1 V1, V2 WQ1
Summer/autumn low flow (440 ML/day during December to May)	• Maintain an adequate depth in pool habitat to support native fish, turtles, platypus and rakali (water rats) and submerged vegetation • Limit encroachment by terrestrial vegetation and support the growth of emergent aquatic plants • Mix pools to maintain oxygen levels suitable for aquatic animals	F1 MI1 PR1 T1 V1 WQ1
Spring/summer/autumn freshes (five to nine freshes of 980-1,400 ML/day for one to five days during November to May) Note: at a lower magnitude (980 ML/day), objectives are met in reaches 3 and 5. At an upper magnitude (1,400 ML/d), objectives are met in reaches 3, 4 and 5.	• Water quality fresh (one-day duration) to: – freshen water quality in pools to support fish, waterbug and zooplankton communities – provide sufficient velocity to turn over and flush sediments (sands and silts) from pools, scour algae from hard surfaces and clean fine sediment from substrates, including river blackfish nesting habitats • Fish and vegetation fresh (three to five days duration) • Objectives for the one-day fresh and additional objectives are: – wet benches to support the growth of emergent aquatic plants – provide longitudinal connectivity (including over benches for Australian grayling) for native fish, platypus and rakali (water rats)	F1 G1 MI1 PR1 V1 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Latrobe River (targeting reach 6)		
Summer/autumn estuary fresh(es) (one to three freshes of 980-1,400 ML/day for seven to 10 days during December to May) Note: Up to 1,220 ML/day will be required from the Thomson River to meet the total recommended magnitude of 2,200 ML/day to achieve expected watering effects in the Latrobe estuary	• Upper estuary: fully flush with freshwater to support submerged vegetation, provide adequate oxygen levels to support aquatic animals, transport silt, wet benches and deliver freshwater to connected wetlands • Mid-estuary: partially/fully flush the upper layer of the water column to improve water quality, support emergent aquatic plants, provide freshwater habitat and associated food sources for freshwater fish and provide breeding opportunities for estuary fish • Lower estuary: partially flush the upper layer of the water column; a flow of this magnitude will also provide opportunities to fill the lower Latrobe wetlands	F1 G1 MI1 PR1 V1 WQ1

Scenario planning

Table 2.2.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The Latrobe catchment experienced drier and closer-to-average rainfall and inflows to storages during 2024-25. Some minor flooding of the lower reaches still occurred during winter and spring, and this flooding, combined with four previous wet years, has meant the Latrobe River estuary and the lower Latrobe wetlands continue to be the freshest they have been for many years. This has improved the condition and extent of streamside and wetland vegetation across the system. Maintaining this level of freshness in the Latrobe River estuary to improve vegetation condition will again be a high priority in 2025-26. As seen in past years, natural tributary inflows will likely achieve most of the planned watering actions in wetter planning scenarios.

Maintaining the target low flows throughout the year to provide habitat for native fish, turtles, platypus and rakali (water rats) and support vegetation growth are high priorities in all planning scenarios. Delivering spring/summer/autumn freshes to reach 5 and the estuary is also a high priority in all planning scenarios to maintain water quality, provide specific opportunities for fish movement and consolidate environmental gains in the Latrobe River estuary associated with multiple years of wet conditions.

The freshes will be delivered at the lower range of the recommended magnitude where possible, but multiple consecutive years of high overbank flows have changed the geomorphology of the lower reaches of the Latrobe River. The proposed larger-magnitude freshes may exceed the channel capacity in the lower reaches and inundate private land on the adjacent floodplain. The West Gippsland CMA is assessing the channel's capacity in the lower reaches of the Latrobe River and aims to reach agreements with affected landholders. Once the investigation is complete, the West Gippsland CMA may substitute some lower-magnitude freshes for upper-magnitude freshes in some scenarios.

Estuary freshes with larger magnitudes and longer durations (up to 10 days) may be coordinated with the flow in the Thomson River in all planning scenarios to meet environmental flow objectives in the Latrobe River estuary (reach 6). Summer/autumn estuary freshes also achieve the objectives of river freshes in reach 5 and will likely be met naturally in the wet and possibly average planning scenarios.

Most of the recommended flows will likely be fully achieved through natural events, operational releases, passing flows and environmental deliveries in the average and wet planning scenarios. There will be less natural inflow in the drought and dry planning scenarios. Available water for the environment will be used to deliver low flows and freshes mostly at their lower recommended duration and frequency to maintain rather than improve current environmental conditions in the Latrobe River. It is expected that even in the drought and dry planning scenarios, passing flows and natural inflows from unregulated tributaries will provide some flow through the system during winter and spring.

There are no true carryover provisions in the Latrobe system. Rather, the VEWH maintains an ongoing share of storage capacity in Blue Rock Reservoir and Lake Narracan. It will be important to ensure a minimum of 5,000 ML is maintained in storage at the end of 2025-26 in drought or dry conditions and 3,000 ML in average conditions to help deliver critical watering actions in early 2026-27.

Table 2.2.2 Latrobe River environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Small contributions to low flows from unregulated reaches and tributaries • Passing flows likely reduced over summer/autumn	• Possible spills from storages in spring, minor flood levels may occur • Some natural flows contributing to the low flows and freshes • Passing flows likely reduced over summer	• Regular spills from storages in spring and minor to moderate flood levels may occur • Natural flow and/or passing flows likely to meet low-flow requirements	• Large and frequent spills from storages and moderate to major flood levels may occur • Natural flow and/or passing flows likely to meet low-flow requirements
Expected availability of water for the environment	• 30,400 ML	• 31,500 ML	• 35,100 ML	• 38,400 ML
Latrobe River				
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river freshes (four lower-duration, lower-magnitude freshes and one mid-duration fresh [four days]) • Summer/autumn estuary freshes (two lower-duration, lower-magnitude freshes)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river freshes (five lower-duration, lower-magnitude freshes and two mid-duration freshes [three days]) • Summer/autumn estuary freshes (two upper-duration, lower-magnitude freshes)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river freshes (six lower-duration, lower-magnitude freshes and three mid-duration freshes [four days]) • Summer/autumn estuary freshes (three upper-duration, lower-magnitude freshes)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river freshes (six lower-duration, lower-magnitude freshes and three upper-duration freshes [five days]) • Summer/autumn estuary freshes (three upper-duration, lower-magnitude freshes)

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• Replace one lower-duration, lower-magnitude spring/summer/autumn river fresh with a 1,400 ML/day (upper-magnitude) fresh • Replace one lower-duration, lower-magnitude summer/autumn estuary fresh with a 1,400 ML/day (upper-magnitude) fresh	• Replace one upper-duration, lower-magnitude summer/autumn estuary fresh with a 1,400 ML/day (upper-magnitude) fresh	• Replace one mid-duration, lower-magnitude spring/summer/autumn river fresh with a 1,400 ML/day (upper-magnitude) fresh • Replace one upper-duration, lower-magnitude summer/autumn estuary fresh with a 1,400 ML/day (upper-magnitude) fresh	• Replace two lower- and three upper-duration, lower-magnitude spring/summer/autumn river freshes with 1,400 ML/day (upper-magnitude) freshes • Replace one upper-duration, lower-magnitude summer/autumn estuary fresh with a 1,400 ML/day (upper-magnitude) fresh
Possible volume of water for the environment required to achieve objectives	• 22,050 ML (tier 1) • 3,020 ML (tier 2)	• 22,250 ML (tier 1) • 5,860 ML (tier 2)	• 30,200 ML (tier 1) • 9,200 ML (tier 2)	• 20,400 ML (tier 1) • 17,780 ML (tier 2)
Priority carryover requirements for 2026-27	• 5,000 ML		• 3,000 ML	• 0 ML

2.2.2 Lower Latrobe wetlands

System overview

The lower Latrobe wetlands (Dowd Morass, Heart Morass and Sale Common) are an important component of the internationally recognised Gippsland Lakes Ramsar site and provide habitat for waterbirds of state, national and international conservation significance. The wetlands are located on the floodplain of *Durt-Yowan* (Latrobe River) between its confluence with *Carran Carran* (Thomson River), and they form part of the Gippsland Lakes system (Figure 2.2.1).

River regulation and water extraction from the Latrobe, Thomson and Macalister rivers have reduced the frequency of small- and medium-sized floods that naturally wet the lower Latrobe wetlands. The construction of levees and drains and the filling of natural depressions have also altered water movement into and through the wetlands. The drainage and flooding regime in all three wetlands is now managed to some extent with regulators connected to the Latrobe River.

Environmental values

Sale Common is one of only two remaining freshwater wetlands in the Gippsland Lakes system. It provides sheltered feeding, breeding and resting habitat for various waterbird species, including the Australasian bittern.

Dowd Morass is a large, brackish wetland that regularly supports rookeries of colonial nesting waterbirds, including Australian white ibis, straw-necked ibis, little black and little pied cormorants, royal spoonbills and great egrets.

Heart Morass is also a large brackish wetland, with open expanses providing shallow feeding habitat for waterbirds, including black swans, Eurasian coots and various duck species. The lower Latrobe wetlands function as a diverse and complementary environmental system. Colonial nesting waterbirds breed among swamp paperbark trees at Dowd Morass in spring. Migratory shorebirds feed on the exposed mudflats as the wetlands draw down and dry over the summer. Waterfowl and fish-eating birds use open-water habitat at the wetlands year-round. The wetlands also support threatened vegetation communities, including swamp scrub, brackish herbland and aquatic herbland.

Environmental objectives in the lower Latrobe wetlands

A1 – Maintain the abundance of frog populations

B1 – Improve waterbird breeding, recruitment, foraging and sheltering opportunities

CN1 – Enable carbon and nutrient cycling between the wetland and river through connectivity

MI1 – Maintain the abundance of all waterbugs

T1 – Maintain the abundance of freshwater turtle populations

V1 – Maintain the diversity, condition and/or extent of native streamside vegetation fringing wetlands and the variety of self-sustaining submerged and emergent aquatic vegetation types

V2 – Discourage the introduction and reduce the extent and density of undesirable/invasive plants (Sale Common)

WQ1 – Provide suitable physicochemical conditions to support aquatic life

WQ2 – Avoid catastrophic water quality conditions (i.e. avoid acid sulfate soil exposure [Heart Morass] or dilute salt concentrations [Dowd Morass])

Traditional Owner cultural values and uses

The lower Latrobe wetlands are a place of spiritual and cultural connection for the Gunaikurnai people. Over many thousands of years, customs and lore have been passed orally between generations about the cultural values and uses of the wetlands and their importance to all Gunaikurnai people. The wetlands are on the lands of the Brayakaulung clan of the Gunaikurnai.

For the Gunaikurnai, the overarching objective for the wetlands is to provide and maintain healthy Country. Healthy Country includes the importance of place and the entire ecosystem's health, including maintaining water quality, controlling pest species and maintaining a natural, seasonal flow regime and overbank flood events.

Water is Life acknowledged that cultural water is not environmental water. Until Traditional Owners manage cultural water flows, environmental objectives for the delivery of water for the environment for the lower Latrobe wetlands should take a cultural landscape approach. Environmental watering requirements should therefore consider the following points to support cultural values and uses:

- collaboration with GLaWAC regarding the timing of environmental water delivery to support a seasonal flow regime and wet and dry periods that embody healthy Country
- maintain freshwater supply to the *Durt-Yowan* (Latrobe River) estuary, Dowd Morass, Sale Common, Heart Morass and associated freshwater habitats
- provide connectivity between reaches and onto floodplains and maintain water quality to support cultural values and uses of significance to the Gunaikurnai.

The lower Latrobe wetlands support many keystone species important to the Gunaikurnai. *Borun* (pelican) and *Tuk* (musk duck) are the father and mother in the Gunaikurnai creation story. If *Borun* and *Tuk* live and breed within the wetlands, it is a sign that Country is healthy. If they are not, flows should be provided to promote required habitat and ecosystem services. *Yeerung* and *Djeetgun* (fairy-wren) are also a totem species. While they are not considered water-dependent and environmental flows may not directly support them, a diversity of flows supporting shrubs and streamside vegetation will provide habitat for fairy-wren. For example, when flooding inundates wetlands, bush birds (including *Yeerung* and *Djeetgun* and other species) are known to increase in abundance and diversity.

Other birds are important for *woorngan* (hunting) and food, including *nalbong* (water hens), *gidai* (black swans), *boyangs* (eggs) and *koortgan* (ducks except for *Tuk*). *Gidai* require submerged and softer emergent vegetation to make nest mounds, placing them on a small island or floating them in deeper water. *Gidai* breed in late winter to early spring after the water level rises. Actions that fill the large wetlands and support the growth of *loombrak* (water ribbon) and submerged aquatic plants will support *gidai*. Ensuring that the lower wetlands and floodplain depressions (for example, billabongs) receive freshwater flows in winter/spring will provide the conditions for submerged and emergent aquatic plants to grow and provide food and nesting materials for the waterbirds.

GLaWAC is developing a strategic Water Plan that will align with the *Gunaikurnai Whole-of-Country Plan*. The plan is due to be completed by the end of 2025. Until then, GLaWAC and the West Gippsland CMA will continue to explore opportunities to align environmental flows with Gunaikurnai outcomes in the lower Latrobe wetlands. Joint GLaWAC/West Gippsland CMA-hosted Community events are planned for 2025. Additional on-Country Community events will occur in collaboration with the development of the Sea Country Indigenous Protection Area, which is proposed to take in the lower Latrobe wetlands. This will include an event to coincide with the delivery of water for the environment and will involve water quality and fish monitoring.

With the West Gippsland CMA agreeing to host GLaWAC's Aboriginal Water Officers in 2025, we see this as an opportunity to increase the understanding and involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program, a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 2.2.3**, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing and fishing)
- riverside recreation and amenity (such as birdwatching, bushwalking, camping and duck hunting)
- socioeconomic benefits (such as commercial eel and carp fishing and tourism).

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.2.3 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 2.2.3 **Lower Latrobe wetlands potential environmental watering actions, expected watering effects and environmental objectives**

Potential environmental watering action	Expected watering effects	Environmental objectives
Dowd Morass		
Top-up (any time, following bird breeding event if required)	• Prolong wetting of reed beds to maintain habitat and food resources for waterbirds and protect chicks from predators, following an observed breeding event	B1
Fill to control salinity (anytime) *Likely trigger: electrical conductivity rising above 7,000 µS/cm*	• Dilute salt concentrations within the wetland that may be caused by king tides from Lake Wellington (likely occurring between March to May) or other sources	WQ2
Partial fill (with top-ups as required to maintain a water depth of 0.3 m AHD during July to December 2024 and April to June 2025)	• Provide seasonal variation in water depth throughout the wetland to encourage the growth and flowering of semi-aquatic plants • Wet vegetation and soils at middle elevations within the wetland to increase the abundance of waterbugs and other food resources for frogs, turtles and waterbirds • Provide connectivity between the river and wetlands, and between wetlands, increasing available habitat for frogs and turtles • Encourage bird breeding (when delivered in spring/early summer following earlier fill) by maintaining wetted habitat around reed beds	A1 B1 MI1 T1 V1

Potential environmental watering action	Expected watering effects	Environmental objectives
Fill (with top-ups as required to maintain a water depth of 0.6 m AHD during August to November)	• Wet reed beds and deep water next to reedbeds to provide waterbird nesting habitat and stimulate bird breeding • Wet high-elevation banks and the streamside zone to support the growth of vegetation, creating nesting habitat for waterbirds • Wet vegetation and soils at higher elevations to stimulate ecosystem productivity and increase the abundance of waterbugs and other food resources for frogs, turtles and waterbirds • Provide connectivity between the river and wetlands, and between wetlands, increasing available habitat and food resources for frogs and turtles • Reduce the effects of saltwater incursion from Lake Wellington	A1 B1 MI1 T1 V1 WQ1
Partial drawdown (during January to March)	• Oxygenate sediments to enable aquatic vegetation to germinate and recruit • Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly swamp scrub and tall marsh) • Break down organic matter and promote nutrient cycling • Expose mudflats and create shallows to facilitate waterbird foraging	B1 CN1 V1
Heart Morass		
Top-up to permanently maintain water level above -0.3 m AHD (anytime)	• Minimise the risk of acid sulfate soils developing by keeping known high-risk areas wet • Respond to decreasing pH from the rewetting of exposed acid sulfate soils, most likely during high-wind events • Dilute salt concentrations within the wetland that king tides from Lake Wellington or other sources may cause. This watering action is likely to be triggered if wetland overtopping appears likely, based on rising water levels at Lake Wellington reaching or exceeding +0.5 m AHD	WQ2
Top-up (anytime up to 0.5 m AHD, following bird breeding event if required)	• Prolong wetting of reed beds to maintain habitat and food resources for waterbirds and protect chicks from predators, following an observed breeding event	B1
Fill and partial flushing flow (during July to November)	• Wet high-elevation banks and streamsides to support the growth of vegetation, create nesting and foraging habitat for waterbirds and provide food resources for terrestrial birds • Provide connectivity between the river and wetlands, and between wetlands, increasing available habitat and providing food resources for frogs and turtles • Export accumulated salts and sulfates and transport nutrients, dissolved organic carbon and seeds between the Latrobe River and Heart Morass	A1 B1 CN1 T1 V1 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Partial fill (with top-ups as required to maintain a minimum water depth of 0.3 m AHD during August to December)	• Support the growth and flowering of semi-aquatic plants • Provide appropriate wetland-fringing habitat for frogs and turtles • Provide conditions that support waterbug communities and food resources for frogs, turtles and waterbirds	A1 B1 MI1 T1 V1
Partial drawdown (during January to March)	• Oxygenate sediments to enable aquatic vegetation to germinate and recruit • Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly swamp scrub and tall marsh) • Break down organic matter and promote nutrient cycling • Expose mudflats and create shallows to facilitate waterbird foraging	B1 CN1 V1
Sale Common		
Top-up (anytime, following bird breeding event if required)	• Prolong the wetting of reed beds to maintain habitat and food resources for nesting waterbirds and protect chicks from predators	B1
Partial fill with top-ups as required to maintain a minimum water height of 0.3 AHD (July to December)	• Encourage the growth and flowering of semi-aquatic plants • Provide appropriate wetland habitat for frogs and turtles • Provide conditions that support waterbug communities and food resources for waterbirds	A1 B1 MI1 T1 V1
Fill (with top-ups as required during August to November to maintain a water depth of 0.4 m AHD for two months)	• Wet the outer boundaries of the wetland to support the growth and flowering of streamside and fringing wetland plants, increasing foraging opportunities for waterbirds • Encourage bird and turtle breeding by providing nesting habitat • Provide connectivity between the river and wetlands, and increase habitat and feeding opportunities for frogs and turtles	A1 B1 T1 V1

Potential environmental watering action	Expected watering effects	Environmental objectives
Trigger-based fill or top-up to 0.5 m AHD (during December to January) *Trigger: requirement to drown out invasive vegetation*	• Wet key habitats within the wetland for a sufficient duration to discourage invasive plants, particularly the excessive spread of giant rush	V2
Partial drawdown (during January to March)	• Oxygenate sediments to enable aquatic vegetation germination and recruitment • Provide fluctuations in water levels so emergent vegetation (particularly swamp scrub and tall marsh) can reproduce and expand • Break down organic matter and promote nutrient cycling • Expose mudflats and create shallows to facilitate waterbird foraging	B1 CN1 V1

Scenario planning

Table 2.2.4 outlines potential environmental watering and expected water use in a range of planning scenarios.

Close-to-average conditions in 2024-25 meant the lower Latrobe wetlands could partially draw down over summer following multiple years of flooding and natural inundation. Localised rainfall events in late summer provided natural top-ups to the wetlands and allowed sensitive freshwater vegetation communities to continue to thrive. The main environmental watering priorities in 2025-26 will be partially filling each wetland in winter/spring to prevent complete drying over summer and autumn. The proposed watering actions aim to consolidate environmental outcomes from the recent wet years and build ecosystem resilience ahead of future dry periods. The wetlands can only be filled when water levels and water quality in the lower reaches of the Latrobe River are suitable, and natural climatic conditions and the flow in the Latrobe River will therefore influence the timing and extent of water delivery. Only partial fills will likely be possible in the drought planning scenario, and natural overbank floods are likely at any time of year in the wet planning scenario. Trigger-based inflows to address a potential acid sulfate soil risk, support a natural waterbird breeding event or control invasive vegetation will be delivered when needed and possible, even if the timing of these actions compromises other planned wetting or partial drawdown events. Specific watering plans for each wetland in different planning scenarios are described below.

Dowd Morass

The plan at Dowd Morass is to maintain water level above 0.3 m AHD from July to December 2025 and April to June 2026 and allow the wetland to partially draw down (without complete drying) between January and March 2026. This proposed watering regime will provide sufficient variation in the water level to support the needs of a range of vegetation communities within and beside the wetland and provide habitat and food for native frogs, turtles and waterbirds. After several wet years, the partial drawdown over summer will facilitate carbon and nutrient cycling in drying soils and provide foraging habitat for wading shorebirds.

The proposed watering regime may need to be modified if wet conditions naturally fill the wetlands or additional water is needed to support a large waterbird breeding event or dilute saline water from king tides. Completely filling Dowd Morass is a lower priority in 2025-26 because multiple natural floods have met the environmental objectives for this action in recent years.

Heart Morass

Acidity and salination represent a high risk to environmental values at Heart Morass, and maintaining water levels above -0.3 m AHD at all times is a high priority to avoid exposing potential acid sulfate soils. Heart Morass has filled and fully flushed in each of the last three years, removing accumulated salts and sulfides and reducing the immediate risk of acid sulfate soils. Filling and providing flushing flows through the wetland are a low priority in 2025-26 but may still be considered in all planning scenarios if they can be delivered in combination with a natural flood to lower the risk of acid sulfate soils occurring in subsequent years.

The preferred watering strategy in all planning scenarios involves partially filling the wetland from winter to early summer and maintaining the water level above -0.3 m AHD for the rest of the year. The partial fill in winter and spring will support established wetland plant communities and increase the available habitat and food for frogs, turtles and waterbirds. Allowing the wetland to partially draw down through summer and autumn is a high priority in all planning scenarios, although natural inflows in the average and wet scenarios may limit it. The aim of the partial drawdown is to expose shoreline habitat to increase the diversity of vegetation communities, allow nutrient cycling and provide foraging habitat for shorebirds.

Sale Common

The aim for Sale Common is to partially fill the wetland in winter and provide top-ups as needed to maintain water levels above 0.3 m AHD throughout the year, which will wet about half of Sale Common. Maintaining at least a partial fill is considered ecologically important to support wetland plant communities and provide habitat for frogs, turtles and waterbirds. Completely filling the wetland is a low priority in 2025-26 because it has filled naturally in each of the past four years.

Allowing the wetland to partially draw down naturally over the warmer months to promote the germination of emergent vegetation is a high priority in all planning scenarios, although there may be a limited drawdown in the average and wet planning scenarios. A managed drawdown (by opening regulator gates) of Sale Common is not proposed in 2025-26 because a risk and benefit assessment identified that, while the risk to native fish is negligible (due to the proximity of the wetland to other refuge areas and the types of plants and animals that are regularly supported by the wetland), there is an increased risk of the expansion of giant rush in the wetland. Giant rush has established in the wetland and is difficult to control. There is a risk that if a prolonged wetland inundation does not immediately follow the managed drawdown, giant rush will further expand. For these reasons, a natural drawdown was considered a lower risk than a managed drawdown, but it may be replaced by a top-up in December or January if monitoring indicates higher water levels are needed to prevent further expansion of giant rush.

Table 2.2.4 Lower Latrobe wetlands environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• No natural inflow from the Latrobe River, and the wetlands are likely to dry completely	• Minor natural inflow from the Latrobe River in winter/spring; expect moderate to substantial drying in summer	• Moderate winter/spring flow in the Latrobe River is likely to fill or partially fill the wetlands; expect minor drying in summer	• Major flow in the Latrobe River in winter/spring and possibly autumn/winter is likely to fill all wetlands with very little drying in summer
Dowd Morass				
Potential environmental watering – tier 1 (high priorities)	• Top-up (any time following bird breeding) • Fill (any time to control salinity) • Partial fill (with top-ups as required to 0.3 m AHD during July to December 2024 and April to June 2025) • Partial drawdown (during January to March)			
Potential environmental watering – tier 2 (additional priorities)	• Fill (with top-ups as required during August to November)			
Heart Morass				
Potential environmental watering – tier 1 (high priorities)	• Top-up (any time to permanently maintain water level above -0.3 m AHD) • Top-up to 0.5 m AHD (any time following bird breeding) • Partial fill (with top-ups as required during August to December) • Partial drawdown (during January to March)			
Potential environmental watering – tier 2 (additional priorities)	• Fill and partial flushing flow (during July to November)			
Sale Common				
Potential environmental watering – tier 1 (high priorities)	• Top-up (any time following bird breeding) • Partial fill (with top-ups as required during July to December) • Trigger-based fill or top-up to 0.5 m AHD (during December to January, if required) • Partial drawdown through evaporation (during December to March)			
Potential environmental watering – tier 2 (additional priorities)	• Fill (with top-ups as required during August to November)			

2.3 Thomson system

Waterway manager – West Gippsland Catchment Management Authority

Storage managers – Melbourne Water (Thomson Reservoir), Southern Rural Water (Cowwarr Weir)

Environmental water holder – Victorian Environmental Water Holder

The Thomson system includes the Thomson River and Heyfield wetlands.

System overview

***Carran Carran* (Thomson River) flows from the slopes of the Baw Baw Plateau to join *Durt-Yowan* (Latrobe River) south of Sale (Figure 2.3.1). The major tributaries of the Thomson River are the Aberfeldy and Jordan rivers in the upper reaches and *Wirn wirndook Yeerung* (Macalister River) in the lowest reach. Two major structures regulate flow in the Thomson River: Thomson Reservoir — the largest water supply storage for metropolitan Melbourne — and Cowwarr Weir — a regulating structure that supplies irrigation water to parts of the Macalister Irrigation District.**

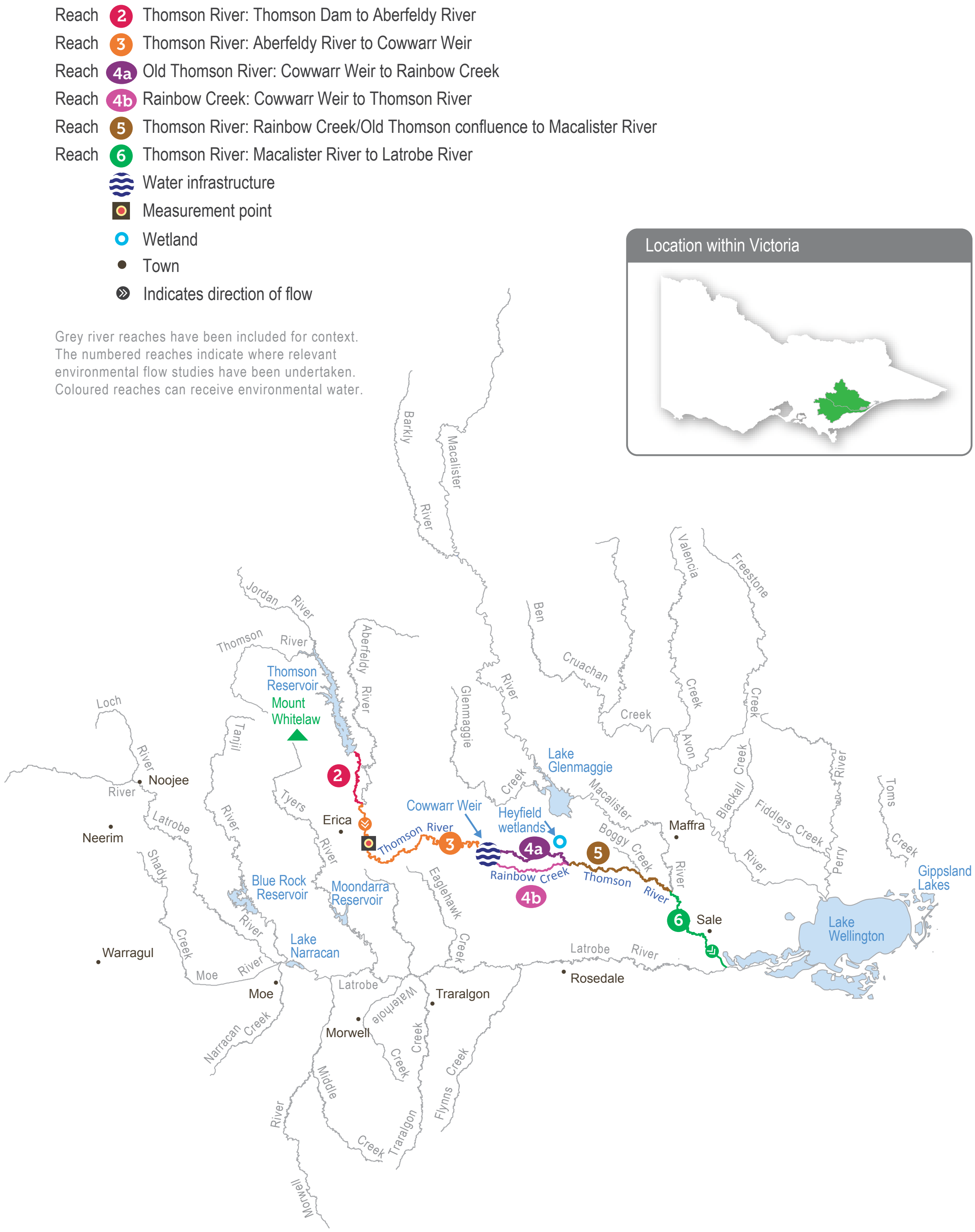
Thomson Reservoir harvests most of the flow from the upper catchment of the Thomson River and significantly affects the flow in all downstream reaches. The Aberfeldy River now provides most of the natural flow variation to the Thomson River below Thomson Reservoir and is essential for providing natural freshes and a high flow.

Water for the environment is held in the Thomson Reservoir and released into the river as required. Reach 3 of the Thomson River (from the Aberfeldy River confluence to Cowwarr Weir) is the highest priority for environmental water delivery due to its heritage river status, high-value native streamside vegetation, high-quality in-stream habitat and low abundance of exotic fish species.

At Cowwarr Weir, the Thomson River splits into the old Thomson River course (reach 4a) and Rainbow Creek (reach 4b) (see **Figure 2.3.1**). Passing flows throughout the year are split two-thirds down reach 4a and one-third down reach 4b to avoid impacts to irrigators located on Rainbow Creek. Water for the environment is primarily delivered to the old Thomson River course (reach 4a) to support fish migration, as Cowwarr Weir impedes fish movement through Rainbow Creek.

The Heyfield wetlands are a cluster of pools located between the Thomson River and the township of Heyfield. The construction of levees and weirs along the Thomson River means that river water rarely enters the wetlands. While the largest pool receives stormwater from the Heyfield township, smaller ponds rely on rainfall or pumped water for the environment to maintain environmental values. These values include wetland plant communities planted in recent years as part of a comprehensive revegetation program.

Figure 2.3.1 Thomson system



Environmental values

The Thomson River supports native species of migratory fish that need to move between the sea and freshwater environments to complete their life cycles, including Australian grayling, tupong, short- and long-finned eel, Australian bass and pouched and shorthead lamprey. A focus for environmental flows management is the Australian grayling, which is a threatened species in Victoria. Australian graylings spawn in response to autumn freshes, and the larvae and juveniles spend time at sea before returning to the freshwater sections of coastal rivers. A flow that supports key migration periods for Australian grayling also provides spawning and recruitment opportunities that benefit the broader native fish assemblage.

The composition and condition of streamside vegetation vary throughout the Thomson River catchment. The vegetation is intact and in a near-natural condition above Thomson Reservoir in the Baw Baw National Park. Streamside vegetation between Thomson Reservoir and Cowwarr Weir is mostly in good condition but is affected by exotic weeds, including blackberry and gorse. Below the Cowwarr Weir, the vegetation is degraded due to stock access and widespread weed invasion.

The Heyfield wetlands are among the few remaining freshwater wetland sites in the Gippsland Plains landscape. They provide habitat for aquatic and terrestrial animals, including threatened migratory birds that prefer shallow, slow-moving water bodies.

Environmental objectives in the Thomson system

A1 – Maintain existing frog populations and provide suitable habitat for them

B1 – Provide freshwater habitat for migratory and non-migratory wetland birds within the Gippsland Plains landscape

CN1– Restore carbon and nutrient cycling within Heyfield wetlands to increase ecosystem productivity

F1 – Increase the distribution, recruitment and abundance of all native fish, and increase opportunities for the spawning and recruitment of native migratory fish (such as Australian grayling)

G1 – Maintain the physical form of the channel to provide a variety of channel features and habitats for aquatic animals

G2 – Improve river function by maintaining substrate condition and enabling carbon cycling

MI1 – Maintain the natural waterbug community

PR1 – Increase the abundance of platypus

V1 – Maintain the structural diversity and appropriate distribution (zonation) of streamside vegetation along the riverbank and reduce terrestrial encroachment and invasion in the Thomson River

V2 – Increase the recruitment and growth of native in-stream, fringing and streamside vegetation in the Thomson River

V3 – Maintain the existing vegetation and promote the growth, establishment and resilience of semi-aquatic species in the Heyfield wetlands

WQ1 – Improve water quality in the Thomson River estuary

Traditional Owner cultural values and uses

The Gunaikurnai have had a continued connection to Gunaikurnai Country for many thousands of years, including with the waterways in the Latrobe system, into which *Carran Carran* (Thomson River) feeds. For the Gunaikurnai as Traditional Owners, there are immense challenges to heal, protect and manage Country, which has been drastically altered since colonisation.

> "As Gunaikurnai, we see our land (*Wurruk*), waters (*Yarnda*), air (*Watpootjan*) and every living thing as one. All things come from *Wurruk*, *Yarnda* and *Watpootjan*, and they are the spiritual life-giving resources, providing us with resources and forming the basis of our cultural practices. We have a cultural responsibility to ensure that all of it is looked after."
>
> – ***Water is Life: Traditional Owner Access to Water Roadmap 2022*** – *Gunaikurnai Nation Statement*

This cultural landscape depends on culture and Traditional Owner management.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is working with the West Gippsland CMA to determine how to express Gunaikurnai objectives for water in a way that contributes to seasonal watering proposals from the perspective of traditional custodians with traditional knowledge.

GLaWAC Cultural Water Officers have completed Aboriginal Waterways Assessments on *Carran Carran* and are assessing how to protect and further the river's cultural values and uses. Traditionally, *Carran Carran* was an important meeting place and a place to camp. Today, most of *Carran Carran* is inaccessible to the Gunaikurnai, making it difficult to meet and yarn along the river.

Assessments for watering requirements of *Carran Carran* for the Gunaikurnai have been based on cultural indicators, including:

- the condition of the lower Latrobe wetlands (which *Carran Carran* helps supply)
- the condition and prevalence of plants and animals with cultural values and uses
- species known to be indicators of water quality, water regimes and healthy Country.

GLaWAC is working with the West Gippsland CMA to share traditional knowledge of plant and animal species of cultural significance in and around the waterways of the Latrobe Valley and the importance of specific watering decisions to support them.

Watering requirements to support cultural values and uses include:

- timing of deliveries of water for the environment planned in partnership with GLaWAC to support a seasonal flow regime and wet and dry periods that contribute to healthy Country
- maintaining freshwater supply to the *Durt-Yowan* (Latrobe River) estuary, Dowd Morass, Sale Common and Heart Morass and associated freshwater habitats; the lower Latrobe wetlands are an important resource for the Gunaikurnai
- providing connectivity between reaches and onto floodplains to support dependent plants and animals with cultural values and uses of significance to the Gunaikurnai
- maintaining water quality to support the health of native plants and animals with cultural values and uses of significance to the Gunaikurnai.

GLaWAC is developing a strategic Water Plan which is due for completion by the end of 2025.

With the West Gippsland CMA agreeing to host GLaWAC's Aboriginal Water Officers in 2025, we see this as an opportunity to increase the understanding and involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program, a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 2.3.1**, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as kayaking, canoeing, fishing and swimming)
- riverside recreation and amenity (such as birdwatching, camping, hiking and duck hunting)
- community events and tourism (such as community education, events at the Heyfield wetlands and visitation by locals and non-locals)
- socioeconomic benefits (such as maintaining bankside vegetation and preventing erosion and the potential loss of private and public land).

Planned environmental flows may be modified to align with a community benefit so long as environmental outcomes are not compromised. This is indicated in **Table 2.3.1** by an icon, as pictured below and also explained in **Figure 1.2.3**.

Autumn, winter and spring freshes in the Thomson River create ideal conditions for whitewater rafting, kayaking and canoeing. The timing of environmental flows may be adjusted to optimise opportunities to support these recreation activities, where it does not compromise environmental outcomes. For example, a fresh that aims to cue the migration of Australian grayling and other native fish may be timed to coincide with recreation events or holiday periods when people take advantage of favourable rafting or kayaking conditions.

In addition, kayaking and rafting activities have inherent risks, and large environmental flows are ramped up and down over several days to avoid sudden changes in water levels that may affect river users.

	Watering will also support water sports activities (e.g. canoeing, kayaking, rowing, swimming, water skiing)
	Watering will also support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

The West Gippsland CMA notifies the public of planned large releases of water for the environment to alert river users about potential increases in the water's level and velocity. People can register on the **West Gippsland CMA website** to be notified of upcoming watering events.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.3.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 2.3.1 Thomson system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Thomson River (targeting reach 3)		
Year-round low flow (125-350 ML/day)	• Maintain a minimum level of habitat and maintain water quality in pools and riffles for waterbugs and fish • Provide greater longitudinal connectivity to support the movement of native fish during autumn/spring (when delivered at the upper magnitude) • Regulate the water temperature and wet large woody debris to provide food and shelter for waterbugs and fish • Maintain sufficient water depth to facilitate platypus and fish movement between localised habitats and increase foraging opportunities (further enhanced when delivered at greater magnitudes) • Wet low-lying benches (when delivered at a greater magnitude) to prevent encroachment by invasive plants and permit seed dispersal • Additional benefits to the Thomson River estuary (reach 6) are expected when provided at 350 ML/day: – partially flush the upper water column, helping to sustain waterbug communities and fish by maintaining oxygen levels – prevent high salinity levels, helping to maintain emergent aquatic plants – provide freshwater to the Latrobe system to improve water quality	F1, MI1, PR1, V1, V2, WQ1
Spring fresh(es) (one to two freshes of 800-900 ML/day for five to seven days during September to November)	• Trigger the migration of adult and juvenile native fish (in particular, the upstream migration of juvenile Australian grayling and Australian bass from marine/estuarine habitats) • Improve and maintain streamside vegetation by inundating the benches and providing variable water levels for plant zonation • Carry plant seeds from the upper catchment for deposition downstream • Prevent infilling of pools by mobilising fine sediments and depositing them on existing bars and benches to provide a substrate for vegetation • Scour substrates to remove accumulated fine sediment and biofilms to improve habitat and food for waterbugs • Additional benefits to the Thomson River and its estuary (reach 6) are expected when provided at 900 ML/day: – wet vegetation on higher benches – partially flush the upper water column in the Thomson River estuary, helping to sustain waterbug communities and fish by maintaining oxygen levels – prevent high salinity levels, helping to maintain emergent aquatic plants – provide freshwater to the Latrobe system to improve water quality	F1, G1, G2, MI1, V1, V2, WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn freshes (two to three freshes of 230-350 ML/day for seven days during December to March)	• Wet aquatic and fringing vegetation to maintain its condition and support its growth • Wet low-lying benches to prevent encroachment by invasive plants and enable vegetation zonation • Provide velocity and depth diversity and prevent sediment from smothering hard substrates • When delivered in February/March (at 230 ML/day), the fresh also aligns with and supports native fish movement: – trigger downstream migration of adult short- and long-finned eel and upstream movement of juvenile Australian bass – increase the water depth over riffles to facilitate local movement between habitats for large-bodied native fish	F1, G2 V1, V2
Autumn fresh (800 ML/day for five to seven days during April to May)	• Trigger the migration of adult and juvenile native fish, in particular: – the downstream migration and spawning of adult Australian grayling (April) – the downstream migration of adult tupong and upstream migration of adult and juvenile Australian bass (May) • Carry plant seeds and propagules from the upper catchment for deposition downstream and help maintain the zonation of vegetation • Prevent infilling of pools by mobilising fine sediments and depositing them on existing bars and benches to provide substrate for vegetation • Scour substrates to remove accumulated fine sediment	F1, G1, G2 V1, V2
Heyfield wetlands		
Fill (during August to September)	• Wet ponds to capacity to stabilise the banks and support the spring growth of semi-aquatic vegetation • Provide freshwater habitat for waterbirds and frogs (such as growling grass frogs and golden bell frogs)	CN1, A1 B1, V3
Top-ups as required to maintain water level (during October to May)	• Top up ponds before summer to maintain vegetation and improve recruitment by triggering the release of seeds • Top up ponds in late summer to ensure the survival of newly planted wetland vegetation • Maintain habitat for waterbirds and frogs (such as growling grass frogs and golden bell frogs) Note: when delivered in April to May, top-ups provide drought refuge habitat for waterbirds and frogs following prolonged dry conditions	
Partial drawdown (during April to May)	• Oxygenate surface soils, break down accumulated organic matter and cycle nutrients • Improve waterbird food availability by exposing the mudflats and providing access to burrowing invertebrates	

Scenario planning

Table 2.3.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The Thomson River experienced a return to average conditions in 2024-25 following four wet years in which the Thomson Dam spilled on two occasions. Water for the environment delivered during 2024-25 has continued to create ideal conditions for native fish to breed and disperse throughout the system. Planned environmental flows for the Thomson River in 2025-26 will focus on supporting the migration, spawning and recruitment of native fish to further boost their populations.

It is important to deliver a mix of low flows and freshes throughout the year in the Thomson River, but the magnitude, duration and frequency of these events will generally be lower in the drought and dry planning scenarios than in the average and wet planning scenarios. More events with higher magnitude and longer duration may be delivered in all planning scenarios if enough water is available. As seen in recent years, natural tributary inflows will likely achieve many of the planned watering actions in the wetter planning scenarios.

The highest-priority potential watering actions for the Thomson River are 800 ML per day freshes in autumn (in April/May) and spring (in September/November) to support migratory fish to move into or out of the system. These events are essential to cue the spawning and recruitment of the threatened Australian grayling population and other native migratory fish species, which have had high recruitment in recent years. These events are necessary yearly in the average and wet planning scenarios to ensure regular recruitment and align with environmental cues in the broader landscape. In the dry and drought planning scenarios, low flows are generally prioritised over freshes to maintain fish populations, but these events are important to deliver even in drier conditions in 2025-26 to consolidate recent population growth. Where possible, the spring and autumn freshes may be timed to coincide with long weekends to provide additional recreational benefits for river users. Delivering two summer/autumn freshes is a high priority in all planning scenarios to clear fine silt and biofilms from in-stream habitat and facilitate the movement of native fish and platypus. If more water becomes available, an additional fresh may be delivered in the dry and average planning scenarios, and at least one of these freshes is expected to occur naturally in a wet scenario.

Delivery of a low flow throughout the year is expected to change depending on the planning scenario. A 125 ML per day flow in reach 3 is the minimum target magnitude through summer and autumn, which is expected to be delivered with the operational passing flows. Increasing the low-flow magnitude to at least 230 ML per day between May and July and 350 ML per day in November (following a spring fresh) is recommended in all planning scenarios to improve water quality in the Thomson estuary. The upper magnitude of 350 ML per day during May to July is preferred in all planning scenarios to improve outcomes for fringing and streamside vegetation. However, the magnitude of the low flow throughout these months may be reduced to 230-300 ML per day in drier planning scenarios, which is still at a rate that allows fish and platypus to move throughout the reach at critical breeding and dispersal times.

The recommended water regime for the Heyfield wetlands is the same in the dry and average planning scenarios because the wetlands are expected to hold water for most of the year in these planning scenarios. Filling the wetlands in late winter or early spring and providing top-ups through summer and early autumn aims to help recently planted semi-aquatic and terrestrial fringing plants become established and promote the natural recruitment of native wetland species. A partial drawdown in mid-to-late autumn in the dry and average planning scenarios will replicate a natural drying event and allow the breakdown of accumulated organic matter, promote nutrient cycling and provide mudflat habitats for waterbirds to feed. In the wet planning scenario, natural inflow is expected to keep the wetlands near full, so a partial drawdown will not be possible. The planned autumn drawdown will be replaced by ongoing top-ups in the drought planning scenario to maintain some aquatic habitat for frogs and waterbirds in the local area. In the average and wet planning scenarios, natural run-off will likely meet some or all of the recommended watering actions at the Heyfield wetlands.

There are no carryover targets in the Thomson system for 2025-26. Natural inflows are again expected to meet many of the planned watering actions in the Thomson River in 2025-26, meaning enough water for the environment will likely be available to meet early-season demands in 2026-27.

Table 2.3.2 Thomson system environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Spill from Thomson Reservoir unlikely • Passing flow and limited natural flow from Aberfeldy River and other tributaries contribute to low flow • A large magnitude of consumptive water is released from storage	• Spill from Thomson Reservoir unlikely • Passing flow and natural flow from Aberfeldy River and other tributaries contribute to low flow and some freshes • A moderate magnitude of consumptive water is released from storage	• Spill from Thomson Reservoir possible • Passing flow and natural flow from Aberfeldy River and other tributaries contribute to low flow and periods of high flow and freshes • A small magnitude of consumptive water is released from storage	• Spill from Thomson Reservoir likely • Natural flow from Aberfeldy River and other tributaries is expected to meet most low-flow requirements, provide large freshes and sustain high flow • Minimal magnitude of consumptive water is released from storage
Expected availability of water for the environment	• 15,100 ML	• 17,200 ML	• 19,400 ML	• 24,500 ML
Thomson River (targeting reach 3)				
Potential environmental watering – tier 1 (high priorities)	• Year-round low flow • Spring fresh (one fresh) • Summer/autumn freshes (two freshes) • Autumn fresh	• Year-round low flow • Spring fresh (one fresh) • Summer/autumn freshes (two freshes) • Autumn fresh		• Year-round low flow • Spring fresh (one fresh) • Summer/autumn freshes (three freshes) • Autumn fresh
Potential environmental watering – tier 2 (additional priorities)	• N/A	• Summer/autumn freshes (three freshes)		• Spring freshes (two freshes)

Planning scenario	Drought	Dry	Average	Wet
Heyfield wetlands				
Potential environmental watering – tier 1 (high priorities)	• Fill • Top-ups as required to maintain the water level	• Fill • Top-ups as required to maintain the water level • Partial drawdown		• Fill • Top-ups as required to maintain the water level
Possible volume of water for the environment required to achieve objectives	• 14,600 ML (tier 1) • N/A (tier 2)	• 17,200 ML (tier 1) • 2,200 ML (tier 2)	• 19,400 ML (tier 1) • 5,100 ML (tier 2)	• 24,300 ML (tier 1) • 9,600 ML (tier 2)
Priority carryover requirements for 2026-27	• 0 ML			

2.4 Macalister system

Waterway manager – West Gippsland Catchment Management Authority

Storage manager – Southern Rural Water

Environmental water holder – Victorian Environmental Water Holder

System overview

***Wirn wirndook Yeerung* (Macalister River) flows from Mt Howitt in the Alpine National Park and joins *Carran Carran* (Thomson River) south of Maffra (Figure 2.4.1). The river winds southeast through mostly forested, confined valleys and narrow floodplains above Lake Glenmaggie. The downstream reaches flow through wide alluvial floodplains cleared for agriculture. The Wellington River and Glenmaggie Creek are the main tributaries of the Macalister River.**

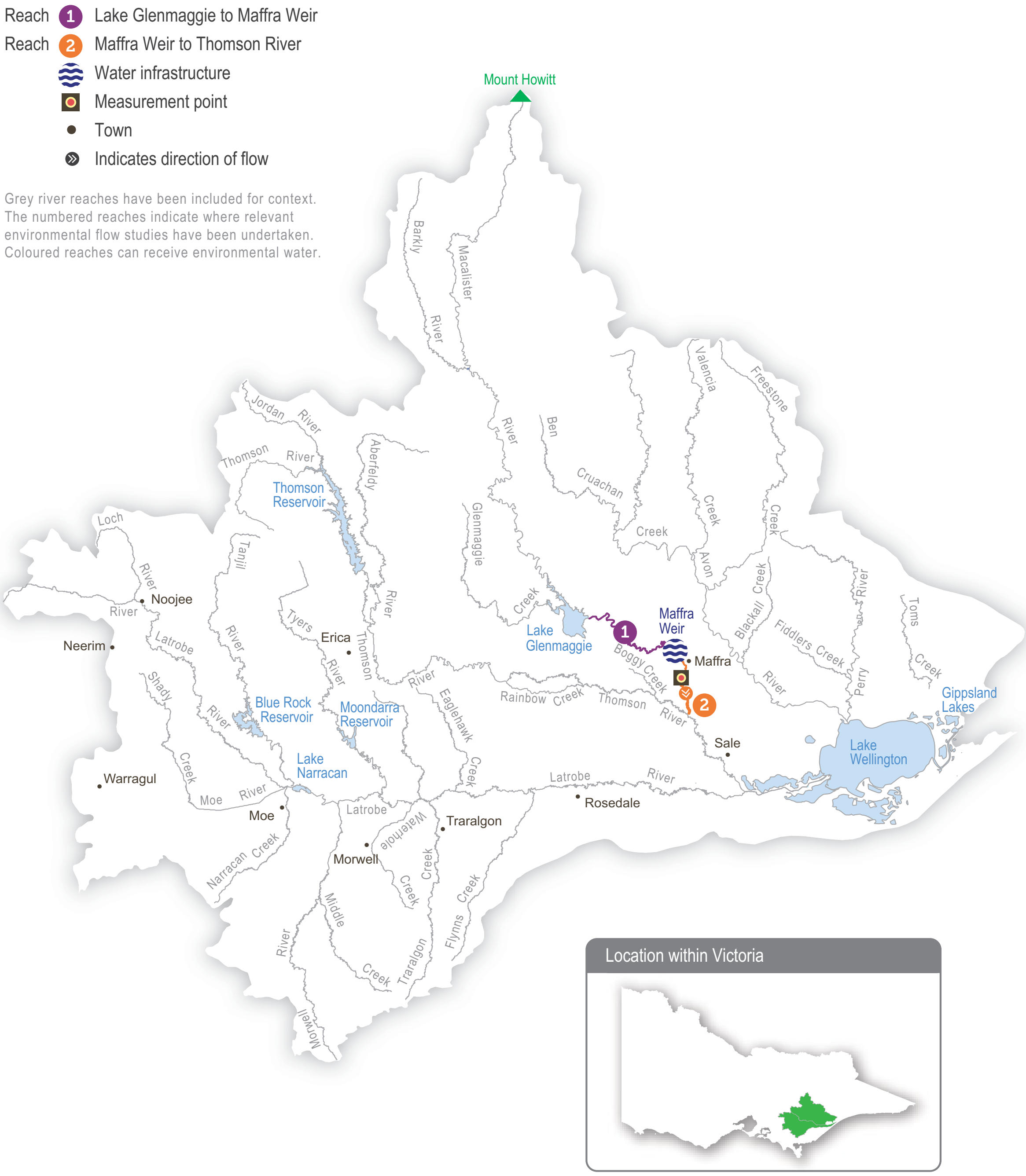
Lake Glenmaggie is the major water harvesting storage regulating the Macalister River. Maffra Weir is a small diversion weir located further downstream in Maffra.

Before the construction of Lake Glenmaggie, the Macalister River would regularly receive high and medium flows in winter and spring. Although Lake Glenmaggie regularly spills, a high flow is less frequent than natural because the storage captures much of the water. A notable effect of irrigation and water harvesting is the reversed seasonality of the flow between Lake Glenmaggie and Maffra Weir. The summer flow through this reach is much greater than natural due to the delivery of irrigation water. Winter flow in this reach is lower than natural because a large proportion of the inflows are captured, and there are no irrigation demands over winter. Most irrigation water is diverted at Maffra Weir, and the flow downstream of the weir is lower than natural year-round. The changed hydrology restricts fish migration, limits the growth and recruitment of in-stream and streamside plants and reduces the quality of in-stream habitat.

Water for the environment is stored in Lake Glenmaggie and released to the Macalister River. The river is divided into two reaches for the purposes of managing environmental flows: Lake Glenmaggie to Maffra Weir (reach 1) and Maffra Weir to the Thomson River (reach 2).

Maffra Weir is a major barrier to fish movement along the river, so environmental water delivery for migratory fish objectives mainly focuses on reach 2. All other objectives apply to reaches 1 and 2. Construction of a new fish ladder on Maffra Weir to improve fish passage is scheduled to commence in the next few years, and it is not expected to affect deliveries of water for the environment in 2025-26.

Figure 2.4.1 Macalister system



Environmental values

Seven migratory native fish species move between the Macalister River, the estuary, Gippsland Lakes and the sea to complete their life cycle. These species include the Australian grayling, short-finned eel, long-finned eel, tupong, Australian bass, shorthead lamprey and common galaxias. Yellow-eye mullet, an estuarine species, has also been recorded in the river. Platypus and rakali (water rats) are widely distributed through the Macalister River and its tributaries.

The streamside vegetation corridor along the regulated reaches of the Macalister River is fragmented. Immediately below Lake Glenmaggie, the vegetation is in good condition. It includes remnant river red gums and good-quality stands of shrubs, particularly in areas where revegetation has occurred in combination with stock exclusion. Further downstream, the vegetation is degraded. In recent years, the cover of in-stream vegetation has declined, possibly due to increased water turbidity, erosion and a lack of an appropriate water regime to encourage plant growth. The cover of non-woody plants (such as reeds, sedges and rushes) along the river's fringes is patchy.

Environmental objectives in the Macalister system

F1 – Increase the distribution, recruitment and abundance of all native fish, and increase opportunities for the spawning and recruitment of native migratory fish (such as Australian grayling)

G1 – Maintain the form of the riverbank and bed to provide physical habitat for aquatic animals and plants

PR1 – Increase the abundance of platypus and rakali (water rats)

V1 – Maintain emergent (non-woody) and fringing (woody) vegetation in the streamside zone

V2 – Reinstate submerged aquatic vegetation

MI1 – Increase the abundance and number of functional groups of waterbugs

WQ1 – Improve water quality during periods of reduced or no passing flow from Lake Glenmaggie

WQ2 – Improve water quality in the Thomson River estuary

Traditional Owner cultural values and uses

Wirn wirndook Yeerung (Macalister River) is a very important river to the Gunaikurnai people. It is a pathway that connects the Snow Country to the heart of Gippsland, to ceremonial grounds and to a known special men's place to Elders. Its traditional name is *Wirn wirndook Yeerung*, which translates to 'song of the male fairy-wren'.

Yeerung is the men's totem. This river has many cultural resources and extensive important sites along the whole system.

The Gunaikurnai have had a continued connection to Gunaikurnai Country for over 50,000 years, including with the waterways in the Latrobe system into which *Wirn wirndook Yeerung* feeds. For the Gunaikurnai as Traditional Owners, there are immense challenges to heal, protect and manage Country, which has been drastically altered since colonisation.

> "As Gunaikurnai, we see our land (*Wurruk*), waters (*Yarnda*), air (*Watpootjan*) and every living thing as one. All things come from *Wurruk*, *Yarnda* and *Watpootjan*, and they are the spiritual life-giving resources, providing us with resources and forming the basis of our cultural practices. We have a cultural responsibility to ensure that all of it is looked after."
>
> – ***Water is Life: Traditional Owner Access to Water Roadmap*** *2022 – Gunaikurnai Nation Statement*

This cultural landscape depends on culture and Aboriginal management.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is working with the West Gippsland CMA to determine how to express Gunaikurnai objectives for water in a way that contributes to seasonal watering proposals from the perspective of traditional custodians with traditional knowledge. GLaWAC has membership on the Macalister Environmental Water Advisory Group.

GLaWAC has expressed that more water needs to go down *Wirn wirndook Yeerung* between Lake Glenmaggie and Lake Wellington to improve water quality, including to address the threat of salinity and to support plants and animals that have cultural values and uses.

GLaWAC has also questioned the timing of watering events and expressed a desire to provide increased water depth to promote downstream fish migration and spawning, deeper water pools to prevent water quality degradation and more variation in water levels to mimic natural conditions better.

Traditionally, the landscape, which includes *Wirn wirndook Yeerung* and branches and associated floodplains, has been a rich source of food, medicine and resources for the Gunaikurnai people. In the area, there are many sites of cultural significance near the river and around Lake Glenmaggie. The Gunaikurnai have moved through the landscape along the waterways for thousands of years, sourcing food and plants along the way.

From the perspective of the Gunaikurnai, the land and waterways flowing to the Gippsland Lakes are interconnected and cannot be considered separately, as decisions can affect downstream areas. The lower Latrobe wetlands and the rivers that feed them, including *Wirn wirndook Yeerung*, have important cultural significance to the Gunaikurnai.

Watering requirements to support cultural values and uses include:

- timing the environmental water delivery planned in partnership with GLaWAC to support a seasonal flow regime and wet and dry periods that embody healthy Country
- maintaining freshwater supply to the *Durt-Yowan* (Latrobe River) estuary, Dowd Morass, Sale Common and Heart Morass, and associated freshwater habitats. The lower Latrobe wetlands are an important resource for the Gunaikurnai
- providing connectivity between reaches and onto floodplains to support dependent plants and animals with cultural values and uses of significance to the Gunaikurnai
- maintaining water quality to support the health of native plants and animals with cultural values and uses of significance to the Gunaikurnai.

GLaWAC is developing a strategic Water Plan due for completion by the end of 2025.

With the West Gippsland agreeing to host GLaWAC's Aboriginal Water Officers in 2025, we see this as an opportunity to increase the understanding and involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program, a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 2.4.1**, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, kayaking and swimming)
- riverside recreation and amenity (such as fishing)
- socioeconomic benefits (such as preventing erosion and potentially losing private and public land).

Watering actions, particularly over summer, may improve the water quality in waterholes and improve swimming conditions. Freshes throughout the year also increase the longitudinal connectivity of the river, improving conditions for canoeing and kayaking.

Winter and spring freshes encourage the spawning and recruitment of fish species (such as Australian bass, a popular recreational fishing species).

The West Gippsland CMA notifies the public of planned large releases of water for the environment to alert river users about potential increases in the water's level and velocity. People can register on the West Gippsland CMA website to be notified of upcoming watering events.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.4.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 2.4.1 Macalister system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Macalister River (targeting reach 2)		
Year-round low flow (60-90 ML/day)	• Maintain pool and riffle habitat for waterbugs and a minimum depth over riffles to allow fish to move throughout the reach • Provide connectivity throughout the river for the local movement of platypus and rakali (water rats), as well as protection from predation and access to food • Provide low-velocity flow and clear water to enable the establishment of submerged vegetation • Maintain a minimum depth in pools in the event of reduced passing flows to allow for turnover of water and to slow degradation of water quality to support aquatic life At 90 ML/day, expected watering effects are met in reaches 1 and 2. At 60 ML/day, expected watering effects are met in reach 2 only.	F1, MI1, PR1, V2, WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Winter/spring low flow (300 ML/day for at least 120 days during July to November 2025 and June 2026)	• Provide permanent wetted habitat for waterbugs and maintain water depth over riffles to enable fish passage between local habitats • Provide sustained wetting of low-level benches to limit the encroachment of terrestrial vegetation	F1 MI1 V1
Spring fresh (one fresh of 700 ML/day for five to 10 days during September to November)	• Cue the upstream migration of adult fish (e.g. shorthead lamprey) and the recruitment of juveniles (e.g. Australian grayling, tupong, common galaxias, Australian bass and short- and long-finned eels) from marine/estuarine environments • Wet mid-level benches to water woody vegetation, limit the encroachment of terrestrial vegetation and facilitate the dispersal of emergent and fringing vegetation seeds and propagules throughout the reach	F1 V1
Spring/summer fresh following spill (one fresh peaking at 1,500–1,800 ML/day for three days during September to December) *Trigger action: extend duration (if needed) and slow recession of spills*	• Inundate emergent and woody vegetation on mid- and high-level benches, move organic matter into the channel and transport food resources downstream • Provide a flow with sufficient shear stress to scour biofilms and flush fine sediment from pools and small gaps in the substrate to improve geomorphic habitat and food resources for waterbugs • Cue the upstream migration of adult fish (e.g. shorthead lamprey) and the recruitment of juveniles (e.g. Australian grayling, tupong, common galaxias, Australian bass and short- and long-finned eels) from marine/estuarine environments	F1 G1 MI1 V1
Summer/autumn fresh (one fresh of 350 ML/day for seven to 10 days during December to March)	• Flush the upper Thomson River estuary (Thomson reach 6) when combined with flows from the Thomson River, and contribute freshwater to the lower reaches of the Latrobe estuary and wetlands • Increase water depth to allow fish to move through the reach • Provide a flow with sufficient shear stress to flush fine sediment from small gaps to improve geomorphic habitat • Flush substrates and improve the quality of existing waterbug habitat and food supply • Wet low benches to facilitate the dispersal of seeds and propagules from emergent vegetation throughout the reach • Flush pools to maintain water quality for aquatic animals	F1 G1 MI1 V1 WQ2

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn freshes (three freshes of 140 ML/day for three days during December to March)	• Increase the water depth to allow fish to move throughout the reach • Flush substrates and improve the quality of the existing waterbug habitat and food supply • Wet low benches to facilitate the dispersal of seeds and propagules from emergent vegetation throughout the reach • Flush pools to maintain water quality for aquatic animals	F1 MI1 V1 WQ1
Autumn fresh (one fresh of 350 ML/day for five to 10 days during April to May)	• Cue the downstream migration of Australian grayling towards the estuary for spawning • When delivered for more than three days and combined with freshes in the Thomson River, fully flush the upper Thomson River estuary and contribute freshwater to the lower reaches of the Latrobe River and wetlands	F1 WQ2
Autumn/winter fresh (one fresh of 700 ML/day for five to seven days during July to August 2025 or May to June 2026)	• Cue the downstream migration of Australian bass and tupong towards the estuary for spawning/breeding • Increase the wetted area and improve water quality by flushing pools, providing habitat and conditions for waterbugs • Wet low and mid-level benches to facilitate the dispersal of emergent and fringing vegetation seeds and propagules throughout the reach	F1 MI1 V1

Scenario planning

Table 2.4.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

Following four consecutive wet years, the Macalister system experienced much drier climatic conditions in 2024-25. No spills occurred from Lake Glenmaggie during winter and spring, meaning water for the environment and operational releases met environmental flows recommendations throughout this period. Planned environmental watering actions in 2025-26 will continue to focus on supporting the migration, spawning and recruitment of native fish within the system. They are generally the same in all planning scenarios, but the duration and magnitude may vary depending on water availability throughout the year.

Providing a year-round low flow to maintain critical habitat, habitat connectivity and food for native fish and platypus in the Macalister River is the highest-priority potential watering action in all planning scenarios. Year-round operational passing flows of 60 ML per day will meet the minimum low-flow objectives for reach 2 in average and wet conditions. Increasing the flow to 90 ML per day will meet the minimum low-flow objectives for reaches 1 (which has a wider channel) and 2 and will provide more habitat and food to help grow waterbugs, fish and platypus populations and exclude terrestrial vegetation from the main channel. A higher-magnitude low flow is therefore preferred and may be partly met by operational releases and natural inflows at certain times. In drought and dry conditions, the operational passing flows may be reduced to 30 ML per day. Water for the environment will be used where possible to deliver a higher-magnitude low flow, but will be prioritised in November in all planning scenarios when operational and consumptive water deliveries are expected to be low. In the wet planning scenario, the low flow may be increased to 300 ML per day during winter and spring to wet the lower benches over a sustained period to discourage the encroachment of terrestrial vegetation.

Larger summer/autumn freshes of 350 ML per day may be timed to coincide with freshes from the Thomson River. These freshes help to improve water quality in the Thomson River and Latrobe estuary and are a high priority in drier planning scenarios. Smaller 140 ML per day summer/autumn freshes to maintain the quality of pool habitats that will serve as important refuges for native fish and platypus will be delivered in all planning scenarios. They are especially important to deliver in the drier planning scenarios when poor water quality could be an issue and are likely to be met naturally in the wet scenario. The West Gippsland CMA will monitor water quality during dry and drought scenarios and adapt the flow as necessary to limit stress on aquatic animals.

Delivering at least one fresh of 350 ML per day in autumn is a high priority in all planning scenarios to provide a migration trigger for native fish to move into or out of the system to complete their life cycles. A larger-magnitude spring fresh is a high priority in all planning scenarios except drought and will inundate vegetation higher up the bank, improving the condition of flood-tolerant species. The autumn fresh will likely improve water quality in the Thomson River and Latrobe estuary, which can deteriorate at the end of summer. These autumn and spring events are necessary yearly in the average and wet planning scenarios to ensure regular recruitment and align with environmental cues in the broader landscape. They are generally a lower priority in dry or drought planning scenarios when environmental allocations are low, but they are important to deliver even in drier conditions in 2025-26 to consolidate recent population growth following multiple wet years. An additional 700 ML per day fresh may be delivered in late autumn or winter in the average and wet planning scenarios to increase fish migration and boost fish recruitment when climatic conditions are favourable. However, this event may be difficult to deliver in the drought and dry planning scenario, given the expected availability of water for the environment. Several other large freshes are recommended to slow the recession following spills from Lake Glenmaggie in the wet planning scenario, but they are a lower priority and will likely be at least partly met by operational releases if the reservoir spills.

As seen in recent years, natural inflows and operational releases to manage storage levels may partially achieve some tier 1 planned watering actions in the wetter planning scenarios, meaning lower-priority tier 2 actions that are proposed in these scenarios may also be achievable if enough water for the environment becomes available.

A minimum carryover target of 1,900 ML has been prioritised in the drought, dry and average planning scenarios to support early-season low-flow requirements in the Macalister River in 2026-27. In the wet planning scenario, opening allocations in 2026-27 are expected to be high enough to meet early-season low-flow requirements.

Table 2.4.2 **Macalister system potential environmental watering planning scenarios**

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Limited natural flow; freshes or high flow are unlikely • Passing flows at Maffra Weir may be reduced	• Possible spills from Lake Glenmaggie in spring, minor flood levels may occur • Passing flows at Maffra Weir may be reduced	• Regular spills from Lake Glenmaggie in spring, minor to moderate flood levels may occur	• Large and frequent spills from Lake Glenmaggie, moderate to major flood levels may occur
Expected availability of water for the environment	• 15,500 ML	• 18,700 ML[1]	• 19,800 ML[1]	• 24,500 ML[1]

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 1 (high priorities)	• Year-round low flow • Summer/ autumn fresh (one fresh) • Summer/ autumn freshes (three freshes) • Autumn fresh (one fresh)	• Year-round low flow • Spring fresh (one fresh) • Summer/ autumn fresh (one fresh) • Summer/ autumn freshes (three freshes) • Autumn fresh (one fresh)	• Year-round low flow • Spring fresh (one fresh) • Summer/ autumn freshes (three freshes) • Autumn fresh (one fresh) • Autumn/winter fresh (one fresh)	• Year-round low flow • Spring fresh (one fresh) • Summer/ autumn freshes (three freshes) • Autumn fresh (one fresh) • Autumn/winter fresh (one fresh)
Potential environmental watering – tier 2 (additional priorities)	• Spring fresh (one fresh) • Autumn/ winter fresh (one fresh)	• Autumn/ winter fresh (one fresh)	• Summer/ autumn fresh (one fresh)	• Winter/spring low flow • Spring/summer fresh following spill (one fresh)
Possible volume of water for the environment required to achieve objectives	• 10,800 ML (tier 1) • 11,100 ML (tier 2)	• 16,700 ML (tier 1) • 7,100 ML (tier 2)	• 17,800 ML (tier 1) • 11,600 ML (tier 2)	• 23,700 ML (tier 1) • 15,600 ML (tier 2)
Priority carryover requirements for 2026-27	• 1,900 ML	• 1,900 ML	• 1,900 ML	• 0 ML

1 Carryover from 2024-25 may be forfeited in the event of spill releases from Lake Glenmaggie.

2.5 Snowy system

Waterway managers – East Gippsland Catchment Management Authority and New South Wales Department of Climate Change, Energy, the Environment and Water

Storage manager – Snowy Hydro Limited

Environmental water holders – Victorian Environmental Water Holder and New South Wales Department of Climate Change, Energy, the Environment and Water

System overview

The Snowy River originates on the slopes of Mount Kosciuszko. It flows from its headwaters on the eastern slopes of the Snowy Mountains in New South Wales through the Snowy River National Park in Victoria and into Bass Strait (Figure 2.5.1).

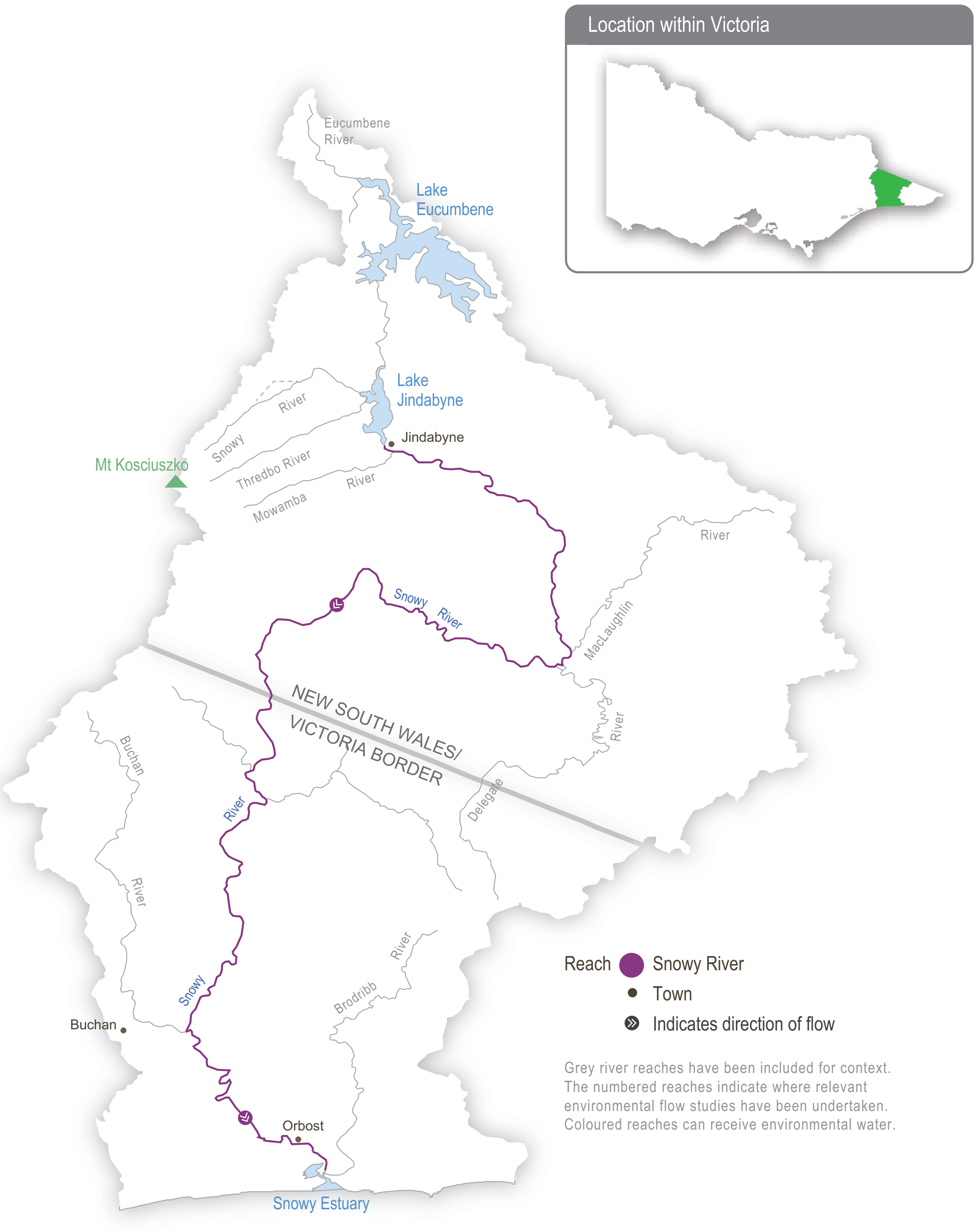
Four major dams and multiple diversion weirs in the upper Snowy River catchment capture and divert water to the Murrumbidgee and Murray River valleys. The hydrological effects of the Snowy Mountains Scheme are substantial, but they are partly alleviated by the contribution of flows from tributaries (such as the Delegate River in NSW and the Buchan and Brodribb rivers in Victoria).

The construction and operation of the Snowy Mountains Scheme previously diverted 99 per cent of the Snowy River's mean annual natural flow at Jindabyne. The loss of flow changed the structure and function of the river, reduced the opening of the Snowy River entrance to Bass Strait and resulted in a decline in environmental values.

The Victorian, NSW and Commonwealth governments agreed to recover some water and, in 2002, delivered the first environmental flow to the Snowy River below Jindabyne Dam to help restore the damage done by decades of limited flow. The Victorian share of water for the environment available for use in the Snowy system is held in the Victorian Murray, Goulburn and Loddon systems. The NSW share of water for the environment available for use in the Snowy system is held in the NSW Murray and Murrumbidgee systems. Collectively, the water is made available for environmental flows in the Snowy River via a substitution method, whereby water for the environment allocated in Victoria and NSW replaces water earmarked for transfer from the Snowy to Victoria and NSW to support irrigation demands. The NSW Department of Climate Change, Energy, the Environment and Water plans environmental flows in the Snowy River in consultation with the Snowy Advisory Committee. The committee includes representatives of the Aboriginal community, the local community, the Victorian Government, the NSW Government and environmental experts. The committee brings together local knowledge and expert advice to help inform the management and delivery of water for environmental outcomes.

The water year in the Snowy system runs from 1 May to 30 April, and the daily flow regime is planned in advance by the Snowy Advisory Committee. Water for the environment is released daily from Jindabyne Dam into the Snowy River. The annual allocation of water for the environment varies based on water availability, rainfall and inflows. Environmental releases aim to deliver an average of 212,000 ML per year, the equivalent of 21 per cent of the average annual natural flow before the construction of the Jindabyne Dam.

Figure 2.5.1 Snowy system



Environmental values

The upper reaches and tributaries of the Snowy River support water-dependent plants and animals, including freshwater native fish (such as river blackfish and Australian grayling), platypus and frogs. The lower reaches support estuary perch and Australian bass that move between saltwater and freshwater systems. The estuary contains estuarine and saltwater species (such as flathead and black bream). The floodplain wetlands of the Snowy River near Marlo provide feeding and breeding areas for wetland and migratory birds.

Traditional Owner cultural values and uses

Traditional Owners with links to the Snowy River system include the Ngarigo, Bidawal and Gunaikurnai peoples.

The river and its associated systems and lands have significant cultural values, including as a functional and spiritual connective pathway. The Snowy River has enduring cultural importance as a place for the gathering of different Nations, ceremonies, access to food, fibre and other resources, stories, spirituality and songlines.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) holds Native Title, a Recognition and Settlement Agreement under the *Traditional Owner Settlement Act 2010* and Registered Aboriginal Party (RAP) status under the Victorian *Aboriginal Heritage Act 2006* in East Gippsland, including the lower Snowy River, associated with the Krauatungalung clan. This landscape was largely a transitional landscape, with people migrating seasonally from the High Country to the coast and back, depending on the availability of different food sources throughout the year. Many trade routes travel through freshwater river systems (such as the Snowy River system).

GLaWAC provided input to the draft Snowy River Estuary Flow Study.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Scope of environmental watering

The total volume available for release to the Snowy River in 2025-26 is 176,900 ML. Due to operating rules in the system, the daily flow regime that will be delivered in 2025-26 is pre-planned. The storage manager will make daily releases of varying volumes from Lake Jindabyne between May 2025 and April 2026 to mimic the typical flow patterns of a mixed snowmelt/rainfall river system characteristic of the Snowy Mountains. A 'natural flow scaling' approach is applied, and the continuous daily releases aim to support environmental processes in the Snowy River below Jindabyne Dam and maintain a healthy river that is much smaller than the natural channel that existed before the river was regulated.

A return to drier conditions in 2024-25 following four consecutive wet years means there will be less water available in 2025-26, but still a large enough volume to deliver multiple high-flow freshes throughout the year. These freshes will help improve environmental conditions and build additional resilience into the system. The flow pattern is similar to previous years and mimics a snowmelt river, with greater flow during winter and spring. Five high-flow events exceeding 2,400 ML per day are scheduled between June and November 2025 to move sediment and improve in-stream habitat for native fish, platypus, frogs and waterbugs. The largest release, known as a 'flushing flow', will occur in October 2025 if Lake Jindabyne is high enough to enable delivery through the required infrastructure. It has a target peak flow rate of at least 9,000 ML per day, which will be held for about eight hours to flush fine sediment and wet high benches and backwaters. Other peaks in the flow will mimic winter rainfall and spring snowmelt events. Moderate-to-high flow rates will be sustained from the end of May to December 2025 to mix water in the estuary to benefit plants and fish (such as Australian bass). Based on the recently completed Snowy River Estuary Flow Study recommendations, a trial of different flow rates will be conducted from January to April 2026, with planned releases of 150-200 ML per day aiming to prevent the estuary entrance from closing. Where possible, a flow with peaks exceeding 1,000 ML per day will also be provided between January to April 2026.

For further information, visit the NSW Government's Snowy River increased flows **web page**.

SECTION 3:
Central region

3.1 Central region overview

The systems in the central region that can receive water from the VEWH's environmental entitlements are *Birrarung* (Yarra River) and Tarago River in the east and *Weariby Yallok* (Werribee River), Moorabool River, upper Barwon River and lower Barwon wetlands in the west. The VEWH does not hold an environmental entitlement in the Maribyrnong system, but in some years, the VEWH purchases allocation to allow delivery in selected reaches of the Maribyrnong system.

Environmental values, objectives and planned actions for delivering water for the environment for each system in the central region are presented in the system sections that follow.

Traditional Owners in the central region

Traditional Owners in the central region have a deep connection to Country that has endured for tens of thousands of years. This includes inherent rights and cultural obligations to Country and the community.

The Bunurong Land Council Aboriginal Corporation, Eastern Maar Aboriginal Corporation, Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) and Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation are the Registered Aboriginal Parties (RAPs) under the Victorian *Aboriginal Heritage Act 2006* for the areas incorporating waterways covered by this section of the seasonal watering plan. Water from the Country of the Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) and the Taungurung Land and Waters Council (TLaWC) can be diverted into the central region. Eastern Maar and Gunaikurnai hold Commonwealth Government Native Title, and GLaWAC and TLaWC have Recognition and Settlement Agreements with the state.

Engagement

Program partners engage extensively with Traditional Owners, stakeholders and local communities to understand community priorities for delivering water for the environment in the coming year and to understand how cultural, social, economic and recreational values, uses and objectives may be supported by delivering an environmental flow, provided it does not compromise environmental outcomes.

Engagement also informs environmental objectives in regional catchment and waterway strategies, environmental flows studies and environmental management plans.

Table 3.1.1 Program partners and stakeholders that engaged with Corangamite CMA to develop seasonal watering proposals and key documents informing the proposals for the Moorabool system, upper Barwon River and lower Barwon wetlands (in alphabetical order)

Partner/ stakeholder	Moorabool system	Upper Barwon River	Lower Barwon wetlands
Community groups and environment groups	• Corangamite Waterwatch • Geelong Landcare Network • Moorabool Catchment Landcare Group • People for A Living Moorabool	• Birregurra Landcare Group • Environment Victoria • Friends of the Barwon • Geelong Field Naturalists Club • Land and Water Resources Otway Catchment • Otway Agroforestry Network Ltd • Upper Barwon Landcare Network • Winchelsea Land and Rivercare Group	• Geelong Field Naturalists Club • Friends of the Barwon
Government agencies	• Barwon Water • Central Highlands Water • Department of Energy, Environment and Climate Action • Parks Victoria • Southern Rural Water • Victorian Environmental Water Holder	• Barwon Water • Colac Otway Shire Council • Department of Energy, Environment and Climate Action • Southern Rural Water • Victorian Environmental Water Holder	• Barwon Water • City of Greater Geelong • Department of Energy, Environment and Climate Action • Parks Victoria • Southern Rural Water • Victorian Environmental Water Holder • Victorian Fisheries Authority
Landholders/ farmers	• Landholders on the Moorabool Stakeholder Advisory Committee	• Individual landholders	• Individual landholders
Local businesses	• Adelaide Brighton Cement		• Commercial eel fishers
Recreational users		• Individual users	• Field & Game Australia (Geelong Branch) • Geelong Gun and Rod Association Inc.
Traditional Owners	• Wadawurrung Traditional Owners Aboriginal Corporation	• Wadawurrung Traditional Owners Aboriginal Corporation • Eastern Maar Aboriginal Corporation	• Wadawurrung Traditional Owners Aboriginal Corporation

Table 3.1.2 Program partners and stakeholders that engaged with Melbourne Water to develop seasonal watering proposals and key documents informing the proposals for the Yarra, Tarago, Maribyrnong and Werribee systems (in alphabetical order)

Partner/ stakeholder	Yarra system	Tarago system	Maribyrnong system	Werribee system
Community groups and environment groups	• Collingwood Children's Farm • Environment Victoria • Friends of Yarra Flats Park • Friends of Yarran Dheran Nature Reserve • Independent community members • Native Fish Australia • Waterwatch coordinators • Yarra Riverkeeper • Abbotsford Riverbankers • Warringal Conservation Society	• Cardinia Environment Coalition • Environment Victoria • Friends of Mt Cannibal Flora and Fauna Reserve • Friends of Robin Hood Reserve • Bunyip Landcare • Independent community members • Native Fish Australia • Waterwatch coordinators	• Environment Victoria • Friends of Holden Flora Reserve • Friends of the Maribyrnong Valley Inc. • Independent community members • Jacksons Creek EcoNetwork • Friends of Steele Creek • Maribyrnong River and Waterways Association • Native Fish Australia • Waterwatch coordinators	• Ecolinc • Environment Victoria • Friends of Toolern Creek Reserve • Friends of Werribee Gorge & Long Forest Mallee Inc. • Independent community members • Moorabool Environment Group • Bacchus Marsh Platypus Alliance • Native Fish Australia • NatureWest • Pinkerton Landcare and Environment Group • Waterwatch Coordinator • Werribee Riverkeeper • Western Region Environment Centre

Partner/ stakeholder	Yarra system	Tarago system	Maribyrnong system	Werribee system
Government agencies	• Banyule City Council • City of Boroondara • City of Melbourne • City of Whittlesea • Commissioner for Environmental Sustainability Victoria • Department of Energy, Environment and Climate Action • Environment Protection Authority Victoria • First Peoples – State Relations • Manningham City Council • Melbourne Water (Service Delivery) • Nillumbik Shire Council • Parks Victoria • Victorian Fisheries Authority • Victorian Freshwater Fish Habitat & Flows Roundtable • Yarra City Council • Yarra Ranges Shire Council	• Baw Baw Shire Council • Cardinia Shire Council • Commissioner for Environmental Sustainability Victoria • Department of Energy, Environment and Climate Action • Environment Protection Authority Victoria • First Peoples – State Relations • Melbourne Water (Service Delivery) • Parks Victoria • Southern Rural Water • Victorian Fisheries Authority • Victorian Freshwater Fish Habitat & Flows Roundtable	• Commissioner for Environmental Sustainability Victoria • Department of Energy, Environment and Climate Action • Environment Protection Authority Victoria • First Peoples – State Relations • Greater Western Water • Hume City Council • Maribyrnong City Council • Melbourne Water (Service Delivery) • Moonee Valley City Council • Parks Victoria • Southern Rural Water • Victorian Fisheries Authority	• Commissioner for Environmental Sustainability Victoria • Department of Energy, Environment and Climate Action • Environment Protection Authority Victoria • First Peoples – State Relations • Greater Western Water • Melbourne Water (Service Delivery) • Melton City Council • Parks Victoria • Southern Rural Water • Victorian Fisheries Authority • Wyndham City Council
Landholders/ farmers	• Individual landholders • Licensed diverters	• Individual landholders	• Licensed diverters from the Maribyrnong River at Keilor	• Individual landholders • Zoos Victoria

Partner/ stakeholder	Yarra system	Tarago system	Maribyrnong system	Werribee system
Local businesses	• Doon Reserve Caravan Park • East Coast Kayaking • Melbourne Adventure Hub • Sea Kayak Australia • Warburton Holiday Park • Warrior Spirit Adventures	• Glen Cromie Reserve	• Atlas Ecology Pty Ltd • Blackbird Cruises	• Camp Sunnystones
Recreational users	• Kirinari Kayak Club • Paddle Victoria • Patterson Lakes Canoe Club • Victorian Sea Kayak Club • VRFish • Whitehorse Canoe Club Inc.	• VRFish	• VRFish	• VRFish • Werribee & District Anglers Club
Technical experts	• Aquatic Pollution Prevention Partnership • Arthur Rylah Institute • Australian Platypus Conservancy • Cesar Australia • Melbourne Water subject matter experts • Research collaborators at Melbourne University	• Aquatic Pollution Prevention Partnership • Arthur Rylah Institute • Australian Platypus Conservancy • Cesar Australia • Melbourne Water subject matter experts • Research collaborators at Melbourne University	• Aquatic Pollution Prevention Partnership • Arthur Rylah Institute • Australian Platypus Conservancy • Cesar Australia • Melbourne Water subject matter experts • Research collaborators at Melbourne University	• Aquatic Pollution Prevention Partnership • Arthur Rylah Institute • Australian Platypus Conservancy • Cesar Australia • Melbourne Water subject matter experts • Research collaborators at Melbourne University

Partner/ stakeholder	Yarra system	Tarago system	Maribyrnong system	Werribee system
Traditional Owners	• Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation • Gunaikurnai Land and Waters Aboriginal Corporation • Taungurung Land and Waters Council Aboriginal Corporation	• Bunurong Land Council Aboriginal Corporation • Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation	• Bunurong Land Council Aboriginal Corporation • Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation	• Bunurong Land Council Aboriginal Corporation • Wadawurrung Traditional Owners Aboriginal Corporation • Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation

Integrated catchment management

Altered water regimes are one of many threats to the health of Victoria's waterways. Many of the environmental objectives of water for the environment in the central region are complemented by simultaneously addressing issues such as barriers to fish movement, high nutrient loads, loss of streambank vegetation and invasive species.

Examples of complementary programs that support the outcomes of environmental flows in the central region include:

- works to protect and improve streambanks along priority reaches, including willow removal, revegetation and fencing to exclude stock
- urban billabong restoration along the lower Yarra River using Western and Traditional Owner ecological knowledge
- an update to the Werribee Diversion Weir (proposed in the ***Central and Gippsland Region Sustainable Water Strategy 2022***) to improve fish passage and delivery of environmental flows.

For more information about integrated catchment management programs in the central region, refer to the Corangamite CMA and Melbourne Water regional catchment strategies, the Melbourne Water ***Healthy Waterways Strategy*** and the ***Corangamite Waterway Strategy 2014-2022***.

Risk management

When developing seasonal watering proposals for the Yarra, Tarago, Maribyrnong, Werribee, Moorabool and Barwon systems, environmental watering program partners assessed risks associated with potential environmental flows for 2025-26 and identified appropriate mitigating strategies. Risks and mitigating actions are continually assessed by program partners throughout the year (see **subsection 1.2.7**).

Seasonal overview

Total rainfall across the central region in the second half of 2024 was at or below the long-term average, except for in July and August. In July, the Werribee and Maribyrnong catchments experienced wetter-than-average conditions, and parts of the Yarra and Tarago catchments were the wettest on record. In August, all central region systems experienced very much below-average rainfall, and parts of the Yarra and Tarago systems were the driest on record.

Storages across the central region drew down during 2024. Of the major storages, only Tarago Reservoir spilled. The share of inflows allocated to many of the central region systems, particularly the Moorabool system, during winter/spring 2024 has been very low and will limit the available carryover taken into 2025-26. The VEWH purchased water from licence holders in the Maribyrnong system to deliver environmental flows in Jacksons Creek.

The Bureau of Meteorology has forecast below-median rainfall and above-median temperatures during winter 2025 across the central region. Allocations to environmental entitlements in 2025-26 will depend on prevailing climatic conditions.

Carryover into 2025-26 in the Yarra system and to some extent in the Tarago system is expected to be substantially lower in 2025-26. As a result, it may not be possible to deliver some high flows in drier conditions, but this is not a concern as they have been delivered in each of the last few years.

The forecast available supply in the Werribee system should be sufficient to deliver the potential environmental watering actions in all planning scenarios to build on environmental outcomes achieved in recent wet years.

A mostly full Rosslynne Reservoir could create an opportunity to purchase water to deliver environmental flows in the Maribyrnong system. However, outcomes in upper Jacksons Creek continue to be limited by infrastructure delivery constraints and supply.

Options for delivering water for the environment in the Moorabool and Barwon systems in 2025-26 will be heavily influenced by local climatic conditions due to their smaller and more variable environmental allocations. Greater flows in the Moorabool and upper Barwon systems rely on significant contributions from local rainfall and are only likely to be achieved in average or wet climatic conditions. Natural inflows will also have a significant bearing on the low flows and freshes in the Moorabool and upper Barwon systems, and summer and autumn flows may need to be delivered at the lower end of their recommended range to conserve available environmental supply if those seasons are dry. Environmental water delivery in the lower Barwon wetlands is not affected by annual allocations of water for the environment, and the proposed fill in winter/spring and partial drawdown in summer/autumn should be possible in all planning scenarios if river levels allow.

3.2 Yarra system

Waterway manager – Melbourne Water

Storage manager – Melbourne Water

Environmental water holder –
Victorian Environmental Water Holder

The Yarra system includes *Birrarung* (Yarra River), the Plenty River and Yarra billabongs.

System overview

The Yarra River (*Birrarung*) flows west from the Yarra Ranges above Warburton, through the Yarra Valley and then opens out into a wider plain as it meanders through the suburbs and city of Melbourne before entering Port Phillip Bay (Figure 3.2.1). Over time, the Yarra River below Warrandyte has been straightened, widened and cleared of fallen trees and other natural habitat features as Melbourne has developed.

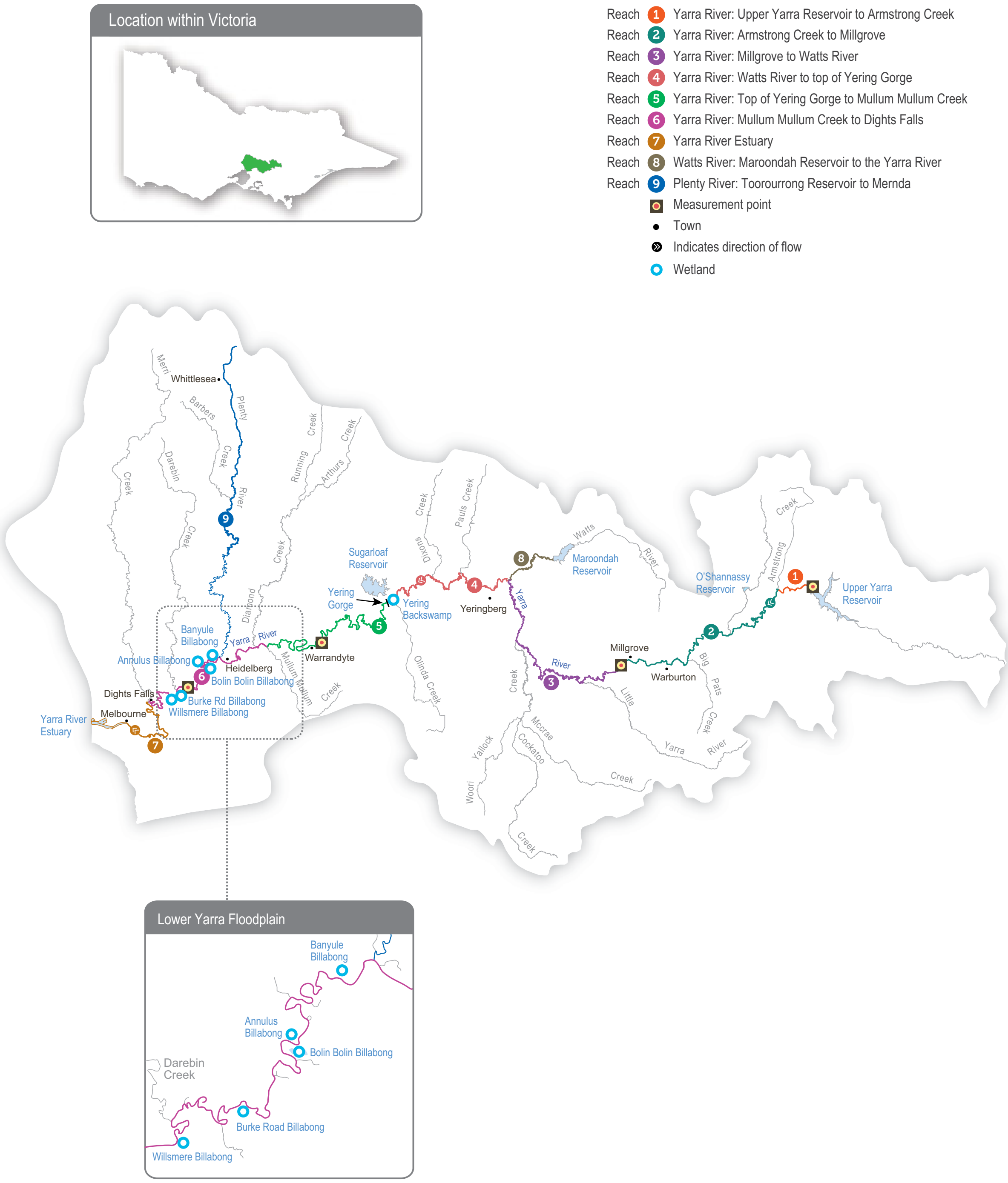
Up to 400,000 ML per year (long-term average diversion limit) can be harvested from the Yarra system for consumptive use in Melbourne and surrounding areas. The Upper Yarra, O'Shannassy and Maroondah reservoirs harvest water from headwater tributaries, and a pump station at Yering Gorge is used to harvest water from the Yarra River to Sugarloaf Reservoir.

Tributaries, including Armstrong Creek, McMahons Creek, Starvation Creek, Woori Yallock Creek and the Watts and Little Yarra rivers, influence flow in the upper reaches of the Yarra River. Urbanised tributaries (such as Olinda Creek, Mullum Mullum Creek, Diamond Creek, Plenty River and Merri Creek) provide additional water to the middle and lower reaches of the Yarra River. There are many significant billabongs in the middle and lower reaches.

Environmental water can be released from the Upper Yarra, Maroondah (from the reservoir to Watts River and via the aqueduct) and O'Shannassy reservoirs to support ecological processes and environmental outcomes in downstream river reaches and wetlands. Requests can also be made to cease harvesting from the Yarra River at the Yering Gorge Pumping Station, allowing the flow to pass down the whole river system. The priority Yarra River reaches for water for the environment are 2 and 5, shown in **Figure 3.2.1**. Reach 6 is also a priority in summer and autumn to manage poor water quality upstream of Dights Falls, as flow targets in reach 5 may not be sufficient. Water for the environment delivered to reaches 2 and 5 will help meet flow targets in other reaches. Occasionally, watering actions met naturally in reaches 2 and beyond are not achieved in reach 1 due to the lack of unregulated tributary inflows immediately downstream of Upper Yarra Reservoir. If so, water for the environment can also be used to meet flow targets in reach 1.

The Plenty River rises from the slopes of Mount Disappointment in the Great Dividing Range about 50 km north of Melbourne. It flows downstream through rural and semi-rural areas and Plenty Gorge before joining the Yarra River near Viewbank, east of Banyule Flats Reserve. Yan Yean Reservoir is located off the waterway north of Plenty Gorge, and it receives a flow from Toorourrong Reservoir via a channel. The Plenty River has not received managed environmental flows before, but there may be opportunities to deliver water for the environment from Yan Yean Reservoir in the coming years.

Figure 3.2.1 Yarra system



Environmental values

The upper reaches of the Yarra River (reaches 1-3) have good-quality streamside and aquatic vegetation and provide habitat for native fish species, including river blackfish, mountain galaxias and common galaxias. The middle and lower reaches of the Yarra River (reaches 4-6) flow through forested gorges, cleared floodplains and some highly-urbanised areas, and they support populations of native fish, including Australian grayling, river blackfish, Macquarie perch and tupong. Macquarie perch were introduced to the Yarra River last century, and the population is now considered one of Victoria's largest and most important.

The Plenty River (reach 9) provides habitat for waterbugs and native fish species (such as common galaxias). Platypus have been detected in the Plenty River in the past, and recent eDNA results suggest they may also be present in the upper Plenty River.

Billabongs are an important feature of the lower Yarra River floodplain between Heidelberg and Dights Falls and in the upper reach around Yarra Glen and Woori Yallock. The billabongs support distinct vegetation communities and provide foraging and breeding habitat for waterbirds and frogs. Except in times of high flow, most billabongs are disconnected from the Yarra River.

Environmental objectives in the Yarra system

A1 – Maintain the frog population, particularly on the mid-Yarra River floodplain

CN1 – Provide sufficient rates of carbon and nutrient production and processing to support native fish and waterbug communities

F1 – Protect and increase populations of native fish, including threatened species (such as the Australian grayling, Macquarie perch and river blackfish)

G1 – Maintain the form of the river channel

G2 – Scour silt from riffles and clean cobbles

M1 – Maintain the diversity and increase the abundance of waterbugs to support aquatic food webs

PR1 – Maintain resident platypus populations

V1 – Maintain native streamside and aquatic vegetation on the riverbank and in the channels

V2 – Increase the growth of threatened wetland plant species to rehabilitate shallow marsh, deep marsh and freshwater meadows on the floodplain and billabongs

WQ1 – Improve water quality in river pools, ensuring adequate oxygen concentration in the water to support fish, crustaceans and waterbugs

Traditional Owner cultural values and uses

Melbourne Water is working with the Registered Aboriginal Parties (RAPs) within the Yarra River (*Birrarung*) system — the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation, the Bunurong Land Council Aboriginal Corporation, the Taungurung Land and Waters Council Aboriginal Corporation and the Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) from whose Country water is diverted to the Yarra system — to develop and strengthen relationships with them and to increase Traditional Owners' involvement in the planning and delivery of water for the environment.

Melbourne Water is in discussions with each of the Traditional Owner corporations to work towards developing overarching partnership agreements. Formal partnership agreements have been signed with GLaWAC and the Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC). In terms of environmental water management, the intent is for Traditional Owners of *Birrarung* and its tributaries, including the Plenty River, to be active partners in the planning, delivery and monitoring of all deliveries of water.

The part of the lower *Birrarung* floodplain included in the environmental watering program is on Wurundjeri Woi-wurrung Country upstream of Chandler Highway. The parts of the lower *Birrarung* floodplain on Bunurong Country are not currently in the environmental watering program. Wallaby Creek (on Taungurung Country), which is connected to the Plenty River catchment via Yan Yean Reservoir, is also not currently in the environmental watering program.

In 2021, RAP determinations saw the lower *Birrarung* from just upstream of Moonee Ponds Creek to Port Phillip Bay included in the Bunurong Land Council Aboriginal Corporation's RAP boundaries. The Bunurong Land Council Aboriginal Corporation is working with the Bunurong people to determine the cultural objectives for *Birrarung* on Bunurong Country.

Where possible, Melbourne Water and the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation work together to link water for the environment on the lower *Birrarung* floodplain with cultural outcomes for the Wurundjeri Woi-wurrung people. In general, environmental water management on the lower *Birrarung* floodplain aligns with a landscape-scale approach for billabong watering, developed in consultation with Wurundjeri Woi-wurrung people.

Management of water for the environment (including wetting and drying) at many billabongs in the lower *Birrarung* (such as Annulus, Banyule and Bolin Bolin billabongs) is closely aligned with Wurundjeri Woi-wurrung aspirations.

Increasing the involvement of Traditional Owners in environmental water management and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 3.2.1** with an icon, as shown below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

There are many places of tangible and intangible cultural significance for the Wurundjeri Woi-wurrung people and the Bunurong people on the lower *Birrarung* floodplain.

The Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation, with The University of Melbourne and Melbourne Water, is leading the Traditional Owner-led restoration of urban billabongs project, which is funded by the Australian Research Council (ARC). The project has been monitoring vegetation, birds, eels, frogs and water quality outcomes from environmental water and held an on-Country knowledge-sharing day in 2024 to discuss learnings. Activities such as these enable the Narrap Unit to build the capacity to inform environmental water delivery to Wurundjeri Woi-wurrung Country.

The intent is to further the role and leadership of the Wurundjeri Woi-wurrung people in managing the billabongs, including vegetation management, research and partnering in decision-making processes. This has now extended to an ARC-funded, four-year research partnership to support self-determination.

This Indigenous-scientist-led project aims to investigate the past and present fire, flooding and vegetation dynamics of urban billabongs through paleoenvironmental assays of sediment cores and field surveys of vegetation, animal and water quality responses to cultural burns and floods. The project will help us better understand billabong ecology and Indigenous peoples' historical land and water management and apply this knowledge to restore and care for Melbourne's billabongs.

The project has been coring at seven priority billabongs in the lower *Birrarung*, with four cores being done for processing, along with other monitoring. The sites must be wet to do the coring. The 2025-26 seasonal watering proposal is to allow the billabongs to enter a drying phase, and only target Bolin Bolin Billabong for active watering in the lower Yarra. Montpellier Billabong is expected to engage naturally in average or wet conditions, allowing for sampling in 2025-26. Melbourne Water shares information about river levels required to naturally inundate the remaining billabongs and will update the research team about its monitoring of unregulated flows so that coring can take place if billabongs fill naturally.

In 2025-26, filling Bolin Bolin Billabong in average or wet conditions will provide an exit strategy for eels that entered the billabong while it was connected to *Birrarung*. The Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation Water Unit suggested this watering action to support the landscape-scale approach to watering floodplain billabongs. The Narrap Unit will collaborate on Bolin Bolin Billabong water delivery and monitoring, depending on the unit's availability in 2025-26.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 3.2.1**, Melbourne Water considered how environmental flows could support values and uses, including:

- water-based recreation (such as kayaking, canoeing, fishing and swimming)
- riverside recreation and amenity (such as birdwatching, camping, picnicking, cycling, running and walking)
- community events and tourism (such as the Moomba Festival)
- socioeconomic benefits (such as for diverters for irrigation, stock needs and domestic use: water quality can be improved by environmental water delivery, particularly in summer).

Environmental water supports these activities indirectly by maintaining healthy river flows, improving water quality and sustaining diverse aquatic and streamside ecosystems. By enhancing habitat conditions, environmental flows help support fish populations for recreational fishing, provide safer and more enjoyable conditions for water-based activities and improve the aesthetic and ecological integrity of riverside areas, benefitting tourism, community events and local economies.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 3.2.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 3.2.1 Yarra system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Yarra River – reaches 2, 5 and 6		
Winter/spring low flow (June to November) reach 2: 80-350 ML/day; reach 5: 350-750 ML/day	• Physically mix pools to minimise the risk of stratification and low oxygen • Maintain access to habitats for fish, waterbugs and platypus • Wet bank vegetation to promote growth	F1 MI1 PR1 V1 WQ1
Winter/spring freshes (two freshes for three to seven days during June to September) reach 2: 700 ML/day; reach 5: 1,300-2,500 ML/day	• Scour sediment and biofilm from gravel in riffles to improve spawning opportunities for Macquarie perch • Wet native streamside vegetation on the banks of the river to promote growth • Provide cues for upstream migration of juvenile migratory fish (e.g. Australian grayling and tupong) and spawning of Macquarie perch • Entrain organic material to support carbon cycling	CN1 F1 G2 V1
Spring high flow (one high flow for 14 days during September to October) reach 2: 700 ML/day; reach 5: 2,500 ML/day	• Scour sediment and biofilm from gravel in riffles • Provide prolonged wetting to favour flood-tolerant native vegetation in the streamside zone • Provide cues for upstream migration of juvenile migratory fish (e.g. Australian grayling and tupong) • Improve spawning opportunities of Macquarie perch • Entrain organic material to support carbon cycling	CN1 G2 F1 V1
Summer/autumn low flow (December to May) reach 2: 80 ML/day; reach 5: 200 ML/day; reach 6: 300-450 ML/day	• Physically mix pools to minimise the risk of stratification and low oxygen • Maintain riffle and pool habitats for fish, waterbugs and platypus	F1 MI1 PR1 WQ1
Summer/autumn freshes (three freshes for two days during December to May) reach 2: 350 ML/day; reach 5: 750 ML/day	• Flush pools to prevent a decline in water quality • Scour sediment and biofilm from gravel in riffles and pools to maintain habitat quality for fish and waterbugs • Provide opportunities for the localised movement of fish and platypus • Wet the banks of the river to maintain flood-tolerant vegetation on the banks	F1 MI1 V1 G2 PR1 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Autumn high flow (one high flow for seven to 14 days during April to May) reach 2: 560 ML/day; reach 5: 1,300 ML/day	• Cue the migration of Australian grayling • Scour sediment and biofilm from gravel in riffles and pools to maintain habitat quality for fish and waterbugs	F1 G2
Yarra billabongs		
Bolin Bolin Billabong (fill in spring)	• Fill the wetland to the full supply level to engage the inlet/outlet channel to the Yarra River as an exit strategy for eels • Allow to draw down over summer and autumn to support the growth of threatened wetland plant species and encourage the regeneration of spreading aquatic herbs • Maintain a permanent pool to provide habitat for frogs, waterbugs and any remaining eels	A1 F1 MI1 V2
Yering Backswamp (fill in autumn/ winter/spring)	• Wet the deepest parts of the wetland to about 80 cm to provide habitat for frogs • Wet remaining areas of the wetland to about 40-60 cm to support the growth of threatened wetland plant species and encourage the regeneration of spreading aquatic herbs	A2 V2

Scenario planning

Table 3.2.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

In the Yarra system, dry, average and wet planning scenarios are considered. A drought planning scenario for the Yarra has not been included as the actions would be almost identical to the dry scenario, and because drought conditions don't normally affect the allocation of water for the environment.

Following four years of above-average inflows into Yarra storages, 2024-25 inflows were well below average. Nonetheless, some unregulated flows and good levels of carryover resulted in the system being managed in line with the average planning scenario. Water resources will be lower going into 2025-26, but coming off the back of wet years, some of the higher-volume actions will not have to be delivered. For instance, in dry or average conditions, rather than deliver a partial autumn high flow, the water may be carried over to deliver a full-duration event in 2026-27. A maintenance strategy will be followed in dry conditions in 2025-26, while wetter conditions would allow an enhancement strategy to build on environmental gains in recent years (such as increasing Australian grayling and Macquarie perch populations).

Yarra River

In all planning scenarios, the environmental watering priority for the Yarra River is to deliver the recommended range of low flows in reaches 2, 5 and 6 and small-to-medium freshes in reaches 2 and 5 throughout the year. This will maintain high-quality habitat for native fish, platypus and waterbugs and provide flow variability in the lower parts of the channel to facilitate fish dispersal and water-fringing vegetation. Low-flow supplementation is particularly important in reach 6 during summer and autumn, when water quality can decline. The extent to which these flows are likely to be met by natural tributary inflows varies between the dry, average and wet planning scenarios, and water for the environment will be used to fill the main deficits in each scenario, where possible.

In the wet planning scenario, the autumn high flow is a high priority to trigger Australian grayling to migrate downstream to the estuary to spawn. Australian grayling live for about three to four years and require spawning opportunities in two out of every three years to sustain healthy populations. Delivering this flow is typically a high priority in average and wet years and will ensure that spawning is cued to other appropriate conditions in the landscape. It is also a high priority in dry years if it hasn't been delivered in the preceding one or two years. Although autumn high flows have occurred in each of the last six years, Melbourne Water may still deliver it in 2025-26 under average and dry planning scenarios if there is sufficient supply or an opportunity to piggyback on a natural event.

The spring high flow for reaches 2 and 5 has the same magnitude as the winter/spring fresh in those reaches but has a longer recommended duration to drown out terrestrial vegetation growing on the banks and encourage the growth of flood-tolerant native plant species. Recent monitoring suggests that the spring high flow is having negligible effect on streamside vegetation and therefore is a lower priority to deliver in 2025-26. It may be delivered under the average or wet planning scenarios to further assess its effect using new rapid assessment methods with a view to potentially modifying the recommendation in future.

Yarra billabongs

Watering of Yering Backswamp is a high priority under all planning scenarios in 2025-26. The distinct vegetation community at Yering Backswamp has adapted to frequent or near-permanent inundation at given times. As such, it is the only managed wetland on the Yarra floodplain actively watered yearly.

Filling of Bolin Bolin Billabong is identified as a high priority in all planning scenarios to allow short-finned eels that inhabit the billabong to move into the main river channel and migrate to the Coral Sea to spawn. The Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation Water Unit suggested this watering action. Tagged eels and acoustic monitoring will help the Arthur Rylah Institute for Environmental Research determine the likelihood of eels being trapped when the billabong is disconnected from the river and thus whether the fill is necessary. It was not delivered in 2024-25 and could provide an important refuge if dry conditions continue in 2025-26.

The remaining Yarra billabongs are planned to remain dry in 2025-26, having met their preferred wetting regime in recent wet years.

There are no priority carryover targets for 2026-27.

Table 3.2.2 Yarra system environmental watering planning scenarios

Planning scenario	Dry	Average	Wet
Expected conditions	• Low streamflow year-round • Lack of unregulated freshes and high flow • Passing flow is not likely to meet the minimum environmental flow recommendations • Potential poor water quality, particularly in summer • Pools may stratify	• Low-flow recommendations are likely to be met by the passing flow • Natural flow may provide some freshes, but its duration and/or magnitude will likely be less than the recommended environmental flow • Potentially poor water quality, particularly in summer • Pools may stratify • Small reservoirs may spill • Overbank flow is not likely, although some billabongs may engage in the lower reaches	• Low-flow recommendations are likely to be met by passing flow • High, natural flow will occur, most likely in winter/spring • Major spills from reservoirs may occur • Natural wetting of most billabongs is likely

Planning scenario	Dry	Average	Wet
Expected availability of water for the environment	• 23,000 ML		
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow (partial) • Winter/spring fresh (one fresh) • Summer/autumn low flow • Summer/autumn freshes (three freshes) • Wetland/billabong watering (Yering Backswamp and Bolin Bolin Billabong)	• Winter/spring low flow • Winter/spring freshes (two freshes) • Summer/autumn low flow • Summer/autumn freshes (three freshes) • Wetland/billabong watering (Yering Backswamp and Bolin Bolin Billabong)	• Winter/spring low flow • Winter/spring freshes (two freshes) • Winter/spring high flow (one high flow) • Summer/autumn low flow • Summer/autumn freshes (three freshes) • Autumn high flow • Wetland/billabong watering (Yering Backswamp and Bolin Bolin Billabong)
Potential environmental watering – tier 2 (additional priorities)	• Autumn high flow • Winter/spring fresh (one fresh) • Winter/spring low flow (full demand)	• Autumn high flow • Spring high flow	• Spring high flow
Possible volume of water for the environment required to achieve objectives	• 23,000 ML (tier 1) • 19,700 ML (tier 2)	• 18,830 ML (tier 1) • 15,800 ML (tier 2)	• 5,980 ML (tier 1) • 2,500 ML (tier 2)
Priority carryover requirements for 2026-27	• N/A		

3.3 Tarago system

Waterway manager – Melbourne Water

Storage manager – Melbourne Water

Environmental water holder –
Victorian Environmental Water Holder

System overview

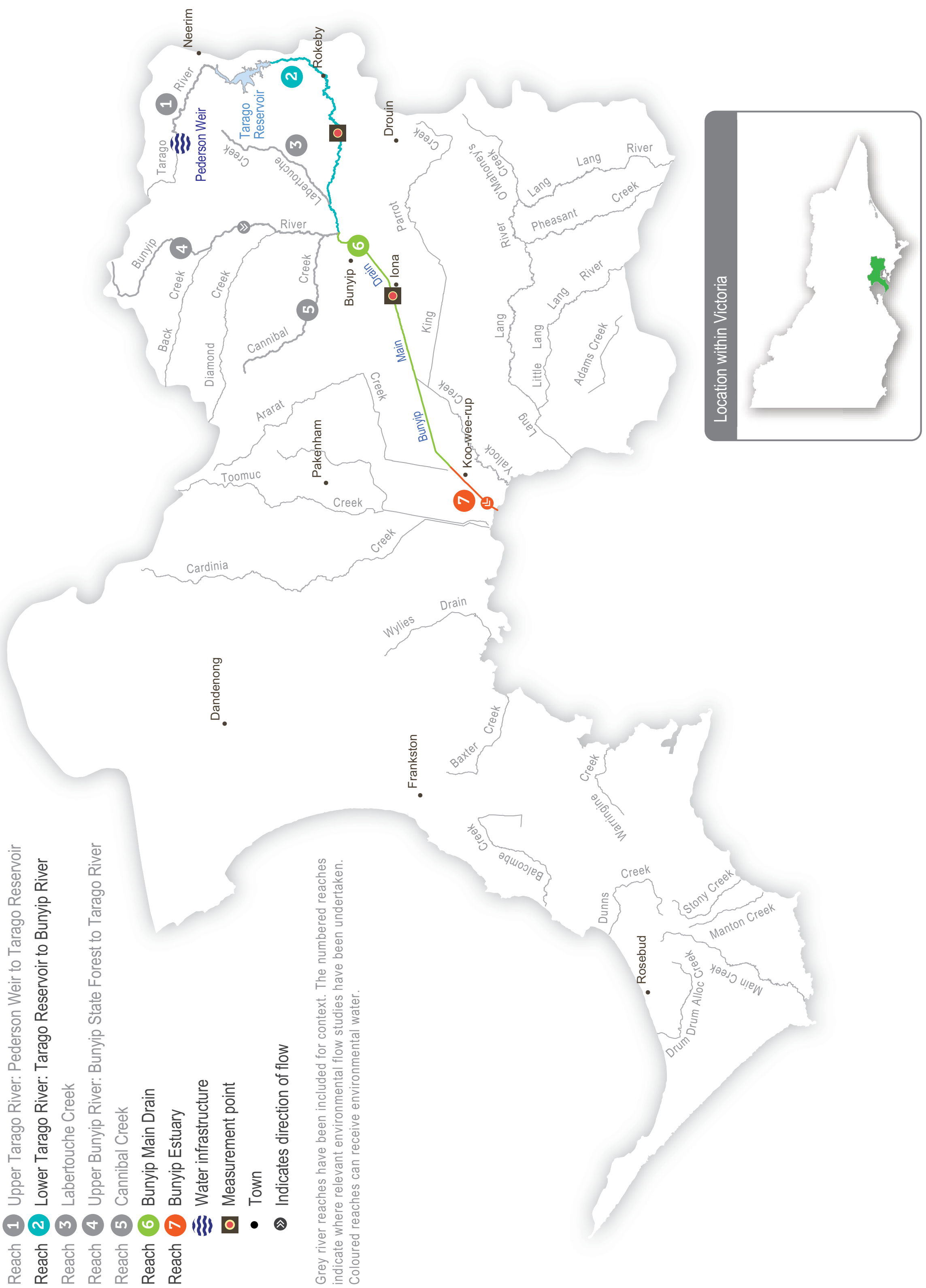
The Tarago River rises in the Tarago State Forest and flows into the Tarago Reservoir at Neerim (Figure 3.3.1). The reservoir harvests inflows from all upstream tributaries to supply towns on the Mornington Peninsula and around the Western Port area. Water is released from the reservoir to supply downstream irrigators. Below the reservoir, the Tarago River flows close to Rokeby before meeting the Bunyip River at Longwarry North. From there, the Bunyip River flows through a modified, straightened channel called Bunyip Main Drain that discharges into Western Port. The Bunyip Main Drain supplies many irrigators in the catchment.

Water available under the *Tarago and Bunyip Rivers Environmental Entitlement 2009* is stored in and released from Tarago Reservoir. This water is primarily used to meet environmental objectives in reach 2, between the reservoir and the confluence of the Tarago and Bunyip rivers, as **Figure 3.3.1** shows. Water for the environment delivered to reach 2 also supports environmental flows recommendations in reach 6 (Bunyip Main Drain).

Year-round passing flows in the Bunyip and Tarago rivers are stipulated under both the environmental entitlement and Melbourne Water's bulk entitlement. These passing flows help meet the minimum low-flow requirements in summer/autumn and winter/spring, but they are less than the recommended minimum flows. The passing flows do not provide any of the freshes or greater flows that are needed throughout the year to support environmental outcomes.

Water released to meet irrigation demands can create variable flow patterns in the Tarago and Bunyip rivers throughout the year. The magnitude and timing of these releases can influence environmental outcomes, and Melbourne Water continues to work with Southern Rural Water to optimise the shared value derived from irrigation releases.

Figure 3.3.1 Tarago system



Environmental values

The Tarago system contains several significant and threatened native animal and plant species, including Australian grayling. The upper catchment (reach 2) has healthy streamside vegetation and diverse in-stream habitat that supports platypus and native fish, including river blackfish, tupong, short-finned eels and mountain galaxias. The lower catchment (reach 6) has been highly modified but still contains patches of remnant vegetation and is a key migration pathway for Australian grayling. It also has healthy platypus populations.

Environmental objectives in the Tarago system

F1 – Increase populations of native fish, including threatened species (such as Australian grayling)

G1 – Maintain channel form and structure

MI1 – Increase the diversity and biomass of waterbugs to support aquatic foodwebs

PR1 – Increase platypus populations

V1 – Increase native streamside and aquatic plant communities on the riverbank and in the channel

WQ1 – Improve water quality in river pools, ensuring adequate oxygen concentration in the water to support fish, crustaceans and waterbugs

Traditional Owner cultural values and uses

Melbourne Water is working with the Registered Aboriginal Party (RAP) within the Tarago system — the Bunurong Land Council Aboriginal Corporation — and other interested Traditional Owner groups to develop and strengthen relationships and increase Traditional Owners' involvement in the planning and delivery of water for the environment. The intent is for Traditional Owners to be active partners in the planning, delivering and monitoring of water for the environment associated with the Tarago and Bunyip rivers.

There are more opportunities for Melbourne Water and the VEWH to work with Traditional Owner groups to identify and integrate cultural values and their flow requirements into the environmental watering program on an ongoing basis. During the development of the seasonal watering proposal, Melbourne Water met with staff from Bunurong Land Council Aboriginal Corporation to discuss how environmental watering can support Traditional Owners' cultural objectives and identify opportunities to use environmental water to support these. The Bunurong Land Council Aboriginal Corporation has expressed a desire to be more involved in environmental flows planning and management in the Tarago River.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*. Melbourne Water and the VEWH will continue to work with Traditional Owner groups to identify and integrate cultural values and their flow requirements into the environmental watering program on an ongoing basis.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 3.3.1**, Melbourne Water considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing and swimming)
- riverside recreation and amenity (such as cycling, camping, caravanning, short- and long-term visiting and walking)
- community events and tourism (such as visiting and residing in the Glen Cromie Reserve caravan park)
- socioeconomic benefits (such as for diverters for irrigation, stock needs and domestic use: water levels and water quality can rely on environmental water delivery, particularly in summer).

The timing or management of planned environmental flows may be modified to align with a community benefit and this is indicated in **Table 3.3.1** by an icon, as pictured below and also explained in **Figure 1.2.3**.

Watering planned to support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

Melbourne Water may time the release of a summer fresh in the Tarago River to coincide with long weekends in January or March, so users of the Glen Cromie Reserve caravan park and the many public areas along the river can enjoy the additional flow.

Scope of environmental watering

The term ‘environmental watering’ refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, ‘environmental watering’ is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 3.3.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 3.3.1 Tarago system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Tarago River (targeting reach 2)		
Winter/spring low flow (75 ML/day or natural during June to November)	• Prevent the encroachment of terrestrial vegetation in the channel • Wet the banks to promote streamside vegetation growth • Maintain an adequate depth through riffles to allow access to habitats for fish and platypus • Mix pools to maintain water quality and increase habitat for fish and waterbugs during wetter months	F1 MI1 PR1 V1
Winter/spring fresh(es) (one to two freshes with a peak of 100-200 ML/day for two days during June to September)	• Flush sediment and scour biofilm from stream substrate and large woody debris to maintain habitat for waterbugs and fish, including river blackfish • Create extra depth to allow greater fish movement between pools and reaches • Cue the downstream migration of species, including eel and tupong • Wet the banks and low benches to maintain the fringing aquatic vegetation	F1 G1 MI1 V1
Spring high flow (one high flow with a peak of 200-300 ML/day for two days in a seven-to-10-day duration during September to October)	• Form and maintain scour holes around large wood • Prevent the encroachment of terrestrial vegetation into the channel • Cue the upstream migration of juvenile diadromous fish (e.g. Australian grayling) from the sea or estuary into the river • Wet the higher benches to maintain the fringing aquatic vegetation and ensure vertical zonation of the fringing vegetation • Encourage female platypus to select a nesting burrow higher up the bank to reduce the risk of greater flow later in the year flooding the burrow when juveniles are present	F1 G1 PR1 V1
Summer/autumn low flow (20 ML/day or natural during December to May)	• Maintain adequate depth through riffles to support waterbugs and allow access to habitats for fish and platypus • Maintain adequate foraging habitat in pools for fish and platypus • Maintain water quality (especially oxygen concentration) in pools	F1 MI1 PR1 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn freshes (three to five freshes of 75 ML/day for two days during December to May)	• Flush fine silt from hard substrates and around large woody debris to maintain habitat for native fish in low-flow periods • Allow the localised movement of native fish • Prevent terrestrial vegetation growth on sandbars • Maintain water quality by aeration in times of low flow	F1 G1 V1 WQ1
Autumn high flow (one high flow with a peak of 100 ML/day for two days in a minimum seven-day duration during April to May)	• Cue the downstream migration and spawning of diadromous fish (e.g. Australian grayling) • Assist the dispersal of juvenile platypus	F1 PR1

Scenario planning

Table 3.3.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The Tarago River generally requires similar watering actions every year, although the magnitude of its low flow and the frequency of the high flow are less in the drought and dry planning scenarios than in the wet or average scenarios. Natural catchment inflows, passing flow and reservoir spills will meet many required watering actions and provide natural flow variation throughout the year, especially in wet climatic conditions. Water for the environment will be used where possible to deliver critical flow components not met by other means. Melbourne Water will monitor water levels and quality throughout the year and adjust releases to limit stress on existing plants and animals. For instance, a summer/autumn fresh was extended in January 2025 to compensate for the reduced volume reaching Drouin West from Tarago Reservoir due to drier conditions than in previous years.

The drought planning scenario would be triggered by a combination of the Bureau of Meteorology's reported El Niño status, below-average inflows to Tarago Reservoir and low streamflow projections. In the drought planning scenario, the passing flow and natural inflows are expected to partially meet the low-flow recommendation. Water for the environment will be primarily used in this planning scenario to deliver up to five summer/autumn freshes to regularly top up water levels and improve water quality to ensure native fish and platypus have adequate habitat and are not stressed for too long.

Compared to the drought planning scenario, the passing flow and natural inflows are expected to meet a greater proportion of the recommended low flow in the dry, average and wet scenarios. In a dry planning scenario, a winter/spring low flow is expected to be partially fulfilled and environmental water used to achieve a summer/autumn low flow and various freshes instead. Fewer summer/autumn freshes are planned in the dry planning scenario compared to the drought scenario because a low flow will be closer to the recommended level. Overall, the number of planned freshes and the high flow increases from the dry to wet planning scenarios to reflect natural hydrological conditions and to improve environmental outcomes by providing more food and better breeding opportunities for native fish and platypus.

An autumn high flow is needed to trigger Australian grayling movement and spawning. Australian grayling require favourable breeding conditions in at least two of every three years to maintain and grow their population. Wet conditions have delivered natural high autumn flows in the Tarago River in recent years, so an additional flow is not essential in 2025-26, but it will be delivered to consolidate increases in grayling populations, if supply allows.

Winter/spring freshes are needed to cue and facilitate fish movement, including the downstream migration of tupong and eels, and to support the growth of new fringing vegetation.

Two freshes are planned in the average and wet planning scenarios and one fresh in the dry scenario. In the drought planning scenario, a winter/spring fresh is the second-highest-priority potential watering action after summer/autumn freshes and will be delivered if additional water becomes available.

The spring high flow will be delivered in average and wet conditions to water vegetation higher up the bank and cue the upstream migration of juvenile fish, but will only be delivered in drier conditions if supply exceeds expectations.

There are no carryover targets for the Tarago for 2026-27. However, there is likely to be a small water surplus in average and wet conditions.

Table 3.3.2 Tarago system environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Very low streamflow • Reduction in passing flow • Increased surface water loss to groundwater • Irrigation releases likely	• Low streamflow • Some reduction in passing flow • Increased surface water loss to groundwater • Irrigation releases likely	• Average streamflow • Partial freshes naturally provided • Some irrigation releases likely	• Above-average streamflow • Partial or full freshes naturally provided • Irrigation releases unlikely • Tarago Reservoir spills
Expected availability of water for the environment	• 2,100 ML	• 2,500 ML	• 3,600 ML	• 3,900 ML
Tarago River (targeting reach 2)				
Potential environmental watering – tier 1 (high priorities)	• Summer/ autumn freshes (five freshes)	• Winter/spring low flow (partial) • Winter/ spring fresh (one fresh) • Summer/ autumn low flow • Summer/ autumn freshes (three freshes)	• Winter/spring low flow • Winter/ spring freshes (two freshes) • Spring high flow • Summer/ autumn low flow • Summer/ autumn freshes (five freshes) • Autumn high flow	• Winter/spring low flow • Winter/ spring freshes (two freshes) • Spring high flow • Summer/ autumn low flow • Summer/ autumn freshes (five freshes) • Autumn high flow

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring fresh (one fresh) • Autumn high flow • Summer/autumn low flow • Winter/spring low flow • Spring high flow	• Winter/spring low flow (full demand) • Spring high flow • Autumn high flow	• N/A	• N/A
Possible volume of water for the environment required to achieve objectives	• 2,000 ML (tier 1) • 3,100 ML (tier 2)	• 2,500 ML (tier 1) • 1,800 ML (tier 2)	• 3,065 ML (tier 1) • 0 ML (tier 2)	• 3,160 ML (tier 1) • 0 ML (tier 2)
Priority carryover requirements for 2026-27	• 0 ML			

3.4 Maribyrnong system

Waterway manager – Melbourne Water

Storage manager – Southern Rural Water

Environmental water holder – Not applicable

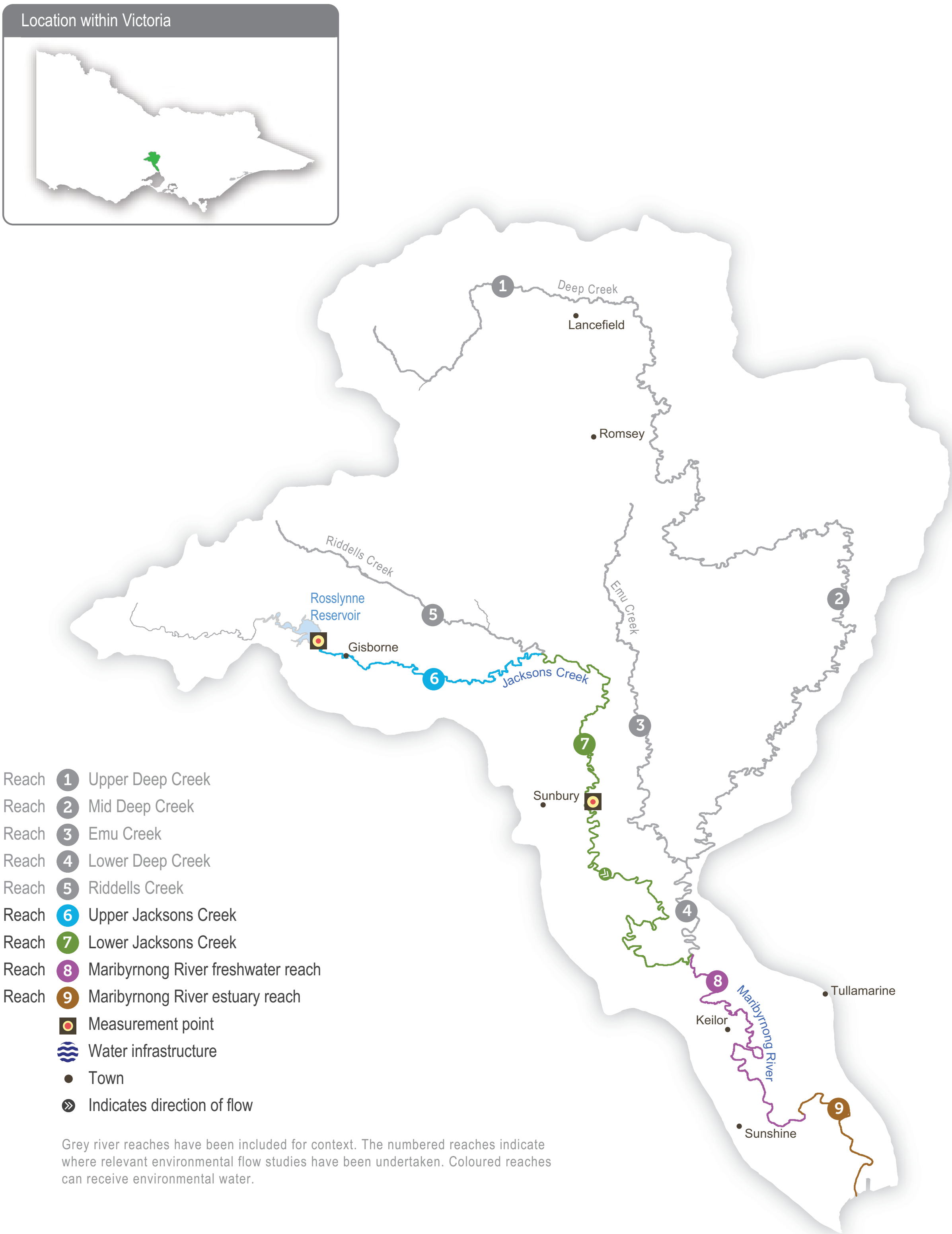
System overview

The Maribyrnong catchment is located to the northwest of Melbourne. The main waterways in the catchment are Jacksons Creek, which flows southeast from Mount Macedon, and Deep Creek, which flows south from Lancefield (Figure 3.4.1). These two tributaries join at Keilor North to form *Mirrangbamurn* (Maribyrnong River), which flows south to join *Birrarung* (Yarra River) at Yarraville before flowing into Port Phillip Bay.

Rosslynne Reservoir is in the upper reaches of Jacksons Creek near Gisborne and is the only major storage in the Maribyrnong catchment. The reservoir has a maximum release capacity of 20 ML per day in ideal conditions, which significantly constrains the environmental outcomes that can be achieved in the Maribyrnong system. Water for the environment is primarily used to support environmental outcomes in Jacksons Creek between Rosslynne Reservoir and the confluence with Riddells Creek: that is, delivery of water for the environment to reach 6, as **Figure 3.4.1** shows. Jacksons Creek is a known groundwater-dependent ecosystem on the national ***Groundwater Dependent Ecosystems Atlas*** and a priority groundwater-dependent ecosystem in the Melbourne Water groundwater-dependent ecosystem program. This means ecological components in the system rely on groundwater at least some of the time.

The VEWH does not hold an environmental entitlement in the Maribyrnong system and relies on opportunistic, temporary trade to meet demands. Melbourne Water (as diversion manager) and the VEWH work with local diversion licence holders to purchase unused water when it is available to support environmental outcomes. This arrangement is negotiated yearly, is subject to water availability in the bulk entitlement and storage capacity, and only occurs with all parties' agreement.

Figure 3.4.1 Maribyrnong system



Environmental values

The upper Maribyrnong catchment contains areas of intact streamside vegetation, which provide important habitat for native fish, including migratory short-finned eels, common and ornate galaxias, flathead gudgeon, tupong and Australian smelt.

A diverse and abundant waterbug community provides food for a significant platypus population in several reaches of the Maribyrnong system.

Environmental objectives in the Maribyrnong system

F1 – Protect populations of native small-bodied fish
MI1 – Support a wide range and high biomass of waterbugs to break down dead organic matter and support the river's food chain
PR1 – Protect the platypus population
V1 – Maintain the condition, abundance, diversity and structure of in-stream and streamside vegetation
WQ1 – Maintain water quality, particularly oxygen concentrations

Traditional Owner cultural values and uses

Melbourne Water is working with the Registered Aboriginal Parties (RAPs) within the Maribyrnong system — the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation and the Bunurong Land Council Aboriginal Corporation — to strengthen relationships and increase Traditional Owner involvement in the planning and delivery of water for the environment.

There are many opportunities for Melbourne Water and the VEWH to work with Traditional Owner groups to identify and integrate cultural values and their flow requirements into the environmental watering program on an ongoing basis.

During the development of the seasonal watering proposal, Melbourne Water met with staff of the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation and the Bunurong Land Council Aboriginal Corporation to discuss how environmental watering can support Traditional Owners' cultural objectives and identify opportunities to use environmental water to support these. Due to the uncertainty in the volume of water that will be able to be secured via temporary trade in 2025-26 and the constraints in delivering this from Rosslynne Reservoir, there are limited opportunities to deliver water for the environment to support Traditional Owners to achieve objectives related to water on Country.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 3.4.1**, Melbourne Water considered how environmental flows could support values and uses (such as community connection and amenity) by planning flows that will maintain healthy habitat and improve water quality.

Opportunities for enhancing shared social, recreational and economic benefits by modifying individual environmental water deliveries are limited by the volume of environmental water available and the constraint at the outlet of Rosslynne Reservoir. However, it may be possible to deliver releases coinciding with public holiday long weekends when there are high levels of visitation at parks along Jacksons Creek at Gisborne and Sunbury. In previous years when releases have aligned with public holidays, increased flows have likely delivered some shared benefits over these periods in the form of increased amenity values for park users and visitors to the waterway.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 3.4.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 3.4.1 Maribyrnong system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Jacksons Creek (targeting reach 6)		
Winter/spring low flow (15 ML/day during June to November)	• Maintain depth in pools and riffles to provide habitat for small-bodied native fish, platypus and waterbugs • Prevent terrestrial vegetation encroachment	F1, MI1, PR1, V1
Summer/autumn low flow (4-6 ML/day during December to May)	• Maintain the availability of pool habitat for small-bodied fish and platypus during low-flow periods • Maintain a > 0.1 m median depth over riffles to provide waterbug habitat and inundate in-stream vegetation • Maintain continuous flow to limit pool stratification and maintain water quality	F1, MI1, PR1, V1, WQ1
Summer/autumn freshes (five freshes of 15 ML/day for four days every four to six weeks during December to May)	• Increase depth over riffles to provide local movement of small-bodied native fish and platypus during the low-flow period • Maintain habitat and food resources for waterbugs • Flush pools to maintain water quality	F1, MI1, PR1, WQ1

Scenario planning

Table 3.4.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

There is no permanent environmental entitlement in the Maribyrnong system, so water for the environment can only be delivered in 2025-26 if other entitlement holders are willing to sell some of their annual allocations to the VEWH.

An adequate low flow throughout the year and summer/autumn freshes are a high priority in all planning scenarios to maintain habitat for native fish, waterbugs and platypus, and to prevent poor water quality. In the average and wet planning scenarios, local catchment run-off, tributary inflows and groundwater contributions will likely meet and exceed these requirements in lower Jacksons Creek (reach 7). However, in all planning scenarios, the mandated passing flow and water for the environment will be needed to achieve these watering actions in upper Jacksons Creek (reach 6).

The VEWH cannot carry over water in the Maribyrnong system to support multi-year planning.

Table 3.4.2 Environmental watering planning scenarios, Maribyrnong system

Planning scenario	Dry	Average	Wet
Expected conditions	• Low volumes of unregulated flow • Passing flow may meet some low-flow objectives • Some baseflow from groundwater contributions in Jacksons Creek	• Unregulated flow meets some objectives • Passing flow may meet several low-flow objectives • Groundwater contributions provide baseflow in Jacksons Creek	• Unregulated flow meets most objectives • Passing flow may meet most low-flow objectives • Groundwater contributions provide baseflow in Jacksons Creek
Expected availability of water for the environment	• There is no environmental entitlement in the Maribyrnong system. Water will need to be traded with willing irrigators to support watering actions.		
Jacksons Creek (targeting reach 6)			
Potential environmental watering – tier 1 (high priorities)	• N/A		
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn freshes	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn freshes	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn freshes
Possible volume of water for the environment required to achieve objectives	• 0 ML (tier 1) • 2,400 ML (tier 2)	• 0 ML (tier 1) • 2,400 ML (tier 2)	• 0 ML (tier 1) • 2,400 ML (tier 2)

3.5 Werribee system

Waterway manager – Melbourne Water

Storage manager – Southern Rural Water

Environmental water holder –
Victorian Environmental Water Holder

System overview

The Werribee River flows southeast from the Wombat State Forest near Ballan, through the Werribee Gorge to Bacchus Marsh and into Port Phillip Bay at Werribee (Figure 3.5.1). The Lerderderg River is a major tributary that joins the river at Bacchus Marsh. The main storages in the Werribee system are Pykes Creek Reservoir, Melton Reservoir and Merrimu Reservoir.

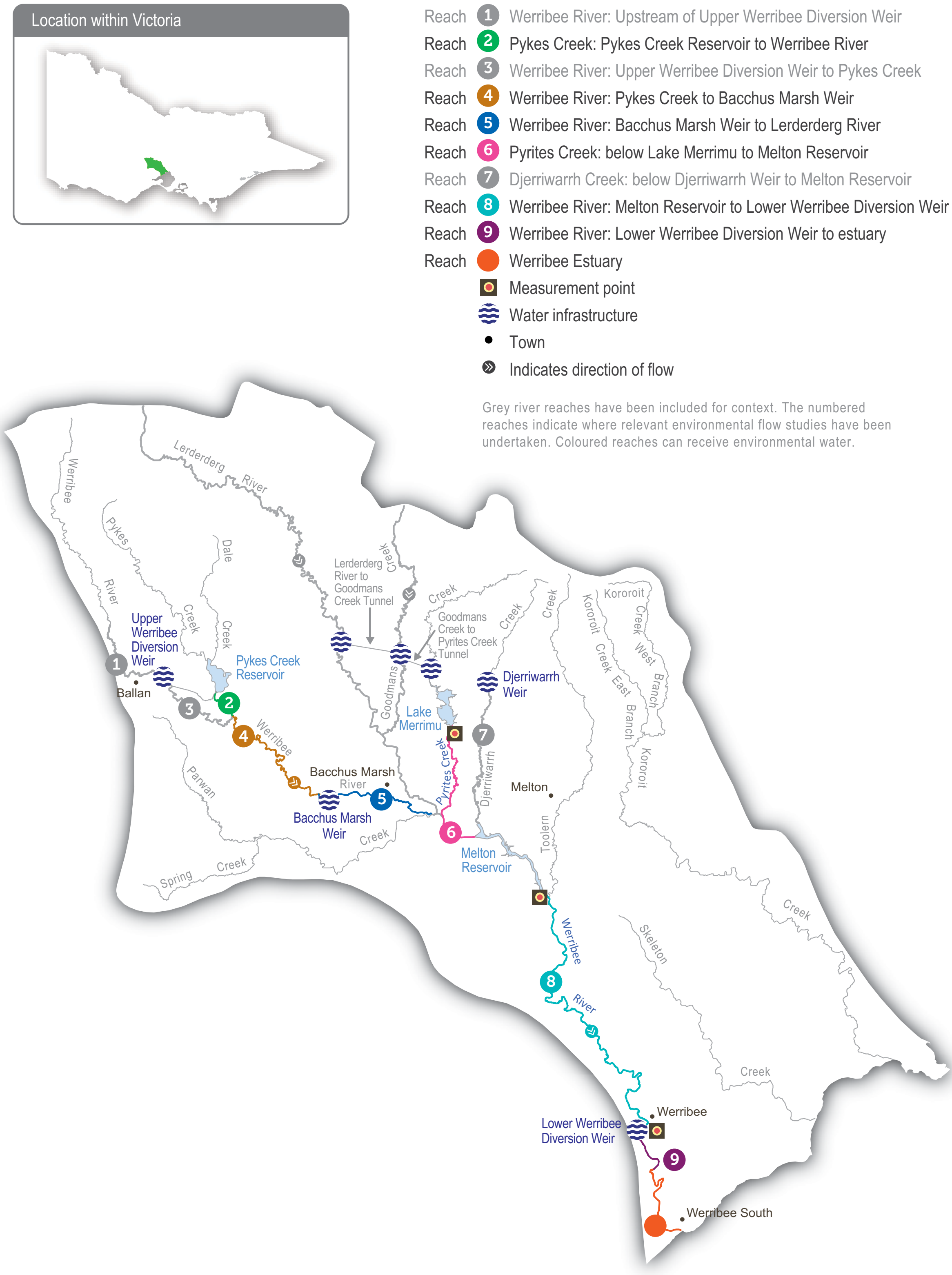
The four reaches in the Werribee system that can receive water for the environment are Pyrites Creek between Lake Merrimu and Melton Reservoir (reach 6), the Werribee River between Melton Reservoir and the Werribee Diversion Weir (reach 8), Werribee River between the Werribee Diversion Weir and Werribee Park Tourism Precinct (reach 9) and the Werribee River estuary below the Werribee Park Tourism Precinct.

Environmental flows that target environmental objectives in reach 9 and the estuary are delivered from Melton Reservoir and therefore also benefit reach 8. Water for the environment released from Lake Merrimu is re-harvested in Melton Reservoir, where it can be held and released at an appropriate time to achieve environmental objectives in the lower Werribee River.

From 2025-26, a new environmental entitlement is expected to be available in the Werribee system, providing additional flexibility to provide environmental flows to reaches 2, 4 and 5 of the Werribee River as well as an increased volume for use in the lower Werribee River. Some of the water allocated under this new entitlement will enable environmental water delivery from Pykes Creek Reservoir for the first time. Initially, releases will be made directly from Pykes Creek Reservoir to reaches 4 and 5, supporting native fish and platypus populations in the Werribee Gorge.

In the longer term, this water might be delivered from the upper diversion weir to reach 3 with re-harvesting in Melton Reservoir, allowing it to be held and released at appropriate times to meet further downstream environmental objectives.

Figure 3.5.1 Werribee system



Environmental values

The Werribee system supports a range of native fish, including Australian grayling, river blackfish, flathead gudgeon, short-finned eel, tupong, Australian smelt, several species of galaxiids and a large black bream population in the estuary. Several species of frogs, a diverse waterbug community and platypus inhabit the upper and lower reaches. The freshwater-saltwater interface of the Werribee River estuary is a regionally significant ecosystem due to the many aquatic plants and animals it supports, and it provides a nursery habitat for juvenile freshwater and estuarine fish species (such as black bream).

Environmental objectives in the Werribee system

A1 – Maintain native frog populations

CN1 – Maintain the capacity of the stream to process organic matter

F1 – Protect and increase native freshwater fish populations, including galaxiids, Australian grayling and tupong

F2 – Protect and support black bream populations in the estuary

G1 – Maintain channel beds and pool habitats

G2 – Maintain clean substrate surfaces to support biological processes

MI1 – Maintain and enhance waterbug populations to help break down dead organic matter and support the river's food chain

PR1 – Maintain the platypus population

V1 – Maintain the health and increase the cover of in-stream, streamside and estuary plants

V2 – Limit the spread of terrestrial plants and promote the recruitment of native water-dependent plant species on the banks and benches of waterways

V3 – Prevent the establishment of terrestrial plants in the stream bed

WQ1 – Maintain oxygen and salinity levels in pools

Traditional Owner cultural values and uses

Melbourne Water is working with the Registered Aboriginal Parties (RAPs) within the Werribee system — the Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC), the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation and the Bunurong Land Council Aboriginal Corporation — to strengthen relationships and increase Traditional Owners' involvement in the planning and delivery of water for the environment.

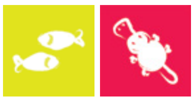
As of February 2025, an overarching partnership agreement had been made between Melbourne Water and WTOAC to frame relations and obligations between the organisations. Melbourne Water was also discussing the development of similar partnership agreements with the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation and the Bunurong Land Council Aboriginal Corporation. The intent is for Traditional Owners to be active partners in the planning, delivering and monitoring of water for the environment associated with the Werribee River (*Weariby Yallok*).

The Bunurong Land Council Aboriginal Corporation is working with Bunurong people to determine cultural objectives for *Weariby Yallok* on Bunurong Country. There are concerns about the low flow in the river's lower reaches and that fish of cultural importance to the Bunurong are not supported by the flow and are restricted in movement. This concern may be partially addressed by implementing actions 8-10 in the ***Central and Gippsland Region Sustainable Water Strategy 2022***, which aim to improve fish passage and environmental water delivery to the lower Werribee River on Bunurong Country.

WTOAC has reviewed the environmental values of the *Weariby Yallok* system. It has identified environmental values that also have cultural significance to Wadawurrung Traditional Owners, which **Table 3.5.1** shows. However, further work is required to understand how environmental watering can improve these cultural values.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Table 3.5.1 Wadawurrung cultural values and uses, Werribee system

Reach	Extent	Key environmental values with cultural significance to the Wadawurrung
8	Werribee River	
9	Werribee River between Wyndham Vale and Bluestone Ford	
Estuary	Werribee River downstream of Bluestone Ford	

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 3.5.2**, Melbourne Water considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, fishing, kayaking and swimming)
- riverside recreation and amenity from urban cooling (such as camping, walking, cycling and picnicking)
- community events and tourism (such as Werribee Zoo).
- timing of environmental releases to manage blue-green algae in the lower Werribee River, a valued recreation area.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 3.5.2 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 3.5.2 Werribee system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected effects	Environmental objectives
Upper Werribee River (targeting reaches 4 and 5)		
Winter/spring low flow (30-50 ML/ day during June to November)	• Maintain habitat for in-stream and water-dependent streamside vegetation • Maintain access to habitat and improve water quality for native fish, frogs, platypus and waterbugs • Maintain flow through pool habitats to allow mixing or suppression/dilution of saline groundwater intrusion • Maintain the capacity of the stream to process organic matter • Maintain the inundated stream channel to prevent colonisation by terrestrial vegetation	A1, CN1, F1, G2, MI1, PR1, V1, V2, V3, WQ1
Winter/spring freshes (six freshes of 245-500 ML/day for two to 10 days during June to November)	• Scour silt, biofilms and algae from substrates to maintain the quality and quantity of food and habitat for waterbugs • Increase the growth and recruitment of streamside and in-stream vegetation • Provide movement cues and enough flow for fish to move upstream past natural and artificial barriers At 500 ML/day, the effects above plus: • mobilise and transport organic matter to downstream reaches	CN1, F1, MI1, V1, V2, V3

Potential environmental watering action	Expected effects	Environmental objectives
Summer/autumn low flow (10 ML/day during December to May)	• Maintain habitat for in-stream and water-dependent streamside vegetation • Maintain access to habitat and improve water quality for native fish, frogs, platypus and waterbugs • Maintain flow through pool habitats to allow mixing or suppression/dilution of saline groundwater intrusion • Maintain the capacity of the stream to process organic matter • Maintain the inundated stream channel to prevent colonisation by inundation-tolerant terrestrial vegetation	A1, CN1, F1, G2, MI1, PR1, V1, V2, V3, WQ1
Summer/autumn freshes (six to eight freshes of 50 ML/day for two to 10 days during December to May)	• Scour silt, biofilms and algae from substrates to maintain the quality and quantity of food and habitat for waterbugs • Increase the growth and recruitment of streamside and in-stream vegetation • Provide movement cues and enough flow for fish to move upstream past natural and artificial barriers • Mobilise and transport organic matter to downstream reaches	CN1, F1, MI1, V1, V2, V3
Pyrites Creek (targeting reach 6)		
Winter/spring/ summer low flow (2 ML/day or natural during June to December)	• Provide sufficient water depth in riffle habitats for waterbugs and native fish • Maintain habitat for frogs at the margin of the stream channel • Provide sufficient water depth to support the growth of flood-tolerant vegetation and limit the growth of terrestrial vegetation within the stream channel • Provide sufficient water depth to allow for native fish to move between pools	A1, F1, MI1, V1, V2
Winter/spring freshes (three to five freshes of 30-40 ML/day for two days during June to November)	• Drown terrestrial plants that encroach on the waterway • Increase the growth and recruitment of streamside and in-stream vegetation • Transport carbon to drive aquatic food webs • Scour silt, biofilms and algae from substrates to maintain the quality and quantity of food and habitat for waterbugs • Improve water quality and the quantity of food and habitat for waterbugs, frogs and native fish • Wet depressions adjacent to the stream that frogs can use for breeding	A1, CN1, F1, G2, MI1, V1, V2, WQ1

Potential environmental watering action	Expected effects	Environmental objectives
Spring high flow (one high flow of 70-130 ML/day for one to two days during September to October)	• Maintain access to food and habitat for waterbugs, native fish and frogs • Increase the growth and recruitment of streamside vegetation At 130 ML/day, the effects above plus: • inundate the full width of the channel and high backwaters to flush accumulated organic matter and promote the growth and recruitment of streamside vegetation	A1, F1, MI1, V1
Werribee River (targeting reaches 8, 9 and estuary)		
Winter/spring low flow (80 ML/day during June to November)	• Provide sufficient depth to allow fish to move upstream past natural and artificial barriers • Facilitate the downstream movement of diadromous fish to the estuary • Drown terrestrial plant species and support the growth and recruitment of water-dependent streamside vegetation • Maintain permanent pools and increase the extent of habitat for waterbugs, fish, platypus and frogs • Maintain the flow through pool habitats to allow mixing or suppression/dilution of saline groundwater	A1, F1, F2, MI1, PR1, V1, V2, WQ1
Winter/spring freshes (two to four freshes of 350 ML/day for three days during June to October)	• Support the growth and recruitment of water-dependent streamside vegetation • Flush silt and scour biofilms and algae from substrates on the stream bed, and maintain pools and channel dimensions • Provide movement cues and enough flow for fish to move upstream past natural and artificial barriers • Maintain water quality and the quantity of food and habitat for waterbugs and platypus • Wet depressions adjacent to the stream that frogs can use for breeding	A1, F1, F2, G1, G2, MI1, PR1, V1, V2, WQ1
Summer/autumn low flow (10 ML/day during December to May)	• Maintain habitat for in-stream and water-dependent streamside vegetation • Maintain access to habitat and improve water quality for native fish, frogs, platypus and waterbugs • Maintain flow through pool habitats to allow mixing or suppression/dilution of saline groundwater intrusion	A1, F1, F2, MI1, PR1, V1, WQ1

Potential environmental watering action	Expected effects	Environmental objectives
Summer/autumn freshes (three to five freshes of 135-215 ML/day for one to two days during December to May)	• Increase the growth and recruitment of water-dependent streamside vegetation • Maintain access to habitat and improve water quality for native fish, frogs and platypus • Provide enough flow for native fish to move downstream past natural or artificial barriers • Maintain the quality of water within pools by dispersing azolla and blue-green algae blooms At 215 ML/day, the effects above plus: • flush silt and scour biofilms and algae from substrates on the stream bed, and maintain pools and channel dimensions	A1 F1, F2 G1, G2 MI1 PR1 V2 WQ1

Scenario planning

Table 3.5.3 outlines potential environmental watering and expected water use in a range of planning scenarios.

Upper Werribee River (reaches 4 and 5)

As per action 8.4 of the ***Central and Gippsland Region Sustainable Water Strategy 2022***, the Victorian Government committed to return about two gigalitres of additional water for the environment in the Werribee River to improve waterway health by maintaining water quality and providing refuges for fish. This action is nearly completed and will potentially be completed in 2025-26. The action includes potential watering actions for reaches 4 and 5, which Melbourne Water will be authorised to target with environmental water in the event this new entitlement is finalised during the year. If water for the environment becomes available under the new entitlement, the highest-priority potential watering actions for reaches 4 and 5 will be maintaining summer/autumn and winter/spring base flows to maintain connectivity and support native fish, frogs, platypus and waterbug populations. Depending on water availability and in the expected conditions of the average and wet planning scenarios, increasing the number, duration and magnitude of freshes becomes an option. Freshes would allow for more fish movement and support breeding activities, enhancing streamside and aquatic vegetation.

Pyrites Creek (reach 6)

Pyrites Creek (reach 6) is naturally ephemeral; it stops flowing for several months from late summer in most years and has longer periods without a flow in dry years. The reach has numerous permanent deep pools that support populations of native fish, frogs and some waterbugs during cease-to-flow periods. The Pyrites Creek catchment downstream of Merrimu Reservoir relies on environmental flows to maintain key components of the creek's flow regime, and while the specific volume and duration of flow events may vary from year to year, the recommended type of watering actions do not vary significantly between years or planning scenarios.

Water for the environment will be used to deliver a low flow during winter, spring and summer to maintain enough pool and riffle habitat to allow existing fish, waterbug and aquatic vegetation populations to persist. A sustained low flow during these seasons is also critical to support aquatic and flood-tolerant plants and prevent encroachment by terrestrial plant species. Winter/spring freshes and a spring high flow may also be delivered to achieve geomorphological objectives, improve the condition of in-stream and streamside vegetation and help grow native fish and frog populations.

The forecast available supply will not be sufficient to deliver all the required flow in the dry planning scenario, so the winter/spring/summer low flow will be delivered for a shorter duration to conserve water for other deliveries (such as regular freshes needed to top up and maintain permanent pools). The timing and duration of the winter/spring/summer low flow in the dry planning scenario will be based on commence and cease-to-flow triggers in the neighbouring Lerderderg River, which is also naturally short-lived.

Lower Werribee River (reaches 8 and 9)

The lower Werribee River (reaches 8 and 9) downstream of Melton Reservoir relies heavily on the passing flow, operational deliveries and environmental flows to achieve many of the requirements for a low flow and freshes. In wet years, unregulated spills from Melton Reservoir, downstream tributary inflows and local run-off, including stormwater from urbanised areas of Werribee, boost the flow and deliver many of the larger flow components that cannot be provided through a managed environmental flow. In all planning scenarios, the passing flow and operational deliveries for irrigators are expected to partially meet low-flow requirements in the lower Werribee River. Water for the environment will be used to supplement other flows when needed to achieve the low-flow target throughout the year and deliver summer/autumn freshes to manage water quality and control potential algal blooms. In all planning scenarios, there is insufficient water for the environment to meet low-flow demands year-round. In the dry and average planning scenarios, the demands are so large compared to the predicted supply that the demands would not be fully met even if all available water was prioritised for this purpose. For this reason, partial compliance with the low flow is the target under tier 1. Water for the environment will be used to top up natural and operational flows as needed to manage the water quality or provide longitudinal connectivity for fish and platypus.

More work to define critical triggers for action has been identified as a priority area for monitoring in the lower Werribee River. Winter/spring freshes will be delivered as needed and as supply allows in the average and wet planning scenarios to support the movement and recruitment of native fish and platypus and to support streamside vegetation. There is unlikely to be enough supply to deliver winter/spring freshes in the dry planning scenario. The winter/spring low flow is a lower priority in all planning scenarios because it is likely to be at least partially met by natural inflows, which should maintain minimum habitat requirements. There is also a lower risk of adverse water quality outcomes under a lower-than-recommended flow during winter and spring, compared to summer and autumn.

In all planning scenarios, a minimum carryover target of 400 ML is set to ensure high-potential flows can be delivered to Pyrites Creek (reach 6) and the lower Werribee River in 2026-27. Maintaining sufficient carryover in Lake Merrimu and Melton Reservoir will be prioritised over the delivery of tier 2 potential environmental watering actions in these reaches in 2025-26. The VEWH will work with Melbourne Water to refine a carryover target for 2026-27 once the new entitlement documents are finalised and the potential resource position is clear.

Table 3.5.3 Werribee system environmental watering planning scenarios

Planning scenario	Dry	Average	Wet
Expected conditions	• Regulated flow conditions below Melton Reservoir year-round • Minimal passing flow to reach 6, possible operational water transfers during summer • Consumptive releases out of storage into reach 8 in summer/ autumn	• Some spills from Melton Reservoir in winter/spring and periods of unregulated flow in reaches 8 and 9 and the estuary • Most low flow in reach 6 met by passing flow • Consumptive releases out of storage into reach 8 in summer/ autumn	• Regular large spills from Melton Reservoir in winter/spring and lengthy periods of unregulated flow in reaches 8 and 9 and the estuary • All low flow in reach 6 provided by passing flow • Consumptive releases out of storage into reach 8 in summer/ autumn
Expected availability of water for the environment[1]	• 1,146 ML	• 2,214 ML	• 3,326 ML

Planning scenario	Dry	Average	Wet
Upper Werribee River – reaches 4 and 5			
Potential environmental watering – tier 1 (high priorities)	• N/A	• N/A	• N/A
Potential environmental watering – tier 2 (additional priorities)	• Summer/autumn low flow • Summer/autumn freshes (six freshes) • Winter/spring low flow • Winter/spring freshes (six freshes)		
Pyrites Creek – reach 6			
Potential environmental watering – tier 1 (high priorities)	• Winter/spring/summer low flow (partial) • Winter/spring/summer freshes (three freshes)	• Winter/spring/summer low flow • Winter/spring/summer freshes (four freshes) • Spring high flow	• Winter/spring/summer low flow • Winter/spring/summer freshes (six freshes) • Spring high flow
Potential environmental watering – tier 2 (additional priorities)	• Spring high flow		
Lower Werribee River – reach 8, 9 and estuary			
Potential environmental watering – tier 1 (high priorities)	• Summer/autumn freshes (three freshes) • Summer/autumn low flow (partial)	• Summer/autumn freshes (five freshes) • Summer/autumn low flow (partial) • Winter/spring freshes (two freshes)	• Summer/autumn freshes (five freshes) • Summer/autumn low flow (partial) • Winter/spring freshes (two freshes)
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring freshes (two freshes) • Winter/spring low flow • Summer/autumn freshes (one fresh) • Summer/autumn low flow (full demand)	• Winter/spring freshes (three freshes) • Winter/spring low flow • Summer/autumn low flow (full demand)	• Winter/spring freshes (four freshes) • Winter/spring low flow • Summer/autumn low flow (full demand)
Possible volume of water for the environment required to achieve objectives[2]	• 745 ML (tier 1) • 16,000 ML (tier 2)	• 1,550 ML (tier 1) • 7,000 ML (tier 2)	• 1,825 ML (tier 1) • 5,000 ML (tier 2)
Priority carryover requirements for 2026-27	• 400 ML		

1 Figures represent forecast available supply under the VEWH's entitlement holdings as of June 2025. The available supply is expected to rise when the new entitlement is finalised.

2 Tier 2 figures include actions identified for reaches 4 and 5, which depend on finalising the entitlement and the return of water to the environment.

3.6 Moorabool system

Waterway manager – Corangamite Catchment Management Authority

Storage managers – Central Highlands Water, Barwon Water

Environmental water holder – Victorian Environmental Water Holder

System overview

The Moorabool River is a tributary of the Barwon River. It flows south from the Central Highlands between Ballarat and Ballan to join the Barwon River at Fyansford, just north of Geelong (Figure 3.6.1). The Moorabool catchment is highly regulated with major storages, including Lal Lal, Moorabool and Bostock reservoirs.

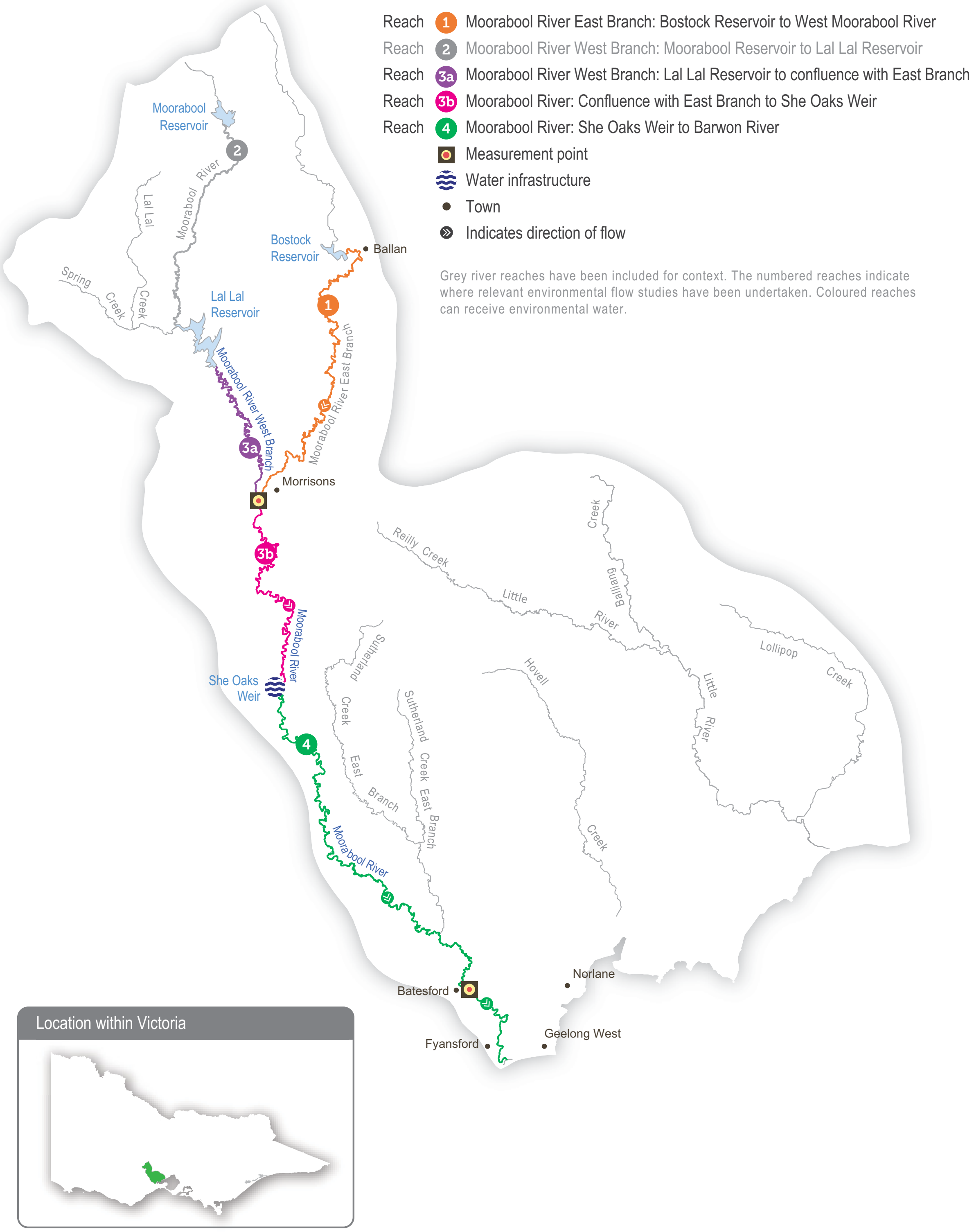
The lower section of the Moorabool River between She Oaks and Batesford has nine private diversion weirs that are significant barriers to fish. These barriers have increased the extent of slow-flowing habitat and reduced habitat diversity.

Water allocated to the Moorabool River environmental entitlement is stored in Lal Lal Reservoir. The entitlement references passing flow, a significant component of annual streamflow, and helps maintain a low flow through winter. The use of environmental water in the Moorabool system is limited by inflows to the reservoir and by a use cap specified in the entitlement. The priority reaches for deliveries of water for the environment are between Lal Lal Reservoir and She Oaks Weir (reaches 3a and 3b, as shown in **Figure 3.6.1**), as that is where the available water can have the most benefit. Environmental flows may also benefit flow-dependent values in the reach between She Oaks Weir and the confluence with the Barwon River.

The Moorabool system is a water supply catchment for Barwon Water and Central Highlands Water. Releases from Lal Lal Reservoir for urban water supply contribute to environmental outcomes in reaches 3a and 3b (above Barwon Water's diversion point at She Oaks) and allow more efficient environmental water delivery to reach 4. Barwon Water and the Corangamite CMA coordinate operational and environmental releases, where possible, to optimise these benefits.

The ***Central and Gippsland Region Sustainable Water Strategy 2022*** action 4-3 proposed the return of water in Lal Lal and Bostock reservoirs to the environment for uses decided by the Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC). As a result, potential watering actions have been included for reach 1 of the Moorabool River, supplied by Bostock Reservoir, if water is made available during the 2025-26 water year and can be delivered.

Figure 3.6.1 Moorabool system



Environmental values

The Moorabool River is home to native fish species, including the Australian grayling, river blackfish, Australian smelt, flathead gudgeon, southern pygmy perch, short-finned eel, spotted galaxias and tupong. The system also contains extensive areas of endangered remnant vegetation, including streambank shrubland and streamside woodland ecological vegetation communities. Platypus, rakali (water rats) and a range of waterbugs are also present. The Moorabool River flows into the Barwon River, connecting it to the Ramsar-listed lower Barwon wetlands.

Environmental objectives in the Moorabool system

F1 – Increase the distribution, abundance and diversity of migratory species (tupong, short-finned eel, common galaxias, spotted galaxias, shorthead lamprey and Australian grayling)

F2 – Increase the distribution, abundance and diversity of non-migratory species (flathead gudgeon, Australian smelt, southern pygmy perch and river blackfish)

MI1 – Maintain the abundance and diversity of waterbug communities

PR1 – Maintain self-sustaining, breeding platypus populations and support the dispersal of juveniles and the movement of adults

V1 – Maintain in-stream aquatic plant communities

V2 – Maintain streamside vegetation communities and promote recruitment

WQ1 – Maintain water quality

WQ2 – Prevent hypoxic blackwater events

Traditional Owner cultural values and uses

The Wadawurrung are the Traditional Owners of the land of Moorabool River and parts of the Barwon, Leigh and Yarrowee rivers. The Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) is the statutory authority for managing Aboriginal heritage values and culture under the Victorian *Aboriginal Heritage Act 2006*.

Wadawurrung Traditional Owners have a strong connection to the Moorabool River and place high cultural value on it. They are a key partner in advocating for additional water recovery to help support a healthy river and associated cultural water objectives.

In 2020, WTOAC released ***Paleert-Tjaara Dja Let's make Country good together 2020-2030 Wadawurrung Country Plan***. The plan identifies waterways, rivers, estuaries and wetlands as key values to look after. WTOAC works with waterway managers to improve outcomes on Country in line with the plan and the ***Wadawurrung Nation Statement*** on water.

In 2019, WTOAC partnered with the Corangamite CMA to complete an environmental flows study for the upper Barwon, Yarrowee and Leigh rivers. The study identified cultural values in all waterways within Wadawurrung Country, including the Moorabool River, including:

- significant aquatic species such as platypus, short-finned eel, native trout galaxias spp, tupong, river blackfish, common reed and cumbungi/typha latifolia, which are traditional sources of food, materials and medicines
- waterway confluences and deep pools, which are places for meeting, ceremonies, trade and marking clan boundaries.

As noted in the system overview, WTOAC will have water available for their self-determined use in Lal Lal and Bostock reservoirs from 2026. When this water is to be released along with environmental water, the Corangamite CMA and WTOAC will liaise to understand how the two entitlements can be used to optimise outcomes when objectives align in providing flows. In the 2023-24 and 2024-25 water years, the two organisations discussed the aligned use of environmental water and Wadawurrung water obtained through transfers via Barwon Water and Central Highlands Water. These conversations provide the basis for future discussions about flow management.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Table 3.6.1 summarises Traditional Owner cultural values and uses considered when proposing watering actions.

Table 3.6.1 Traditional Owner cultural values and uses, Moorabool system

Objectives/ opportunities	Values/uses	What environmental watering aims to do
Maintain or improve the abundance, breeding and recruitment of the platypus	• Meat and pelt	• Provide pool habitat and connectivity between reaches
Maintain or improve the abundance of eels	• Meat, an important food source sometimes smoked • Large gatherings during the eel run at Buckley's Falls	• Provide water for pools, habitat and food sources, and water over riffles to allow eels to migrate
Maintain or improve the abundance of native trout galaxias spp	• Meat	• Provide water for pools, habitat and food sources, and water over riffles to allow fish to move between pools and breed, feed and find new habitat
Maintain or improve the abundance of river blackfish	• Meat	
Maintain or improve the abundance of water ribbons	• Plant food: finger-shaped tubers are crisp and sweet and cooked in a ground oven	• Maintain an adequate depth of water in channels
Maintain or improve the condition, extent and abundance of common reed, pale rush and cumbungi	• Common reed. Weapon stems used for spear shafts for fishing. Reed cut while still green to make necklaces, weaving bags and baskets. Also, a food plant. • Weaving baskets • Fluff is used to pack wounds under a paperbark bandage	• Maintain an adequate depth of water to limit terrestrial encroachment into aquatic habitats. This will also support growth on terraces, channel edges and lower banks
Maintain or improve the abundance of river red gum	• The bark is removed for canoes, shelter and tools • Bowls • Nectar drink • Medicinal uses: the gum or sap was used for burns to shrink or seal them; the sap is high in tannin • Leaves are used for steam baths	

Objectives/ opportunities	Values/uses	What environmental watering aims to do
Maintain or improve the abundance of manna gum and swamp wallaby grass	• Timber is used for making clubs and shields • The sap-sucking lerp bug was gathered each season • Young leaves were fed onto a fire near the patient, and a poultice of well-chewed leaves was applied for backache • Quail flocks were attracted to manna gums • Leaves were split, dried out and reconstituted in running water • Fibres were twisted into rope to make long nets for game hunting	• Environmental watering cannot be considered to support this value in 2025-26 due to various constraints (such as an insufficient entitlement)
Deep pools	• Deep pools have cultural significance	• Help fill and ensure connectivity to pools where possible
Confluences (e.g. Moorabool and Barwon rivers)	• Confluences have high cultural value due to their historical use as meeting places for three different clans	• Maintain an adequate depth of water for connectivity
Holding cultural events on the Moorabool River	• Celebrations of culture, family events, fishing days and cultural festivals	• Summer/autumn freshes and some winter/spring freshes can be delivered to coincide with cultural events. This can support significant cultural values and species for an event's lead-up or duration.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 3.6.2**, the Corangamite CMA considered how environmental watering could support cultural, social, recreational and economic values and uses, including peak recreational use as required in the Victorian *Water Act 1989*, if the delivery does not compromise environmental outcomes.

Social and recreational activities that may benefit from environmental water releases in the Moorabool system include camping, canoeing, kayaking, swimming and angling.

Actions such as summer/autumn freshes will increase the Moorabool River's flow and provide water-based recreation opportunities, particularly camping and fishing, regardless of whether a watering action is timed to coincide with a specific period.

The extent to which the Moorabool River can influence social, recreational and economic values extends only throughout the reaches of the Moorabool itself. The use of environmental water in a broader context throughout the Barwon River downstream of Fyansford is not viable. The main factors that impede the predictability and viability of environmental water's scope to influence social, recreational and economic values in the Barwon River include:

- the relative difference between the channel size of the Barwon and Moorabool rivers
- groundwater losses surrounding Batesford quarry
- the distance from the release points to the confluence.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 3.6.2 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 3.6.2 Moorabool system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Moorabool River west branch (targeting reach 3a)		
Winter/spring low flow (5-60 ML/day during June to November)	At 5 to 10 ML/day: • maintain in-stream vegetation • maintain connectivity and allow fish movement through the reach • maintain pool and riffle habitat for platypus and native fish A higher continuous flow of 60 ML/day would inundate the full extent of the channel bed and reduce intrusion by terrestrial vegetation into the stream bed	F1, F2 PR1 V1
Winter fresh (one fresh of 80-90 ML/day for five to 10 days during June to August)	• Provide connectivity between riffle and pool habitats to support fish and platypus movement through the reach • Maintain a clear flow path and control intrusions by terrestrial vegetation • Trigger the downstream spawning migration of tupong • Flush silt, scour pools and remove biofilms from hard substrates and the stream bed to maintain waterbug communities, and transport organic matter to prevent blackwater events • Temporarily inundate the lower part of the riverbank to promote the growth and recruitment of streamside vegetation	F1, F2 MI1 PR1 V1, V2 WQ2
Spring fresh(es) (one to two freshes of 80-90 ML/day for five to 10 days during September to November)	• Provide connectivity between riffle and pool habitats to support fish and platypus movement through the reach • Maintain a clear flow path and control intrusions by terrestrial vegetation • Trigger the upstream migration of juvenile galaxias, tupong, short-finned eel and Australian grayling • Flush silt, scour pools and remove biofilms from hard substrates and the stream bed to maintain waterbug communities and transport organic matter to prevent blackwater events • Temporarily inundate the lower part of the riverbank to promote the growth and recruitment of streamside vegetation	F1, F2 MI1 PR1 V1, V2 WQ2

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow (5-40[1] ML/ day during December to May)	At 5 to 10 ML/day: • maintain refuge pools and riffle habitat for fish, waterbugs and platypus and submerged aquatic vegetation • maintain water quality for aquatic life by reducing periods of low oxygen, high temperature and high salinity Flow above 30 ML/day will water fringing vegetation, promoting growth and recruitment	F1, F2 MI1 PR1 V1 WQ1
Small summer/ autumn fresh (one fresh of 30-60 ML/ day for three days during February to March)	• Allow fish and platypus movement through the reach • Maintain a clear flow path and control intrusions by terrestrial vegetation • Flush silt and scour biofilms and algae from the stream bed and transport organic matter to improve habitat and food for waterbugs • Maintain species within the marginal zone by watering fringing vegetation	F1, F2 MI1 PR1 V2
Summer fresh (one fresh of 60-80 ML/ day for five days during January to February)	• Trigger the downstream spawning migration of adult short-finned eel • Maintain pool and riffle habitat and the condition of streamside vegetation, and promote recruitment • Allow fish and platypus to move through the reach to access habitat • Flush silt and scour biofilms and algae from the stream bed and substrates to improve habitat quality for waterbugs	F1, F2 MI1 PR1 V2
Autumn fresh (one fresh of 60-80 ML/ day for five days during April to May)	• Trigger the downstream spawning migration of Australian grayling • Maintain pool and riffle habitat and the condition of streamside vegetation, and promote recruitment • Allow fish and platypus to move through the reach to access habitat • Flush silt and scour biofilms and algae from the stream bed and substrates to improve habitat quality for waterbugs	F1, F2 MI1 PR1 V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Year-round freshes (trigger-based, of 30 ML/day for three days) *Triggers:* • *oxygen below 5 mg/L* • *electrical conductivity above 10,000 µs/cm* • *water temperature above 25°C*	• Maintain water quality by reducing periods of low oxygen, high water temperature and salinity • Transport organic matter to prevent blackwater events	WQ1, WQ2
Moorabool River east branch (targeting reach 1)		
Winter/spring low flow (8 ML/day during June to November)	• Maintain connectivity and allow fish movement through the reach • Maintain pool and riffle habitat for platypus and native fish • Maintain a clear flow path and control intrusions by terrestrial vegetation	F1, F2 PR1 V1
Autumn/winter fresh (one fresh of 37 ML/day for five days during May to August)	• Provide connectivity between riffle and pool habitats to support fish and platypus movement through the reach • Trigger the downstream spawning migration of tupong • Flush silt, scour pools and remove biofilms from hard substrates and the stream bed to maintain waterbug communities, and transport organic matter to prevent blackwater events • Temporarily inundate the lower part of the riverbank to maintain the diversity of fringing vegetation species and promote the growth and recruitment of streamside vegetation	F1, F2 MI1 PR1 V2 WQ2
Spring fresh(es) (one to two freshes of 37 ML/day for five days during September to November)	• Provide connectivity between riffle and pool habitats to support fish and platypus movement through the reach • Trigger the upstream migration of juvenile galaxias, tupong, short-finned eel and Australian grayling • Flush silt, scour pools and remove biofilms from hard substrates and the stream bed to maintain waterbug communities and transport organic matter to prevent blackwater events • Temporarily inundate the lower part of the riverbank to maintain the diversity of fringing vegetation species and promote the growth and recruitment of streamside vegetation	F1, F2 MI1 PR1 V2 WQ2

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow (1-2 ML/day during December to May)	• Maintain refuge pools and riffle habitat for fish, waterbugs and platypus and submerged aquatic vegetation • Maintain water quality for aquatic life by reducing periods of low oxygen, high temperatures and high salinity	F1, F2 MI1 PR1 V1 WQ1
Summer/autumn freshes (two to three freshes of 2 ML/day for two to three days during December to May)	• Maintain the condition of streamside vegetation and promote recruitment • Allow fish and platypus to move through the reach to access habitat • Flush silt and scour biofilms and algae from the stream bed and substrates to improve habitat quality for waterbugs • Maintain water quality for aquatic life by reducing periods of low oxygen, high temperatures and high salinity	F1, F2 MI1 PR1 V2 WQ1

1 The flow will generally target between 5 and 10 ML per day at the compliance point, but 40 ML per day could be achieved in combination with Barwon Water's transfer to She Oaks Weir and passing flow.

Scenario planning

Table 3.6.3 outlines potential environmental watering and expected water use in a range of planning scenarios.

Reach 3 a (west branch)

In recent years, there has been little variation in the proposed watering regime year to year, due to restrictions on how much water for the environment can be used each year. The *Moorabool River Environmental Entitlement 2010* stipulates that a maximum of 7,500 ML can be used over three consecutive years. This effectively limits environmental water use to 2,500 ML a year because a larger volume could only be delivered in one year if less water had been delivered in the previous two years, and it would reduce the volume that could be used in the two subsequent years. Due to dry conditions in 2024-25, allocation has been very low and is expected to significantly affect the volume of water that can be carried over into 2025-26, if dry conditions persist. As a result, the watering actions proposed to be delivered with the available water in the drought and dry planning scenarios are more restricted than in previous years. It is not possible to predict the volume of additional water expected to become available in 2025-26 through the proposed return of water to the environment in Lal Lal Reservoir.

The Moorabool River requires a continuous low flow throughout the year and periodic freshes in all planning scenarios to achieve the intended environmental outcomes.

In the drought and dry planning scenarios, the main objective is to deliver a sufficient flow to maintain enough habitat to prevent significant declines in existing populations of native fish and platypus. There will be limited natural inflow to the river in these planning scenarios, so water for the environment will be used to deliver a low flow at the lower end of the recommended range (5 ML per day) to maintain a continuous flow throughout reach 3a for as long as possible. Water for the environment may be added to operational transfers to increase flow variability downstream of Lal Lal Reservoir and maintain some flow in the reaches downstream of She Oaks Weir once operational water is diverted.

Even with these proposed watering actions, sections of the Moorabool River are likely to periodically cease flowing in the dry or drought planning scenarios, which would reduce the river's environmental condition and the size of plant and animal populations. In the drought planning scenario, water quality will be regularly monitored to inform the delivery of trigger-based, year-round freshes as needed.

In the average and wet planning scenarios, most of the recommended flow is expected to be provided through a combination of the natural flow, passing flow and operational releases, which will mean water for the environment can be used to deliver additional freshes to improve environmental conditions and increase populations of native plants and animals.

Delivering an autumn fresh in April/May is a high priority in all planning scenarios to trigger Australian grayling migration and spawning. In the average and wet planning scenarios, a summer fresh is proposed for January/February to trigger the downstream spawning migration of short-finned eel.

Winter and spring freshes are a lower priority than summer and autumn freshes and consequently depend on water availability in drought and dry conditions. A winter fresh would be delivered to trigger the downstream spawning migration of adult tupong, whereas spring freshes will aim to trigger the upstream migration of juvenile galaxias, tupong, short-finned eel and Australian grayling.

Although environmental flows released from Lal Lal Reservoir primarily target outcomes in reaches 3a and 3b, deliveries will be planned where possible to also provide benefits in reach 4.

The *Moorabool River Environmental Entitlement 2010* caps use at 7,500 ML over three years. As a result, use in 2025-26 is proposed to be capped at 2,500 ML unless additional environmental entitlement is made available and can be delivered.

In average and wet conditions, the priority carryover volume at the end of 2025-26 for the *Moorabool River Environmental Entitlement 2010* is 1,000 ML, which provides water to deliver a critical low flow if conditions turn dry in 2026-27 without affecting outcomes achievable through water delivery in 2025-26 within the constraints of the 2,500 ML delivery cap. In drought and dry conditions in 2025-26, water availability will be more limited, and there will be a need to balance critical environmental watering requirements across 2025-26 and in 2026-27. Therefore, the carryover targets in drought and dry conditions in 2026-27 are reduced to 500 ML and 750 ML, respectively.

Reach 1 (east branch)

There is currently no environmental entitlement in the east branch of the Moorabool River. However, one might be issued during the 2025-26 water year in line with ***Central and Gippsland Region Sustainable Water Strategy 2022*** action 4-3. If water for the environment is made available and can be delivered, the highest priority will be to maintain a continuous flow in all planning scenarios and provide summer/autumn freshes in drought and dry conditions to maintain habitat for native fish and platypus and prevent poor water quality. If winter/spring watering actions are delivered, they are expected to be at lower magnitudes if insufficient water is available to meet the full demand and the existing infrastructure has capacity. It is not possible to predict the volume of water to become available in 2025-26 through the proposed return of water to the environment in Bostock Reservoir, so these potential watering actions are included as tier 2 actions.

Table 3.6.3 Moorabool system environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Little rainfall with no inflow to Lal Lal Reservoir • Regular periods of no flow	• Below-average rainfall and inflow to Lal Lal Reservoir • Cease-to-flow events	• Moderate inflows to Lal Lal Reservoir, especially during winter and spring • Low flow over summer and high peaks in winter months	• Lal Lal Reservoir is likely to fill and spill • Continuous flow year-round • Overbank flow in some parts during winter/ spring
Moorabool River west branch (targeting reach 3a)				
Expected availability of water for the environment[1]	• 1,386 ML	• 1,858 ML	• 3,715 ML[2]	• 4,799 ML[2]
Potential environmental watering – tier 1 (high priorities)	• Summer/ autumn low flow (5 ML/day) • Year-round fresh(es) (if required)	• Winter/spring low flow (5 ML/ day) • Summer/ autumn low flow (5 ML/day)	• Winter/spring low flow (5 ML/ day) • Winter fresh (one fresh) • Spring fresh (one fresh) • Summer/ autumn low flow (5 ML/day) • Small summer/ autumn fresh (one fresh) • Summer fresh (one fresh) • Autumn fresh (one fresh)	• Winter/spring low flow (of greater than 10 ML/day) • Winter fresh (one fresh) • Spring freshes (two freshes) • Summer/ autumn low flow (of greater than 10 ML/ day) • Small summer/ autumn fresh (one fresh) • Summer fresh (one fresh) • Autumn fresh (one fresh)
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow (5 ML/ day) • Autumn fresh (one fresh) • Spring fresh (one fresh) • Winter fresh (one fresh)	• Autumn fresh • Spring fresh (one fresh) • Winter fresh (one fresh)	• Spring fresh (one additional fresh)	• N/A

Planning scenario	Drought	Dry	Average	Wet
Possible volume of water for the environment required to achieve objectives	• 886 ML (tier 1) • 2,463 ML (tier 2)	• 1,108 ML (tier 1) • 1,553 ML (tier 2)	• 2,400 ML (tier 1) • 495 ML (tier 2)	• 780 ML (tier 1) • N/A (tier 2)
Priority carryover requirements for 2026-27	• 500 ML	• 750 ML	• 1,000 ML	
Moorabool River east branch (targeting reach 1)				
Expected availability of water for the environment	• It is not possible to predict water availability in 2025-26 from the proposed new environmental entitlement			
Potential environmental watering – tier 1 (high priorities)	• N/A			
Potential environmental watering – tier 2 (additional priorities)	• Summer/autumn low flow • Winter/spring low flow • Summer/autumn freshes • Spring fresh (one fresh) • Autumn/winter fresh (one fresh)		• Summer/autumn low flow • Winter/spring low flow • Spring freshes (two freshes) • Autumn/winter fresh (one fresh)	
Possible volume of water for the environment required to achieve objectives	• 0 ML (tier 1) • 2,278 ML (tier 2)		• 0 ML (tier 1) • 2,550 ML (tier 2)	

1 The expected availability of water for the environment for target reach 3a is based on the current *Moorabool River Environmental Entitlement 2010*. It is not possible to predict the additional volume of water expected to become available in 2025-26 through the return of water for the environment in Lal Lal Reservoir.

2 Up to 7,086 ML can be stored under the *Moorabool River Environmental Entitlement 2010*. However, the entitlement is subject to delivery rules — a maximum of 7,500 ML over three consecutive years — which restricts delivery of water to 2,500 ML per year.

3.7 Barwon system

Waterway manager – Corangamite Catchment Management Authority

Storage manager – Barwon Water

Environmental water holder – Victorian Environmental Water Holder

The Barwon system includes the upper Barwon River and lower Barwon wetlands.

The Barwon River flows east from the Otway Ranges, passing the towns of Forrest, Birregurra, Winchelsea, Inverleigh and the City of Geelong before discharging into Bass Strait at Barwon Heads. The Leigh and Moorabool rivers are major tributaries, joining the Barwon River at Inverleigh and Fyansford, respectively. Other tributaries, including Birregurra, Boundary, Callahan, Dewing, Matthews, Pennyroyal, Deans Marsh and Gosling creeks, flow into the Barwon River above Winchelsea. The main storages in the Barwon River catchments are the West Barwon and Wurdee Boluc reservoirs.

The Barwon estuary contains a Ramsar-listed system of wetlands and lakes collectively called the lower Barwon wetlands. Water for the environment can be used to manage the flow in the upper Barwon River and manage water levels in Reedy Lake and Hospital Swamps, which connect to the lower Barwon River.

3.7.1 Upper Barwon River

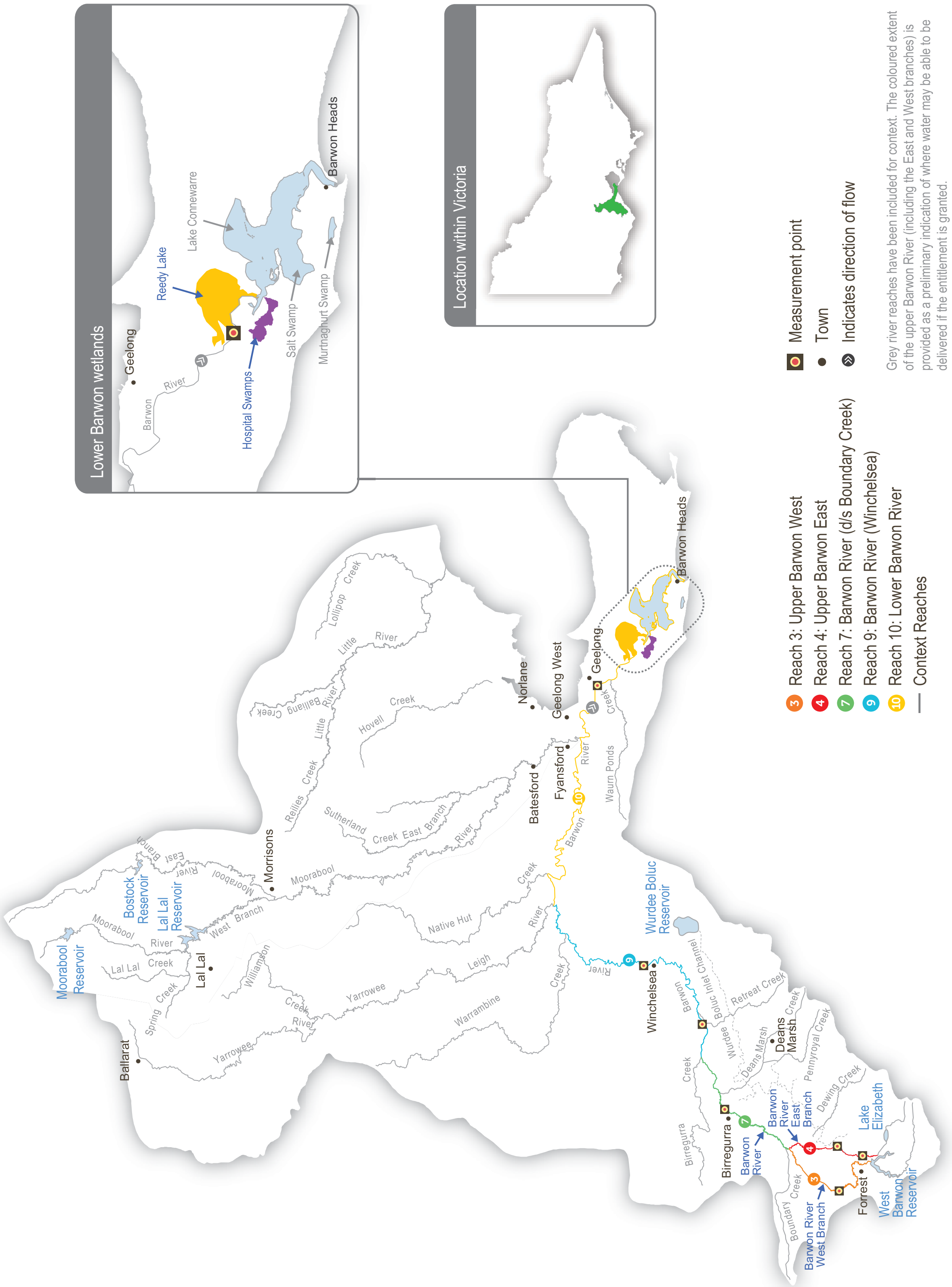
System overview

The operation of the West Barwon Reservoir regulates flows in the upper Barwon River. Water can be released directly from the reservoir into the west or east branches via a diversion tunnel. The junction of the two branches is near Boundary Creek. Downstream of the reservoir, operational water can be diverted into the Wurdee Boluc inlet channel, a 57 km concrete-lined channel that transfers water to Wurdee Boluc Reservoir (Figure 3.7.1).

Barwon Water releases a passing flow of 1-5 ML per day in both the upper east and west branches from the West Barwon Reservoir, which may increase to 15 ML per day in the east branch over September in a wet year. All the natural flow is passed down the east branch when West Barwon and Wurdee Boluc reservoirs together hold more than 26,100 ML in January, 22,900 ML in February and 20,900 ML in March. Flood spills from the reservoir and natural inflows from unregulated and regulated tributaries add to the passing flow in the west branch. Regulated and unregulated tributaries add to the passing flow in the east branch.

The *Upper Barwon River Environmental Entitlement 2018* enables water for the environment to be made available from the West Barwon Reservoir. The entitlement provides an average of 1,000 ML per year and up to 2,000 ML of the total storage capacity at full supply. Water for the environment was first delivered to the upper Barwon River in 2018-19. The current entitlement provides only enough water to meet the highest-priority potential watering actions in the upper Barwon east branch (reach 4) and the upper Barwon west branch (reach 3) in particular climatic conditions.

Figure 3.7.1 Barwon system



Environmental values

The upper Barwon River is home to platypus and native fish species, including the river blackfish, short-finned eel, southern pygmy perch, Australian smelt and various galaxias. The system retains some submerged aquatic vegetation, undercut banks, overhanging vegetation and riffle pool sequences, which provide essential habitat for fish and other aquatic animals.

Long-term environmental objectives for the upper Barwon system are based on delivering watering actions recommended in the ***Upper Barwon, Yarrowee and Leigh rivers FLOWS study update***. These include improving the breeding and recruitment of various fish, platypus and waterbug species and improving the condition, extent and diversity of in-stream, emergent, streamside and floodplain vegetation. However, due to the limited size of the environmental entitlement, channel constrictions and historical channel diversions, the flow magnitudes for most of the potential watering actions described in this plan have been adjusted to be less than the known channel constraints. The watering actions presented in this plan aim to maintain rather than improve current ecological conditions within the upper Barwon River. Significant improvements in ecological condition are unlikely until complementary actions are taken to address channel constraints and other factors (such as unrestricted livestock access and weed infestation).

Environmental objectives in the upper Barwon River

F1 – Maintain the abundance of migratory fish species, including short-finned eels and tupong

F2 – Maintain the abundance of resident freshwater fish, including several species of galaxias, Australian smelt, bigheaded gudgeon, Yarra pygmy perch, southern pygmy perch and river blackfish

MI1 – Maintain the abundance of waterbugs as a food source for the native fish, frog and platypus populations

PR1 – Maintain the abundance of the platypus population

V1 – Maintain the condition and extent of in-stream vegetation to provide structural habitat for waterbugs and various fish species

V2 – Maintain the condition, extent and diversity of emergent aquatic plants and streamside vegetation to provide structural habitat and stabilise the channel and lower banks

WQ1 – Maintain water quality for native fish, waterbugs, other water-dependent animals and aquatic vegetation

Traditional Owner cultural values and uses

The reaches of the Barwon River that can be most influenced by water delivered from the West Barwon Reservoir sit on Eastern Maar Country.

In February 2020, the Eastern Maar Aboriginal Corporation (EMAC) received Registered Aboriginal Party (RAP) status under the Victorian *Aboriginal Heritage Act 2006* over a large portion of land in south-west Victoria, including the Barwon River upstream of Winchelsea. In 2023, Eastern Maar gained formal recognition of their rights under the Commonwealth *Native Title Act 1993* for over half of the RAP area. On 21 March 2024, the Federal Court of Australia handed down a third native title determination, marking a significant milestone since their initial recognition in 2011 under the Native Title Act. Further areas remain in negotiation. Native Title determinations acknowledge Eastern Maar's ongoing connection and intrinsic relationship to Country across south-west Victoria, including parts of the Barwon River catchment.

Eastern Maar obligations to Country and objectives for Country are described in the 2015 Eastern Maar Country plan ***Meerreengeeye Ngakeepoorryeeyt***. Eastern Maar assertions for *parreeyt* (water) are further documented in Eastern Maar's Nation Statement in the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap***.

The current environmental entitlement can most affect the river reaches between the West Barwon Reservoir and Winchelsea, with diminishing benefits to the reaches downstream. The reaches of the river downstream of Winchelsea sit on Wadawurrung Country. The Corangamite CMA is working with the Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) to understand opportunities to provide for cultural values and uses and other aspirations for the management of water for the environment in the Barwon River downstream of Winchelsea, on Country where WTOAC holds RAP status.

EMAC and WTOAC have formal plans for how to heal Country in the region, and the Corangamite CMA continues to work with each Traditional Owner group to identify their cultural objectives and associated values and uses that align with environmental flows.

WTOAC has been working with waterway managers through the development of seasonal watering proposals to improve outcomes on Country in line with ***Paleert Tjaara Dja Let's make Country good together 2020-2030 Wadawurrung Country Plan*** and the ***Wadawurrung Nation Statement*** on water:

- by 2030, the water in the waterways of the *Barre Warree Yulluk* is clean enough to drink
- by 2025, the waterways of the *Barre Warree Yulluk* will have sufficient cultural flows and connectivity to support culturally important species
- Wadawurrung Yaluks and waterway ecosystems are flowing freely and are healthy.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 3.7.1**, the Corangamite CMA considered how environmental watering could support cultural, social, recreational and economic values and uses, including peak recreational use as required in the Victorian *Water Act 1989* if the delivery does not compromise environmental outcomes.

The adjacent land use of the upper Barwon River is dominated by grazing for livestock (beef, sheep and dairy) and forestry and is of significant economic value. Limited public access to the riverfront limits the upper Barwon's social and recreational values and uses.

In planning the potential environmental watering actions, the Corangamite CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as swimming and fishing, particularly for river blackfish)
- riverside recreation and amenity (such as birdwatching, camping, trail running, mountain bike riding and walking)
- socioeconomic benefits (such as for diverters for stock needs and domestic use; water levels and water quality can rely on environmental water deliveries, particularly in summer).

Although the watering actions in **Table 3.7.1** may support social, recreational and economic values and uses, they were not actively modified to accommodate such values and uses.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 3.7.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 3.7.1 Upper Barwon River potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Upper Barwon River (targeting reach 3 – west branch)		
Winter/spring low flow (3-15 ML/day during June to November) **Summer/autumn low flow (3-15 ML/day during December to May)**	• Maintain permanent water in the channel and pools to provide habitat to support resident and migratory fish and platypus • Maintain an adequate depth of permanent water in the channel to promote the recruitment of aquatic and streamside plants and to limit the encroachment of terrestrial species	F1, F2 PR1 V1, V2
Upper Barwon River (targeting reach 4 – east branch)		
Winter/spring low flow (1-10 ML/day during June to November)	• Maintain an adequate depth of permanent water in the channel and pools to provide habitat for resident and migratory fish and platypus • Maintain an adequate depth of permanent water in the channel to promote the recruitment of aquatic and streamside plants and to limit the encroachment of terrestrial species • Provide sufficient flow velocity to mix pools	F1, F2 PR1 V1, V2 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow (0.5-5 ML/day during December to May)	• Maintain an adequate depth of permanent water in the channel/pools to provide habitat for resident and migratory fish and platypus • Maintain an adequate depth of permanent water in the channel to promote the recruitment of aquatic and streamside plants and to limit the encroachment of terrestrial species • Provide a velocity to mix pools	F1, F2 PR1 V1, V2 WQ1
Summer/autumn freshes (two to three freshes of 6-9 ML/day for two days during December to May)	• Increase the water depth in the channel and pools to allow for the movement of resident and migratory fish and platypus • Provide a mosaic of wetted areas to maintain in-stream, emergent and streamside vegetation • Provide minimum velocity to mix pools and improve habitat quality for fish and waterbugs	F1, F2 MI1 PR1 V1, V2 WQ1

Scenario planning

Table 3.7.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

Planned watering actions for the upper Barwon River are derived from recommendations in the ***Upper Barwon, Yarrowee and Leigh rivers FLOWS study update***. Many of the flow magnitudes recommended in the study cannot be delivered due to the size of the environmental entitlement and the risk of inundating private land.

Observations during 2024-25 identified locations on both branches of the river that are significantly affected by constrictions and/or breakouts. These are expected to affect the ability to deliver the proposed watering actions in this plan with water for the environment. The Corangamite CMA will work with relevant agencies and landholders to investigate options that will allow deliveries of water for the environment and avoid affecting private land without consent.

On the basis that the constrictions and/or breakouts limiting environmental water delivery are resolved, the planned watering actions in **Table 3.7.2** are still intentionally less than the recommended environmental flows, due to numerous other constrictions throughout both branches of the upper Barwon River, and they would provide a lower environmental benefit. Given these limitations, the main aim of watering actions is to deliver enough flow through the system to maintain pool habitat and food (waterbugs) for aquatic animals. A low flow will aim to prevent or limit cease-to-flow events, and small freshes will be delivered as needed in the east branch during summer and autumn to manage potential water quality issues. The overall approach to environmental flows in the upper Barwon River in 2025-26 will help maintain existing populations of native fish, platypus and waterbugs, and it relies on natural events to deliver the greater flows needed to facilitate the movement and potential breeding of fish and platypus.

The Barwon Flagship Project is an integrated catchment management project working with stakeholders to address flow restrictions through streamside management and to improve the overall health of the upper Barwon River.

The priority carryover requirement for 2026-27 for the upper Barwon River is 500 ML. This amount is the drought reserve amount agreed with the Upper Barwon Surface Water Advisory Group. Carryover will be vital to ensure sufficient water is available to deliver the highest-priority flows during the early part of 2026-27 if there are low allocations during the year.

Table 3.7.2 Upper Barwon River environmental watering planning scenarios

Planning scenario	Dry	Average	Wet
Expected conditions	• Disconnected pools during summer and autumn • Cease-to-flow events	• Low flow in summer and autumn • Peak flow in winter and spring	• Continuous flow throughout the year • Reservoir spills are likely, especially during winter and spring
Expected availability of water for the environment	• 1,462 ML	• 1,631 ML	• 1,850 ML
Upper Barwon River (targeting reach 3 – west branch)			
Potential environmental watering – tier 1 (high priorities)	• Summer/autumn low flow (delivered at a lower magnitude in the range)	• Summer/autumn low flow (delivered at a lower magnitude in the range)	• Summer/autumn low flow • Winter/spring low flow
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow (delivered at a lower magnitude in the range)	• Winter/spring low flow (delivered at a lower magnitude in the range)	• N/A
Upper Barwon River (targeting reach 4 – east branch)			
Potential environmental watering – tier 1 (high priorities)	• Summer/autumn low flow (delivered at a lower magnitude in the range) • Summer/autumn freshes (two freshes)	• Summer/autumn low flow (delivered at a lower magnitude in the range) • Summer/autumn freshes (two freshes)	• Summer/autumn low flow • Summer/autumn freshes (three freshes) • Winter/spring low flow
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow	• Winter/spring low flow	• N/A
Possible volume of water for the environment required to achieve objectives	• 942 ML (tier 1) • 2,560 ML (tier 2)	• 669 ML (tier 1) • 1,098 ML (tier 2)	• 410 ML (tier 1) • N/A (tier 2)
Priority carryover requirements for 2026-27	• 500 ML		

3.7.2 Lower Barwon wetlands

System overview

The estuarine reach of the Barwon River contains a system of wetlands and lakes, including Lake Connewarre, Reedy Lake and Hospital Swamps, Salt Swamp and Murtnaghurt Lagoon (Figure 3.7.1). For thousands of years, the system has been a place of great significance to the Wadawurrung Traditional Owners. *Paleert Tjaara Dja Let's make Country good together 2020-2030 Wadawurrung Country Plan* acknowledges the system's special place in their Dreaming.

Water for the environment can be used to manage water levels in Reedy Lake and Hospital Swamps, which connect to the Barwon River. The environmental entitlement for the lower Barwon wetlands does not provide access to water held in storage. Instead, it allows water to be diverted from the Barwon River into Reedy Lake and Hospital Swamps when river levels are above 0.7 m AHD. High water levels in the Barwon River can also result in the natural wetting of the wetlands.

Environmental values

Reedy Lake and Hospital Swamps form part of the internationally recognised Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site, which is used by many thousands of internationally significant species. The wetlands support 47 known threatened plant and animal species and communities. These include some of Victoria's rarest species (such as the brolga, orange-bellied parrot, Australasian bittern, growling grass frog, Australian grayling and dwarf galaxias) and subtropical and temperate coastal saltmarsh communities. Reedy Lake also supports a range of vegetation communities, including coastal saltmarsh, herbfields and reed beds.

Reedy Lake was naturally a partly ephemeral system, but river regulation meant the lake was nearly permanently wet from the 1970s until 2016. Wetting and drying regimes are now recommended to maintain the lake's ecological character and diverse habitats.

Following a four-year (2016-17 to 2019-20) watering regime trial at Reedy Lake, the Lower Barwon Review in 2020 proposed to implement a long-term, seasonally adaptive water regime that avoids complete drying. At Reedy Lake, this means having the wetland full for a quarter of all years and having a partial drawdown in summer and autumn in three-quarters of all years.

Hospital Swamps comprises five wetland basins that support important ecological processes and significant environmental values, including large areas of coastal saltmarsh and diverse waterbird communities.

Environmental objectives in the lower Barwon wetlands

B1 – Provide suitable feeding and breeding habitat for waterbirds, including mudflats and shallow water for wading birds, flooded vegetation and wetland fringes

CN1 – Maintain nutrient cycling and improve lake productivity

F1 – Provide habitat for fish breeding and growth and improved conditions for migration and dispersal when wetlands are connected to the Barwon River

F2 – Reduce carp populations

MI1 – Increase waterbug populations and their biomass

V1 – Increase the diversity of ecological vegetation communities in the wetlands and increase the recruitment of aquatic vegetation

V2 – Increase the growth and extent of coastal saltmarsh, herbfields and lignum shrubland ecological vegetation communities

V3 – Retard colonisation of tall reed in low-lying areas and increase open-water habitat

WQ1 – Remove accumulated salts

WQ2 – Maintain surface water and groundwater interactions

Traditional Owner cultural values and uses

The lower Barwon wetlands are part of Wadawurrung Country. The Corangamite CMA is continuing to work with the Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) to support their values and uses of the wetlands and to refine the Corangamite CMA's understanding of how the water regimes in the lower Barwon wetlands can support Wadawurrung aspirations.

Wadawurrung people place a high cultural value on the Barwon River. Many Wadawurrung people in the region have a connection to and a long history with the river. Under the Victorian *Aboriginal Heritage Act 2006* and the Aboriginal Heritage Regulations 2007, any waterway or Ramsar-listed site is recognised as culturally sensitive.

In 2018, the Corangamite CMA engaged representatives of WTOAC to inform part of the ***Upper Barwon, Yarrowee and Leigh rivers FLOWS study update*** and to assist in capturing Aboriginal values relevant to Wadawurrung Country in each of the waterway reaches. Many of these values, notably culturally significant species, are also common to the wetlands of the Barwon River system.

WTOAC's 2020 ***Paleert Tjaara Dja Let's make Country good together 2020-2030 Wadawurrung Country Plan*** identifies important cultural values and recommendations for the lower Barwon wetlands, including:

- culturally significant wetland species (such as brolga, black duck, black swan, short-finned eel, common reed and bull rush)
- recognition of wetlands as meeting, ceremony and trade places
- maintaining water holes and refuge pools
- maintaining access to culturally important story places and ceremonial places
- protection of artefact sites
- use of appropriate Wadawurrung language for places of cultural importance
- increased opportunities for the Wadawurrung to be involved in monitoring and evaluation activities
- inclusion of the Wadawurrung in all communications about releases of water for the environment and other wetland-related activities.

Paleert Tjaara Dja acknowledges Reedy Lake and Hospital Swamps as special places in Wadawurrung Dreaming.

> "The chain of ponds from the Barwon River to Reedy Lake, Hospital Lake, Lake Connewarre and Estuary Bay is connected through water and Black Swan Dreaming."

WTOAC has been working with waterway managers to improve outcomes on Country in line with the ***Paleert-Tjaara Dja Let's make Country good together 2020-2030 Wadawurrung Country Plan*** and the ***Wadawurrung Nation Statement*** on water.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 3.7.3**, the Corangamite CMA consulted with stakeholders to ensure it considered how environmental flows could support social, recreational and economic values and uses, which are incorporated into planning and watering decisions if they do not compromise environmental outcomes.

Expert advice (such as the 2012 environmental flows study for the lower Barwon wetlands and the 2020 Lower Barwon Review) emphasised that the entire lower Barwon recommended watering regime — providing a fill to the wetlands and allowing water levels to draw down at the right times — would have to be implemented to improve biodiversity and protect the long-term health of the wetlands. This may mean it is not possible to meet some community expectations for shared benefits that don't maintain or improve environmental outcomes. The Corangamite CMA manages water levels in the wetlands to meet environmental requirements, which concurrently benefit a range of social, economic and recreational values and uses, including:

- water-based recreation (such as boating, duck hunting and fishing)
- wetlands recreation and amenity (such as birdwatching and spending time outdoors)
- community events (including Traditional Owner events)
- socioeconomic benefits (such as commercial fishing).

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 3.7.3 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 3.7.3 Lower Barwon wetlands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Reedy Lake		
Autumn/winter/spring fill (April to November) and top-ups as required (year-round) (targeting 0.8 m AHD)	• Maintain a mosaic of water depths and resources across the wetland to support waterbird breeding events • Inundate fringing wetland vegetation to provide foraging habitat for waterbirds • Maintain a sufficient depth of water around wetland vegetation to provide fish breeding habitat • Temporarily inundate the outer edges of the wetland to initiate the growth and recruitment of diverse vegetation communities, while permanently inundating the inner wetland vegetation communities • Allow fish to move between the river, lake and estuary • Stimulate waterbug communities to breed for waterbird feeding • Dilute soil and surface water salts, and initiate the decomposition of organic matter	B1, CN1, F1, MI1, V1, WQ1, WQ2
Summer/autumn drawdown (December to May) (targeting 0.3 m AHD)	• Dry out wetland-fringing vegetation to reduce the potential waterlogging of saltmarsh communities to support germination • Expose mudflats and margins to provide feeding habitat for wading/migratory waterbirds • Manage reed colonisation of low-lying areas by allowing drying and saline groundwater intrusion to reduce reed growth • Support a drying phase for vegetation communities that require drying to grow and recruit • Restrict carp movement and access to habitat • Allow vegetation to decay and soils to oxidise and release nutrients to improve lake productivity and maintain biogeochemical processes • Enable surface water/groundwater interaction by allowing saline groundwater to discharge to the wetland bed	B1, CN1, F2, V2, V3, WQ2

Potential environmental watering action	Expected watering effects	Environmental objectives
Hospital Swamps		
Autumn/winter/ spring fill (April to November) and top-up as required (year-round) (targeting 0.5 m AHD)	• Maintain a mosaic of water depths and resources across the wetland, inundate various vegetation communities and create nesting, breeding and feeding opportunities for waterbirds, fish and waterbugs • Increase water levels to trigger fish spawning and waterbird breeding; high water levels will allow fish to access the wetland from the river • Increase freshwater to dilute the salt in the soil and surface water over winter • Initiate the decomposition of organic matter • Inundate the outer edges and margins to initiate the growth and maintain the condition of important wetland vegetation communities	B1, CN1, F1, MI1, V1, WQ1, WQ2
Summer/autumn drawdown (December to May) (targeting 0.1-0.3 m AHD)	• Dry out the wetland-fringing vegetation and expose mudflats and margins to support the feeding of wading/ migratory waterbirds • Manage reed colonisation of low-lying areas by allowing drying and saline groundwater intrusion to reduce reed growth • Support a drying phase for vegetation communities that require drying to grow and recruit • Restrict carp movement and access to habitat • Allow vegetation to decay and soils to oxidise and release nutrients to improve lake productivity and maintain biogeochemical processes • Enable the interaction of surface water and groundwater by allowing saline groundwater to discharge to the wetland bed	B1, CN1, F2, V2, V3, WQ2

Scenario planning

Table 3.7.4 outlines potential environmental watering and expected water use in a range of planning scenarios.

A 2020 independent review of environmental watering at the lower Barwon wetlands recommended that Reedy Lake be partially drawn down on average in three out of four years and Hospital Swamps partially drawn down in most years. It also recommended that the timing of planned drawdowns should be adapted to avoid disrupting significant waterbird breeding events.

Between 2019-20 and 2022-23, the Barwon catchment experienced consecutive years of wet conditions, which made it difficult to achieve successive planned drawdowns in the lower Barwon wetlands. The target drawdown at Reedy Lake has only been achieved twice since 2019-20. Hospital Swamps has been drawn down more frequently but remained full during 2022-23. Drawing both wetlands down is a high priority where possible in all planning scenarios in 2025-26 to achieve environmental objectives in line with the 2020 watering regime review.

Wetland filling is proposed to commence as early as April but can occur at any point until November. Further top-ups may be needed throughout the year to achieve and maintain target water levels, particularly if waterbirds are breeding, and to provide some variability. Planned drawdowns can commence from December and continue until the following May at the latest to mimic natural seasonal patterns, but they will be delayed where required to avoid disrupting breeding waterbirds.

The planned wetland drying may be difficult to carry out in the wet planning scenario, especially if there are multiple high-flow events in the Barwon River during summer and autumn. The planned wetland fill might also be difficult to achieve in the drought-dry planning scenario due to the wetland's potential disconnection from the Barwon River for long periods.

Table 3.7.4 Lower Barwon wetlands environmental watering planning scenarios

Planning scenario	Drought-dry	Average	Wet
Expected conditions	• Limited to no flow from the Barwon River in winter/spring • Disconnection between wetlands and the Barwon River for a long period • Natural drawdown may begin earlier than planned	• Some natural inflow from the Barwon River in winter/spring • More gradual lowering of water levels during drawdown	• Wetlands will be filled by overbank flow from the Barwon River • Stormwater inflow and local rain/run-off will provide regular top-ups • The proposed extent of drying of the wetland is unlikely
Reedy Lake			
Potential environmental watering – tier 1 (high priorities)	• Reedy Lake fill and top-up (as required) • Reedy Lake drawdown	• Reedy Lake fill and top-up (as required) • Reedy Lake drawdown	• Reedy Lake fill and top-up (as required) • Reedy Lake drawdown
Hospital Swamps			
Potential environmental watering – tier 1 (high priorities)	• Hospital Swamps fill and top-up (as required) • Hospital Swamps drawdown	• Hospital Swamps fill and top-up (as required) • Hospital Swamps drawdown	• Hospital Swamps fill and top-up (as required) • Hospital Swamps drawdown

SECTION 4: Western region

4.1 Western region overview

The systems in the western region that can receive water from the VEWH's environmental entitlements are *Bochara-Bogara-Pawur* (Glenelg River), the Wimmera River system and the Wimmera-Mallee wetlands. The Wimmera River system and Wimmera-Mallee wetlands are part of the Murray-Darling Basin, although *Barringgi Gadyin* (Wimmera River) ends in terminal lakes without directly flowing into the Murray River.

Water for the environment in the western region is supplied from the Wimmera-Mallee System Headworks, which is a series of on-stream reservoirs, off-stream storages and connecting channels that harvest water (mainly near the Grampians) and distribute it to entitlement holders throughout the Wimmera catchment and parts of the Avoca, Loddon, Glenelg and Mallee catchments.

The Wimmera and Glenelg systems share water available under the *Wimmera and Glenelg Rivers Environmental Entitlement 2010*, and the VEWH works with the Wimmera and Glenelg Hopkins CMAs to determine how the available allocation will be used in the river systems each year. Water for the environment available to the Wimmera-Mallee wetlands is provided under the same entitlement, and this water is available for use in the small wetlands supplied by the Wimmera-Mallee Pipeline across the Wimmera, Mallee and North Central CMA areas.

The Commonwealth Environmental Water Holder (CEWH) also holds entitlement in the Wimmera system that can be used to supply the Wimmera River and lower Mount William Creek.

The following system sections present the environmental values, objectives and planned actions for each system in the western region.

Traditional Owners in the western region

Traditional Owners and their Nations in the western region have deep connections to Country that have endured for tens of thousands of years. These include inherent rights and cultural obligations to Country and the community.

The Barengi Gadjin Land Council Aboriginal Corporation (BGLC), Gunditj Mirring Traditional Owners Aboriginal Corporation (GMTOAC) and the Eastern Maar Aboriginal Corporation are the Registered Aboriginal Parties (RAPs) under the Victorian *Aboriginal Heritage Act 2006* for the areas incorporating waterways covered by this section of the seasonal watering plan. They each also hold Native Title, and BGLC has a Recognition and Settlement Agreement with Victoria.

The Burrandies Aboriginal Corporation (based in South Australia) has connections to the western region.

Some sites that make up the Wimmera-Mallee wetlands are on the Country of the Dja Dja Wurrung people (Djaara), and on land of significance to the Barapa Barapa people. The Dja Dja Wurrung Clans Aboriginal Corporation (trading as DJAARA) is a RAP and has a Recognition and Settlement Agreement with the Victorian Government.

Engagement

Program partners engage extensively with Traditional Owners, stakeholders and local communities to understand community priorities for delivering water for the environment in the coming year and to understand how cultural, social, economic and recreational values, uses and objectives may be supported by delivering environmental flows, provided environmental outcomes are not compromised.

Engagement also informs environmental objectives in regional catchment and waterway strategies, environmental flows studies and environmental management plans.

Table 4.1.1 Program partners and stakeholders that engaged with the Glenelg Hopkins CMA to develop seasonal watering proposals and key documents informing the proposals for the Glenelg system (in alphabetical order)

Partner/stakeholder	Glenelg system
Community groups and environment groups	• Friends of the Glenelg River Inc. • Glenelg River User Group
Government agencies	• Department of Energy, Environment and Climate Action • Grampians Wimmera Mallee Water • Limestone Coast Landscape Board • Parks Victoria • Victorian Environmental Water Holder • Victorian Fisheries Authority • Wimmera CMA
Landholders/farmers	• Individual landholders
Local businesses	• Harrow Discovery Centre • Paestan Canoe Hire • Vickery Bros (sand extraction)
Recreational Users	• Casterton Angling Society Inc. • Dartmoor Angling CLUB • Individual anglers • Kayakers • VRFish
Traditional Owners/ Aboriginal corporations	• Barengi Gadjin Land Council • Burrandies Aboriginal Corporation • Gunditj Mirring Traditional Owner Corporation • Winda-Mara Aboriginal Corporation

Table 4.1.2 Program partners and stakeholders that engaged with the Wimmera CMA to develop seasonal watering proposals and key documents informing the proposals for the Wimmera system (in alphabetical order)

Partner/stakeholder	Wimmera system
Community groups and environment groups	• Friends of Bungalally and Burnt Creek Group • Lake Lonsdale Action Group • Yarriambiack Creek Advisory Committee
Government agencies	• Commonwealth Environmental Water Office • Department of Energy, Environment and Climate Action • Glenelg Hopkins CMA • Grampians Wimmera Mallee Water • Hindmarsh Shire Council • Horsham Rural City Council • Murray-Darling Basin Authority • Northern Grampians Shire Council • Parks Victoria • Victorian Fisheries Authority • Victorian Environmental Water Holder • Yarriambiack Shire Council
Landholders/farmers	• Wimmera community members, especially landholders and stock and domestic water users
Recreational users	• Dimboola Boat and Water Ski Club • Dimboola Fishing Classic • Dimboola Rowing Club • Field and Game • Hindmarsh Ski Club • Horsham Fishing Competition Inc. • Horsham Triathlon Committee • Jeparit Anglers Club • Natimuk Field and Gane • Natimuk Lake water ski club • Paddle Victoria • VRFish • Wimmera Anglers Association
Traditional Owners	• Barengi Gadjin Land Council

Table 4.1.3 Program partners and stakeholders that engaged with the Mallee, North Central and Wimmera CMAs to develop seasonal watering proposals and key documents informing the proposals for the Wimmera-Mallee wetlands (in alphabetical order)

Partner/stakeholder	Wimmera-Mallee wetlands
Community groups and environment groups	• Avon Plains Banyena Landcare Group • Birchip Landcare Group • Donald Landcare Group • Mallee CMA Aboriginal Reference Group • Mallee CMA Land and Water Advisory Committee • Wimmera Glenelg Storage Manager Reference Group • Wimmera Mallee Pipeline Wetlands Environmental Water Advisory Group • Wimmera Mallee Wetland Prioritisation Advisory Group
Government agencies	• Buloke Shire Council • Commonwealth Environmental Water Office • Department of Energy, Environment and Climate Action • Grampians Wimmera Mallee Water • Mildura Rural City Council • Parks Victoria • Victorian Environmental Water Holder • Yarriambiack Shire Council
Landholders/farmers	• Private landholders • Wimmera-Mallee Pipeline Environmental Water Advisory Group (North Central CMA)
Recreational users	• Natimuk & District Field & Game Inc. • Recreational users in the local community
Traditional Owners	• Barapa Barapa Nation Aboriginal Corporation • Barengi Gadjin Land Council • Dja Dja Wurrung Clans Aboriginal Corporation

Integrated catchment management

Altered water regimes are one of many threats to the health of Victoria's waterways. Many of the environmental objectives of water for the environment in the western region are complemented by simultaneously addressing issues such as barriers to fish movement, high nutrient loads, loss of streambank vegetation and invasive species.

Examples of complementary programs that support environmental flows outcomes in the western region include:

- fish passage works at Sandford Weir, Dergholm Gauge and Warrock are used in combination with environmental water delivery to facilitate the movement of migratory fish from the estuary to the upstream reaches of the Glenelg and Wannon rivers
- installation of artificial wetland pontoons in the Dimboola weir pool and a regulating structure to reconnect Langlands Anabranch in the Horsham weir pool, as well as walking tracks to manage recreational access along the Wimmera River to reduce bank erosion
- stock-exclusion fencing along priority waterways throughout the Wimmera and Glenelg catchments to support the re-establishment of streamside and in-stream vegetation
- restoration of complex habitat for native fish by installing large wood in reach 2 of the Glenelg River using red gum trunks and root-balls
- control of invasive species and stock-exclusion fencing in the Wimmera-Mallee wetlands.

For more information about integrated catchment management programs in the western region, refer to the Glenelg Hopkins, Mallee, North Central and Wimmera CMA's regional catchment strategies and regional waterway strategies.

Risk management

When developing seasonal watering proposals for the Glenelg, Wimmera and Wimmera-Mallee wetland systems, environmental watering program partners assessed risks associated with assessed risks associated with potential environmental water delivery in 2025-26 and identified appropriate mitigating strategies. Risks and mitigating actions are continually assessed by program partners throughout the year (see **subsection 1.2.7**).

Seasonal overview

Rainfall across the western region in 2024-25 was below average. In the Glenelg system, water for the environment was needed to help maintain a continuous flow from Rocklands Reservoir to the estuary from early November 2024 to June 2025. Total rainfall across the Wimmera system in 2024-25 was also below the long-term average, with only November and December 2024 reaching average monthly volumes. The Wimmera system had few natural events, and inflows to the catchment's storages were very low. Water for the environment was used in the MacKenzie River and Burnt Creek from early August 2024, initially to provide a low flow. However, with drying conditions and water availability from Wartook Reservoir diminishing, the focus in these waterways shifted to maintaining drought refuges. Water was also used to deliver a low flow and freshes in the Wimmera River from early October 2024. Small volumes of environmental water were delivered in upper Mount William Creek during October 2024 to top up refuges.

Water storages across the Wimmera-Mallee System Headworks were collectively at 55 per cent capacity at the start of 2024-25. They rose to about 57 per cent in early October 2024 and dropped to 39 per cent capacity in mid-April 2025. The *Wimmera and Glenelg Rivers Environmental Entitlement 2010* reached 19 per cent allocation in April 2025, but carryover of 57,560 ML provided the bulk of the available water. The CEWH did not receive any new allocation in the Wimmera system, but its carryover from 2023-24 was 16,150 ML. New allocation combined with carryover and accumulated passing flow meant about 84,000 ML of water for the environment was available in 2024-25 across the CEWH's and the VEWH's entitlements.

The Bureau of Meteorology has forecast average rainfall across the western region during winter 2025. At the time of writing, Grampians Wimmera Mallee Water had not issued an allocation outlook for 2025-26. However, given storage levels, the VEWH expects modest allocations in July 2025. The CEWH is not likely to receive any allocation in 2025-26 unless storage inflows are significantly above the long-term average. The VEWH and CEWH will be able to carry over water in the Wimmera and Glenelg rivers environmental entitlement and in the Wimmera-Mallee wetlands to help support environmental watering actions in 2025-26 and subsequent years if dry conditions develop and persist. Carryover requirements are regularly a key consideration in the western region, and they influence the range of environmental watering actions that are authorised and delivered.

The dry conditions experienced in 2024-25 and the summer 2024-25 bushfires in the Grampians and Little Desert national parks are expected to affect watering decisions in 2025-26 as we manage potentially poor water quality and seek to support the recovery of environmental values. This means that the priority of environmental watering actions might be adjusted throughout the year, depending on conditions. Maintaining the condition of native plant and animal communities in rivers and wetlands across the western region and improving their resilience remains a priority in 2025-26. The Glenelg Hopkins and Wimmera CMAs have planned potential environmental watering actions for 2025-26 to continue supporting recent improvements in environmental conditions, but can adapt according to conditions. The VEWH will monitor allocations and forecast climatic conditions during winter and spring and work with the Glenelg Hopkins and Wimmera CMAs to set a carryover target for 2026-27, if necessary.

The Wimmera-Mallee wetland portion of the environmental entitlement is only likely to receive an allocation in 2025-26 if storage inflows are close to or greater than the long-term average. The planned watering actions for the wetlands in 2025-26 are expected to use up to 392 ML of available carryover, which will leave about 193 ML to support watering actions in future years. The current supply for the Wimmera-Mallee wetlands may allow essential watering actions to at least the end of 2026-27 without new allocations.

4.2 Glenelg system

Waterway manager – Glenelg Hopkins Catchment Management Authority

Storage manager – Grampians Wimmera Mallee Water

Environmental water holder – Victorian Environmental Water Holder

System overview

The Glenelg River (*Bochara* in Dhauwurd Wurrung, *Pawur* in Bunganditj and *Bogara* in Wergaia-Jadawadjali languages) rises in *Gariwerd* (the Grampians National Park) and flows west through Harrow and then south to Casterton and Dartmoor (Figure 4.2.1). The Glenelg River estuary flows through South Australia for a short distance before returning to Victoria and flowing into the sea at Nelson. At over 500 km, the Glenelg River is one of the longest rivers in Victoria.

Moora Moora Reservoir and Rocklands Reservoir are Wimmera-Mallee System Headworks water storages in the Glenelg River system that contribute to the supply of water to towns and properties across the Wimmera, Mallee, Glenelg, Loddon and Avoca catchments. Water for the environment is actively managed in the Glenelg River below Rocklands Reservoir. There are passing flow rules for the Glenelg River and the upper Wannon River.

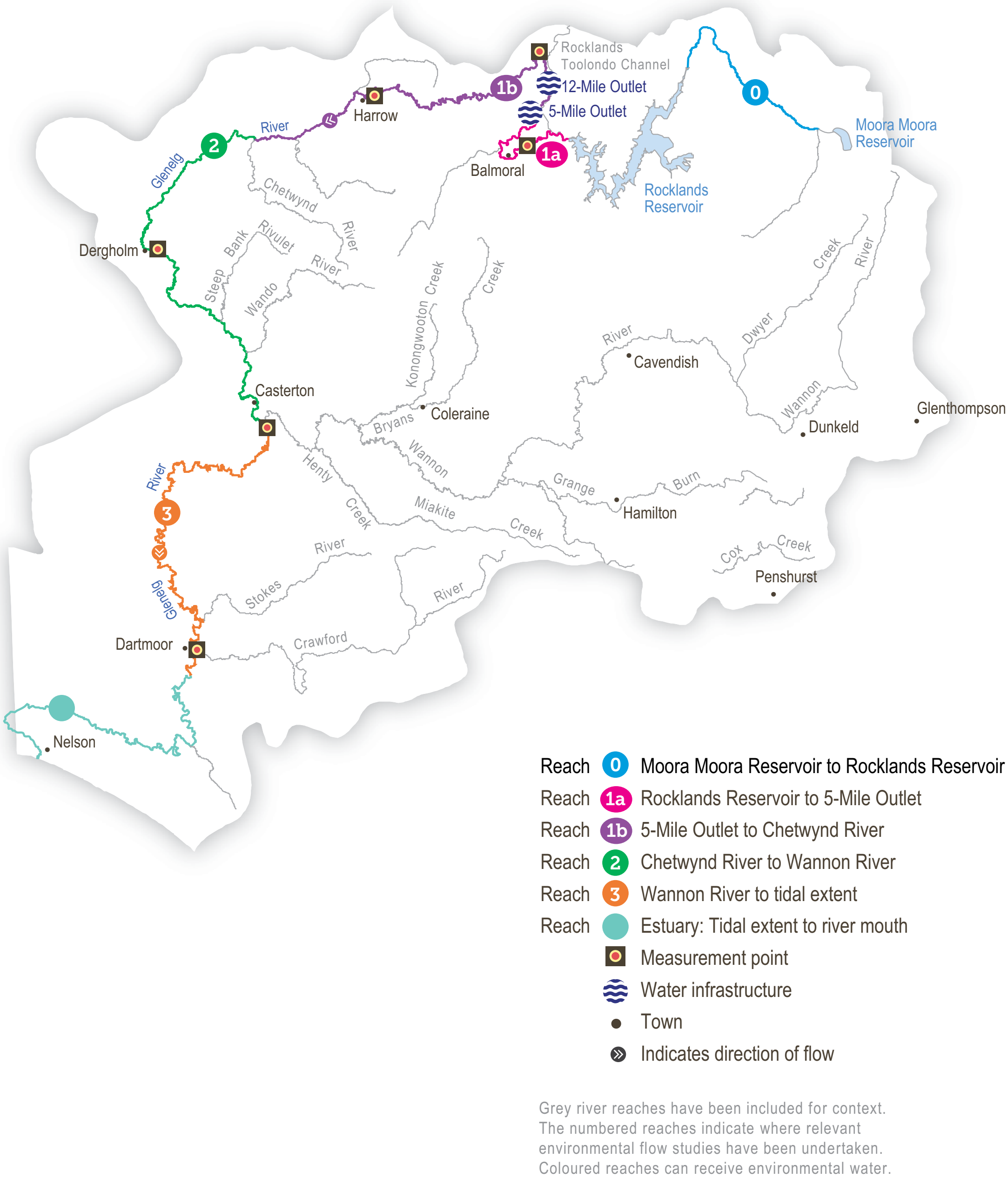
The priority reaches of the Glenelg River for deliveries of water for the environment are:

- Moora Moora Reservoir to Rocklands Reservoir (reach 0)
- Rocklands Reservoir to 5-Mile Outlet (reach 1a)
- 5-Mile Outlet to the confluence with the Chetwynd River (reach 1b)
- Chetwynd River to the Wannon River (reach 2)
- Wannon River to the tidal extent just below the confluence with Crawford River (reach 3).

Water for the environment in the Glenelg system is released from Moora Moora Reservoir for reach 0, Rocklands Reservoir for reach 1a via the reservoir wall outlet and for reaches 1b, 2 and 3 via the 5-Mile and 12-Mile outlets.

The Glenelg River estuary benefits from environmental flows released to upstream reaches, but releases do not currently target the estuary. The Glenelg Hopkins CMA has investigated the importance of water for the environment in the Glenelg River estuary, listed as a heritage river reach and a site of international significance under the Ramsar Convention. Environmental flows provide landscape-scale benefits that support estuarine values.

Figure 4.2.1 Glenelg system



Environmental values

The Glenelg River starts in *Gariwerd* (the Grampians National Park) and flows to the sea through the Lower Glenelg National Park. The lower reaches of the Glenelg River are part of a landscape recognised as one of 15 national biodiversity hotspots, and the Glenelg Estuary and Discovery Bay site was listed under the Ramsar Convention as a site of international significance in February 2018.

The Glenelg River supports a range of rare and unique aquatic life, including the endangered Glenelg freshwater mussel, Glenelg spiny crayfish and a newly described species of river blackfish. It is also home to platypus and populations of native fish, including estuary perch, short-finned eel, tupong and three species of pygmy perch, including the threatened variegated pygmy perch and Yarra pygmy perch. Some of these fish species migrate long distances to and from the Glenelg River estuary to complete their life cycles. Sand extraction currently occurs around the Casterton to Dergholm reaches to provide deep pools, habitats and drought refuge areas, important to fish species and the waterbugs that feed them.

Frasers Swamp is another important feature of the upper Glenelg system and is home to a healthy growling grass frog population. The swamp also meets the habitat requirements for the Australasian bittern, and investigations are underway to see if they use this habitat.

The Glenelg River supports a variety of streamside vegetation communities and species, including the endangered Wimmera bottlebrush. Streamside and floodplain vegetation comprises river red gum woodlands with paperbark, bottlebrush and tea tree understorey.

Environmental objectives in the Glenelg system

F1 – Protect, maintain, and, where possible, improve endemic fish populations, including threatened and diadromous species

G1 – Maintain deep pool habitats and connectivity along the river

MI1 – Maintain a wide range and large number of waterbugs to break down organic matter and support the river's food chain

PR1 – Maintain the platypus population

V1 – Maintain healthy and diverse mosaics of water-dependent vegetation (such as river red gums and Wimmera River bottlebrush)

V2 – Prevent the establishment of terrestrial plans in the stream bed

WQ1 – Maintain water quality for native fish, waterbugs, other water-dependent animals and aquatic vegetation

Traditional Owner cultural values and uses

The Glenelg River, known as *Bochara* in Dhauwurd Wurrung, *Pawur* in Bunganditj and *Bogara* in Wergaia-Jadawadjali languages, is a significant feature in the cultural landscape of south-west Victoria. The river features in Traditional Owner creation stories. It continues to be an important place for Traditional Owners, who have been custodians of the area for thousands of years, using the rich resources available along the river and the associated habitats.

Traditional Owners across the Glenelg catchment have retained a strong identity and connection to the traditional lands for which they have custodial rights and responsibilities. Cultural values in the Glenelg River system align strongly with environmental values. Cultural values are holistic and interrelated: they are bound up with the health of the river system overall and the Country of which the river is part. Traditional Owners' wellbeing is connected to the health of the river and of Country.

Gunditjmara Traditional Owners have identified that it is a priority to spend time on the river and increase cultural practices and connection to Country. They have highlighted the importance of increasing ceremonial and on-Country gatherings along the river, including at Casterton and the Glenelg Estuary.

The **Glenelg River Yarns website** was launched in late 2021 as part of the Glenelg River Cultural Flows project. The website shares cultural values and stories on a virtual tour and welcomes all visitors to Country.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Figure 4.2.2 Glenelg River Environmental Flow Seasonal Calendar

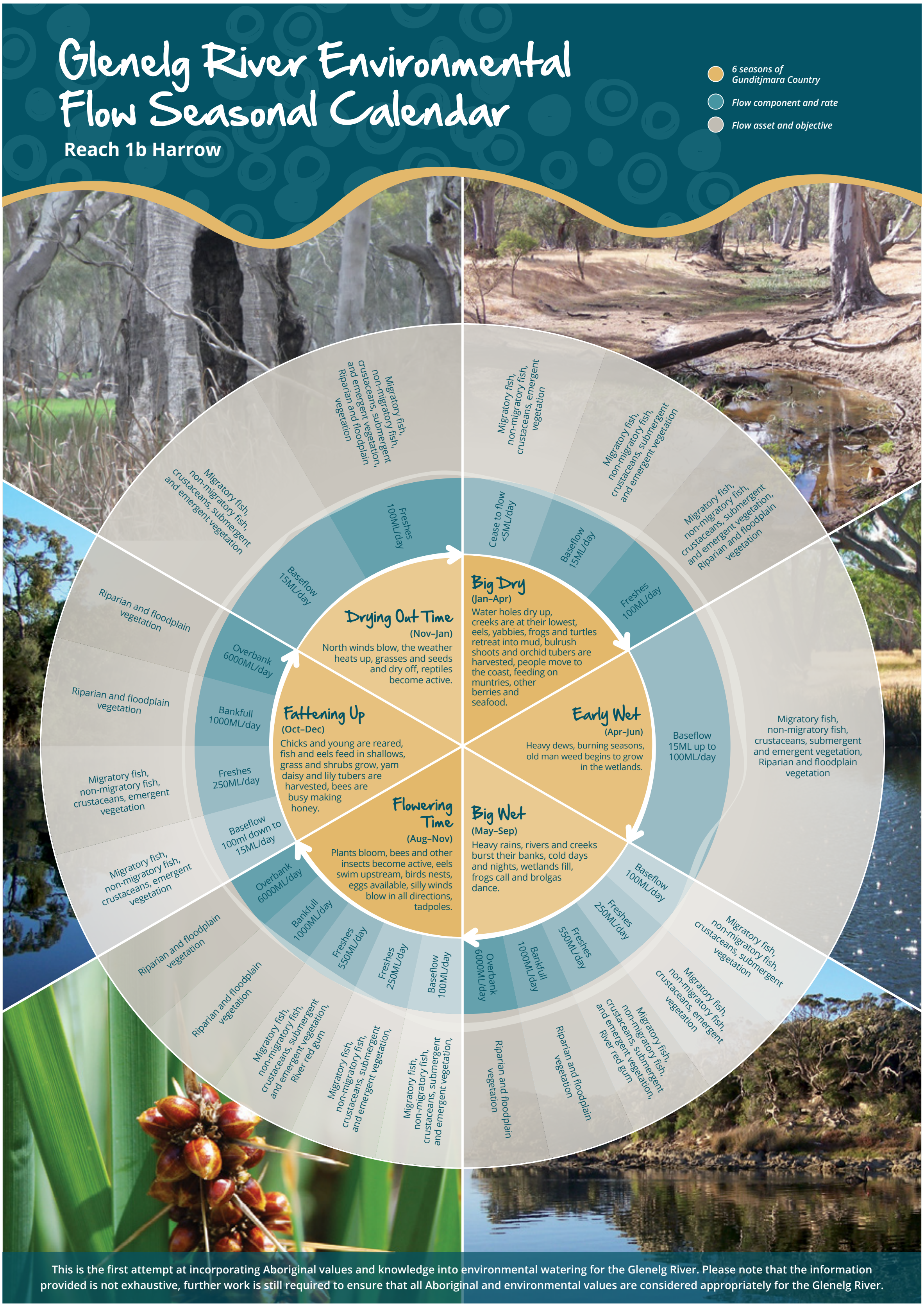


Figure 4.2.2 was produced by the Gunditj Mirring Traditional Owners Aboriginal Corporation and describes the six seasons of Gunditjmara Country.

The northern part of the river upstream of the Harrow area is in Jadawadjali Country, and the south-west part of the system is in Boandik Country. The calendar describes the six seasons alongside flow components for reach 1b of the Glenelg River — from 5-Mile Outlet to Chetwynd River — and aligns them with corresponding watering effects and objectives. The calendar reflects the seasonal flow conditions that all Glenelg River system Traditional Owner groups recognise.

The value of the calendar is in its clear visual depiction of Traditional Owners' knowledge, developed over many generations, of how varying flows correspond to seasonal conditions and broader environmental patterns. The six seasons will continue to be embedded in future environmental flows recommendations and scenario planning.

How proposed watering actions may support cultural values and uses

In planning for environmental flows in the Glenelg River, the Gunditj Mirring Traditional Owners Aboriginal Corporation, the Barengi Gadjin Land Council Aboriginal Corporation and the Burrandies Aboriginal Corporation, together with the Glenelg Hopkins CMA, have considered:

- supporting the health of cultural heritage sites (such as scar trees, ring trees, stone structures, middens and rock paintings) and native plants, which are sources of traditional foods and medicines
- that improving the health and abundance of totem species and their habitat by delivering water for the environment also benefits Traditional Owners' spiritual wellbeing
- supporting contemporary cultural events such as the Johnny Mullagh Cup, a cricket match in March each year; a summer fresh is delivered to support environmental outcomes, and it also supports this event on the river.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 4.2.1** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Social, recreational and economic values and uses

Water for the environment provides social, recreational and economic benefits for those who visit, live or work along the river system. Consultation with Glenelg River communities, landholders, businesses and users has identified and considered these values when planning and managing environmental water releases.

In planning the potential environmental watering actions in **Table 4.2.1**, the Glenelg Hopkins CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing and fishing)
- community events and tourism (such as the Johnny Mullagh Cup and visitation)
- socioeconomic benefits (such as stock needs and domestic use: water levels and water quality can rely on environmental water delivery, particularly in summer).

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 4.2.1** by an icon, as pictured below and also explained in **Figure 1.2.3**.

Environmental flows support the spawning and recruitment of popular angling species like estuary perch and bream. Local anglers continue to report increased fish activity associated with the delivery of freshes, improving fishing opportunities in the river. Releases also support numerous fishing competitions, including the annual Casterton Angling Society carp competition and the tandanus catfish competition, partnering with local angling clubs.

The timing of the summer/autumn fresh for the Glenelg River is planned to support the annual Johnny Mullagh Cup cricket match between Gunditj Mirring and Barengi Gadjin Traditional Owners.

Also, summer/spring freshes improve conditions at popular riverside campgrounds in the upper reaches of the Glenelg River, including Fulham Reserve near Balmoral and the Johnny Mullagh Reserve at Harrow. Summer freshes in the Glenelg River improve accessibility, water quality and amenity for canoeists planning trips on the river over the summer holiday period.

	Watering will also support angling activities
	Watering will also support water sports activities (e.g. canoeing, kayaking, rowing, swimming, water skiing)
	Watering will also support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

The Glenelg Hopkins CMA also manages the Glenelg River Compensation Flow, a consumptive entitlement. This entitlement can be used in conjunction with environmental water to provide a nominal flow for domestic and stock use, and for social and environmental purposes in the Glenelg River downstream of Rocklands Reservoir.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 4.2.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 4.2.1 Glenelg system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Winter/spring low flow in reach 1a (60 ML/day or natural during June to November)	• Maintain water quality for fish and waterbugs • Wet aquatic vegetation to maintain its condition and prevent encroachment by terrestrial species • Maintain shallow-water habitat for fish, waterbugs and platypus	F1, MI1, PR1, V1, V2
Winter/spring low flow in reach 1b (100 ML/day or natural during June to November)		
Winter/spring low flow in reach 2 (160 ML/day or natural during June to November)		
Winter/spring low flow in reach 3 (260 ML/day or natural during June to November)		

Potential environmental watering action	Expected watering effects	Environmental objectives
Winter/spring fresh(es) in reach 1b (one to five freshes of 250 ML/day for one to five days during June to November)	• Wet benches to improve the condition of emergent vegetation and vegetation on the riverbanks to support recruitment and growth, and maintain habitat diversity • Provide adequate water depth for fish passage and to cue fish movement • Encourage female platypus to select nesting burrows higher up the bank to reduce the risk of a greater flow later in the year, flooding burrows when juveniles are present • Scour sand from pools to improve the quality of fish habitat	F1 G1 PR1 V1, V2
Winter/spring fresh(es) in reach 2 (one to five freshes of 300 ML/day for one to five days during June to November)		
Winter/spring fresh(es) in reach 3 (one to two freshes of 150 ML/day for three days during June to November)		
Summer/autumn low flow in reach 1a (10 ML/day during December to May)	• Protect against a rapid decline in water quality in the low-flow period • Maintain edge habitats, pools and shallow-water habitat for fish, waterbugs and platypus • Maintain a near-permanently inundated wetted stream channel to promote the growth of in-stream vegetation and prevent encroachment by terrestrial plants	F1 PR1 V1, V2 WQ1
Summer/autumn low flow in reach 1b (15 ML/day during December to May)		
Summer/autumn low flow in reach 2 (25 ML/day during December to May)		
Summer/autumn low flow in reach 3 (80 ML/day during December to May)		

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow in reach 0 (0.5 ML/day during December to May)	• Maintain edge habitats, pools and shallow-water habitat for fish and waterbugs (western swamp crayfish) • Maintain a near-permanently wetted stream channel to promote the growth of in-stream vegetation and prevent encroachment by terrestrial plants	F1 MI1 V1, V2
Summer/autumn fresh(es) in reach 1a (one to two freshes of 60 ML/day for two to three days during December to May)	• Flush fine silt from the stream bed and hard substrate to improve the quality of the fish and waterbug habitat • Wet emergent vegetation on the lower banks to improve its condition • Flush pools to improve water quality and lower temperatures • Provide sufficient flow to allow native fish and platypus to access habitat	F1 G1 MI1 PR1 V1 WQ1
Summer/autumn fresh(es) in reach 1b (one to two freshes of 100 ML/day for two to three days during December to May)		
Summer/autumn fresh(es) in reach 2 (one to two freshes of 150 ML/day for two to three days during December to May)		
Summer/autumn fresh(es) in reach 3 (one to two freshes of 150 ML/day for three days each or natural during December to May)		
Summer/autumn fresh(es) in reach 0 (one to two freshes of 10 ML/day for three days each or natural during December to May)	• Wet emergent vegetation on the lower banks to improve its condition • Flush pools to improve water quality and lower temperatures • Provide sufficient flow to allow native fish to access habitat	F1 V1, V2 WQ1

Scenario planning

Table 4.2.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

Rainfall across the Glenelg catchment in 2024-25 was very much below average, and natural run-off did little to meet any actions for the water year. Environmental water releases over summer helped prevent the worst impacts of the drought conditions. However, there were still periods of below-target deliveries, due to dry conditions. These conditions also resulted in low inflows into headworks storage, with cumulative inflows below the 95 per cent probability of exceedance.

Environmental watering actions in the Glenelg River during 2025-26 will target reaches 1b and 2 because that is where managed flows can have the greatest environmental effect. The carryover supply of environmental water in 2025-26 will still allow a range of watering actions to be delivered in the Glenelg system for the third consecutive year, following the 2022 floods.

The priority environmental objectives for environmental flows in 2025-26 are to:

- maintain channel form and water quality
- maintain connectivity and provide migration opportunities for native fish
- support juvenile recruitment of native fish
- promote in-stream vegetation and edge habitat for waterbugs, fish and platypus
- prevent the establishment of terrestrial plants in the stream bed
- support reach 0 of the Glenelg River with environmental water releases, if conditions and water availability allow.

Delivering a summer/autumn low flow to maintain a continuous flow in reaches 1a, 1b and 2 is the highest-priority potential watering action in all planning scenarios. Monitoring has demonstrated that maintaining a continuous flow and avoiding cease-to-flow events is the most effective way of preventing declines in the abundance and condition of native fish and platypus populations in the Glenelg River. A summer/autumn low flow is the only environmental watering action proposed for reach 2 in the drought planning scenario. In the drought planning scenario, a fresh is not planned for reach 2 because it cannot be delivered with the forecast available supply and would likely have less environmental benefit than a flow delivered in reaches 1a and 1b. It could also be assumed that a fresh targeting 1b would still yield some benefit to reach 2 as it moved downstream. Water for the environment will not be used to deliver a low flow to reach 3 in any planning scenario. This is due to the distance from Rocklands Reservoir to reach 3, which would require excessive volumes of water to meet targets. Low-flow objectives in reach 3 are expected to be met by tributary inflows in average and wet conditions.

Summer/autumn freshes are the next-highest-priority potential watering action in the Glenelg River and are needed to vary the magnitude of the river's flow, support fish migration and meet water quality outcomes. In the drought planning scenario, one summer/autumn fresh is planned for reaches 1a and 1b, where they support the Glenelg River's most flow-sensitive environmental values. As water availability increases in the very dry to wet planning scenarios, an additional fresh and extending the magnitude of freshes to support reach 2 will be prioritised. All reaches, including reach 3, are planned to receive two freshes in the dry through to wet planning scenarios, as the available supply and natural inflows become greater.

Our limited ability to influence the flow in reach 3 in the drought and very dry planning scenarios presents a risk that the reach has undesirably long cease-to-flow events. Cease-to-flow events would contribute to water quality deteriorating, potentially leading to the disconnection of native populations and fish death events. The VEWH and waterway manager must accept this risk due to the water availability and deliverability limitations expected in these planning scenarios. Deliveries to reach 2 in these planning scenarios are expected to result in some through-flow to reach 3 and help maintain water quality in deeper pools, but this cannot be guaranteed.

Planned freshes in the dry through to wet planning scenarios and the maintenance of native species populations in upstream reaches provide the best support for these populations to rapidly recover through reach 3 after periods of drought and very dry conditions.

Environmental watering actions in reach 1a are greatly constrained by the hydraulic interactions of releases from the Rocklands Reservoir wall outlet and Frasers Swamp. Reach 1a is immediately downstream of Rocklands Reservoir, meaning it has little natural inflow and relies heavily on the mandated passing flow and managed environmental flows. However, large releases from Rocklands Reservoir can potentially flood private land adjacent to Frasers Swamp. Therefore, a winter/spring low flow is the largest flow proposed to be delivered to reach 1a in the average and wet planning scenarios if sufficient water is available. While larger releases would likely have an environmental benefit, they are not planned due to the risk of flooding private land.

A winter/spring low flow and freshes are likely to be met naturally in reaches 1b, 2 and 3 in average and wet conditions. Freshes trigger fish and platypus movement, wet vegetation higher up the banks and scour sand from some pool substrates to improve the quality of fish and waterbug habitat.

Water for the environment has been delivered occasionally to reach 0 in recent years. These releases have partly addressed specific environmental requirements and have also been used to help understand what flow magnitudes can be achieved via managed flow releases from Moora Moora Reservoir. A summer/autumn low flow may be delivered to reach 0 in 2025-26 in the very dry through to wet planning scenarios. This will support the recovery of reach 0 post-bushfire and further test environmental responses to managed releases. However, the reach 0 flow is a lower priority than planned deliveries to reaches 1a, 1b and 2 in the drought planning scenario.

During the proposal preparation process, the Glenelg Hopkins CMA used a flow delivery model to inform decisions about the volumes of environmental water required. The model cannot accurately predict the contribution of passing flow to proposed environmental watering actions. This contribution is potentially significant in the average and wet planning scenarios. Therefore, the volumes in **Table 4.2.2** will likely be greater than needed in average and wet planning scenarios.

Carryover will be vital to ensure sufficient water availability to deliver the highest-priority flows during summer and autumn 2026-27 if there are low allocations during the year. The VEWH will work with the Wimmera and Glenelg Hopkins CMAs to refine a carryover target for 2026-27, once winter and spring storage inflows are known and the potential resource outlook for the following year is clear.

Table 4.2.2 **Glenelg system environmental watering planning scenarios**

Planning scenario	Drought	Very dry	Dry	Average	Wet
Expected conditions	• Little to no inflows to headworks storages • Low to no passing flow for the year • Limited natural run-off year-round and a complete dependence on environmental water over summer/autumn	• Some inflows to storages creating allocations • A small amount of passing flow available • Natural run-off might support winter/spring baseflow targets in the lower reaches	• Better inflows to storages, offsetting any water used for the year and reducing the need to preserve carryover volumes • Passing flow available to support the upper reaches • Natural flow achieves several winter/spring targets and supports lower reaches over summer	• Good inflows to storage, creating good allocations • Passing flow available to support environmental water releases well into summer/autumn • Natural flow meets most winter/spring targets and even meets summer/autumn actions	• Storages spilling and full allocations • Passing flow available to support environmental water releases well into summer/autumn • Natural flow meets most winter/spring targets and even meets summer/autumn actions
Expected availability of water for the environment[1]	• 38,204 ML	• 43,883 ML	• 57,673 ML	• 71,058 ML	• 78,764 ML

Planning scenario	Drought	Very dry	Dry	Average	Wet
Glenelg River – reach 1a					
Potential environmental watering – tier 1 (high priorities)	• Summer/ autumn low flow • Summer/ autumn fresh (one fresh)	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)
Potential environmental watering – tier 2 (additional priorities)	• Summer/ autumn fresh (one fresh) • Winter/ spring low flow	• Winter/ spring low flow	• Winter/ spring low flow	• N/A	• N/A
Glenelg River – reach 1b					
Potential environmental watering – tier 1 (high priorities)	• Summer/ autumn low flow • Summer/ autumn fresh (one fresh)	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Winter/ spring freshes (three freshes) • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Winter/ spring freshes (three freshes) • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)
Potential environmental watering – tier 2 (additional priorities)	• Summer/ autumn fresh (one fresh) • Winter/ spring fresh (one fresh) • Winter/ spring low flow	• Winter/ spring fresh (one fresh) • Winter/ spring low flow	• Winter/ spring freshes (two freshes) • Winter/ spring low flow	• Winter/ spring low flow	• N/A

Planning scenario	Drought	Very dry	Dry	Average	Wet
Glenelg River – reach 2					
Potential environmental watering – tier 1 (high priorities)	• Summer/ autumn low flow	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Winter/ spring freshes (three freshes) • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Winter/ spring freshes (five freshes) • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)
Potential environmental watering – tier 2 (additional priorities)	• Summer/ autumn freshes (two freshes) • Winter/ spring low flow • Winter/ spring fresh (one fresh)	• Winter/ spring low flow • Winter/ spring fresh (one fresh)	• Winter/ spring low flow • Winter/ spring freshes (two freshes)	• Winter/ spring low flow	• Winter/ spring low flow
Glenelg River – reach 3					
Potential environmental watering – tier 1 (high priorities)	• N/A	• N/A	• Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Winter/ spring freshes (two freshes) • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Winter/ spring low flow • Winter/ spring freshes (two freshes) • Summer/ autumn low flow • Summer/ autumn freshes (two freshes)
Potential environmental watering – tier 2 (additional priorities)	• Summer/ autumn freshes (two freshes)	• Summer/ autumn freshes (two freshes)	• N/A	• N/A	• N/A

Planning scenario	Drought	Very dry	Dry	Average	Wet
Glenelg River – reach 0					
Potential environmental watering – tier 1 (high priorities)	• N/A	• Summer/ autumn low flow	• Summer/ autumn low flow	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)
Potential environmental watering – tier 2 (additional priorities)	• Summer/ autumn low flow • Summer/ autumn freshes (two freshes)	• Summer/ autumn freshes (two freshes)	• Summer/ autumn freshes (two freshes)	• N/A	• N/A
Possible volume of water for the environment required to achieve objectives	• 11,781 ML (tier 1) • 42,177 ML (tier 2)	• 12,010 ML (tier 1) • 40,128 ML (tier 2)	• 13,635 ML (tier 1) • 38,503 ML (tier 2)	• 25,843 ML (tier 1) • 32,265 ML (tier 2)	• 26,159 ML (tier 1) • 30,133 ML (tier 2)
Priority carryover requirements for 2026-27	• The VEWH will work with the Wimmera and Glenelg Hopkins CMAs to refine a carryover target for 2026-27 once winter and spring storage inflows are known and the potential resource outlook for the following year is clear.				

1 Volume represents the available water for the Wimmera and Glenelg systems under the shared *Wimmera and Glenelg Rivers Environmental Entitlement 2010* and is the sum of carryover and estimated new allocations

4.3 Wimmera system

Waterway manager – Wimmera Catchment Management Authority

Storage manager – Grampians Wimmera Mallee Water

Environmental water holders – Victorian Environmental Water Holder and Commonwealth Environmental Water Holder

System overview

***Barringgi Gadyin* (Wimmera River) rises in the Pyrenees Ranges near Elmhurst and flows through Horsham, Dimboola and Jeparit before terminating at Lake Hindmarsh, which is Victoria's largest freshwater lake and the first of a series of terminal lakes. The Wimmera River receives flows from several regulated tributaries, including the MacKenzie River, Mount William Creek and Burnt Creek (Figure 4.3.1). These tributaries, plus Bungalally Creek and the Wimmera River below Mount William Creek, can receive water for the environment. In exceptionally wet periods, Lake Hindmarsh will overflow into Outlet Creek and then to Lake Albacutya, an internationally recognised Ramsar-listed wetland. Many wetlands beyond Lake Albacutya have not filled with water for decades.**

Water in the Wimmera system is stored in three on-stream reservoirs (Lake Wartook on the MacKenzie River, Lake Lonsdale on Mount William Creek and Lake Bellfield on Fyans Creek) and in several off-stream storages (Taylors Lake, Lake Fyans and Toolondo Reservoir). A channel system enables water to be moved between storages. Water can also be transferred from Rocklands Reservoir in the Glenelg system to the Wimmera system via the Rocklands-Toolondo Channel and from Moora Moora Reservoir via the Moora Channel. The connected storages and channels are collectively called the Wimmera-Mallee System Headworks. Water harvested in the system headworks is used for town, stock and domestic supply throughout the Wimmera catchment and parts of the Avoca, Hopkins, Loddon, Glenelg and Mallee catchments. Passing flows are provided to the Wimmera River and lower Mount William and Fyans creeks.

Priority reaches in the Wimmera system that can receive water for the environment are Wimmera River reaches 3 and 4, MacKenzie River reaches 2 and 3, upper and lower Mount William Creek, upper and lower Burnt Creek and Bungalally Creek.

Yarriambiack Creek is a distributary of the upper Wimmera River that would have naturally received a flow during high-flow or flood events. Lower reaches of the Wimmera River have priority for environmental water, which means no water is diverted for environmental watering to this creek. Grampians Wimmera Mallee Water provides recreational entitlements via the Wimmera-Mallee Pipeline to the creek at the Warracknabeal, Brim and Beulah weir pools.

The flow in the downstream reach of the Wimmera River is intermittent and experiences regular cease-to-flow episodes. During 2026, four drought refuges in the main channel of reach 4 of the Wimmer River — at Lochiel, Arkona, Antwerp and Tarranyurk — are expected to be connected to the Wimmera-Mallee Pipeline network to support downstream reaches during cease-to-flow episodes and increase the rate of recovery. Connection of these sites to the pipeline will allow for the efficient delivery of water to them when conditions don't allow us to maintain flows from headworks storages.

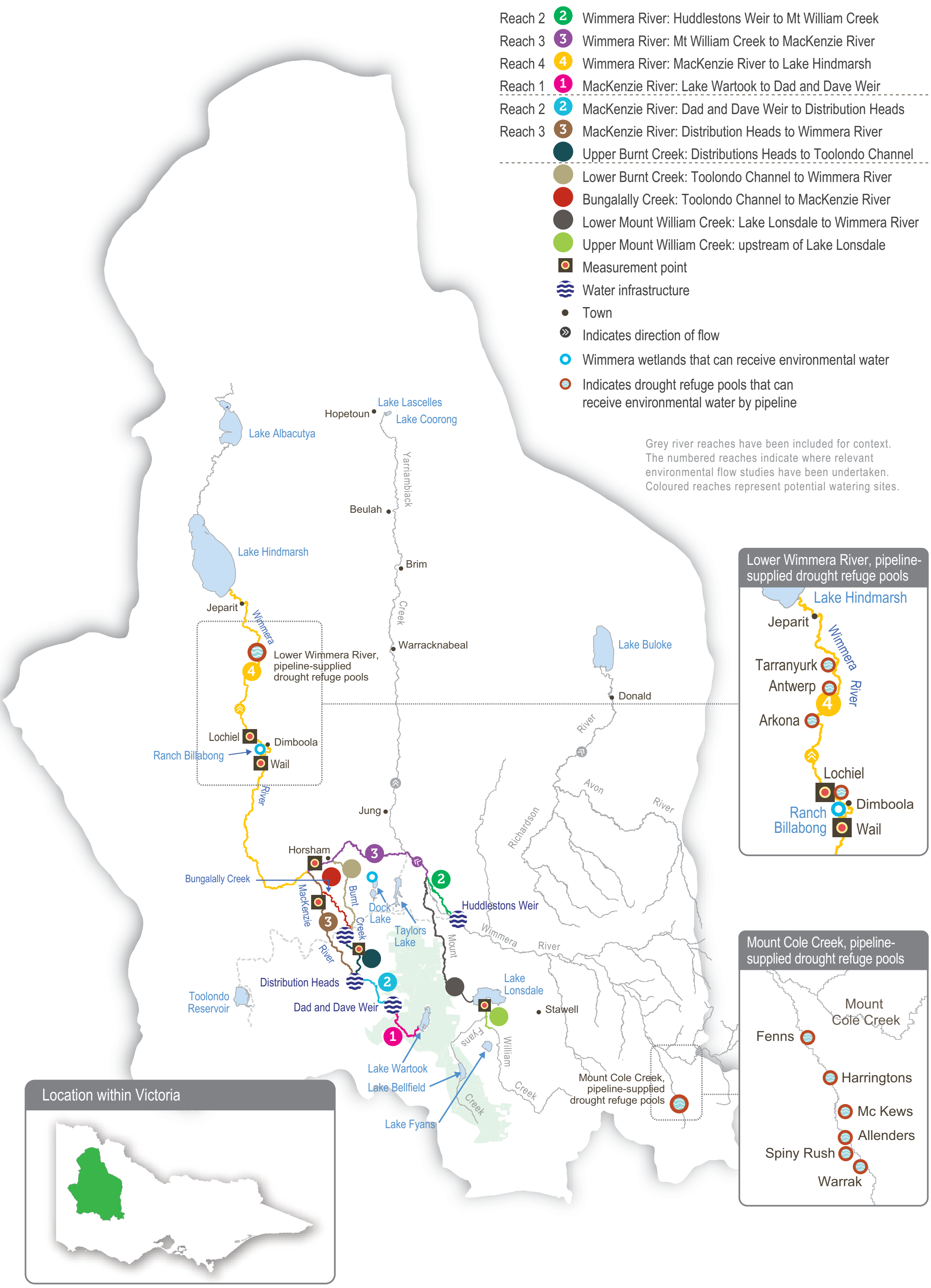
Downstream of Jeparit, the Wimmera River reaches the terminal lakes, including Lake Hindmarsh, a wetland of national significance and Lake Albacutya, recognised internationally under the Ramsar Convention. These lakes do not usually receive environmental water but rely mainly on passing flow and/or unregulated flows to provide suitable inundation to achieve environmental outcomes. However, in a wet year, regulated releases are of some value for raising the levels of terminal lakes and improving environmental outcomes.

Dock Lake, near Horsham, would have naturally filled via spills from nearby Green Lake when there was significant run-off from the northern edge of the Grampians. In the 1930s, Dock Lake was modified to allow it to be used as a water storage for irrigation supply in the Wimmera-Mallee system. Dock Lake was removed from the supply system after the Wimmera-Mallee Pipeline was completed in 2010. Water can be delivered to Dock Lake from Green Lake via a gravity-fed channel when there is sufficient water in Green Lake.

Ranch Billabong, near Dimboola, is an anabranch of the Wimmera River at Dimboola. It is on land managed by Barengi Gadjin Land Council Aboriginal Corporation. The anabranch was disconnected from the Wimmera River by changes to a road that traverses land between the river and the billabong. Restoring elements of the natural water regime at Ranch Billabong aims to improve habitat for native animal and plant communities and is an important outcome for Traditional Owners.

Mt Cole Creek is an upper tributary of the Wimmera River, high in the upper catchment. Construction of the East Grampians Rural Pipeline is planned to start in 2026 with the source of water from Lake Fyans. This new pipeline and planned connection of Mt Cole Creek near Warrak is expected to allow for the delivery of small volumes of environmental water to support up to six drought refuge pools between Warrak and the Ararat-St Arnaud Road.

Figure 4.3.1 Wimmera system



Environmental values

The Wimmera River supports abundant native fish populations, including one of Victoria's few self-sustaining populations of freshwater catfish. The Wimmera River also supports native waterbird, turtle, frog and rakali (water rat) populations.

The MacKenzie River contains the only confirmed remaining platypus population in the Wimmera system and supports locally important populations of native fish, including river blackfish and southern pygmy perch. It also supports populations of threatened Glenelg spiny crayfish, western swamp crayfish and turtles, as well as the critically endangered Wimmera bottlebrush. Managed releases from Lake Wartook for urban supplies and an environmental flow maintain flows in reaches 2 and 3 of the MacKenzie River and provide refuges for regionally important populations during dry periods.

Vegetation along Burnt and Bungalally creeks provides habitat corridors for terrestrial wildlife. Upper Burnt Creek contains an important native fish community and a threatened western swamp crayfish population, which is also becoming established in lower Burnt Creek. Mount William Creek supports regionally important populations of obscure galaxias, southern pygmy perch and rakali (water rats).

Dock Lake is a natural wetland that was modified and used as part of the Wimmera-Mallee System Headworks until 2010. When wet, Dock Lake provides feeding and breeding habitat for large numbers of waterbirds and frogs.

Ranch Billabong is a small wetland near Dimboola that supports river redgums, various aquatic plant species, waterbirds and frogs. It also includes a range of culturally significant plant species (such as sneezeweed). This site was affected by recent fires, with about 30 per cent of the trees that surround the billabong affected.

Mt Cole Creek is a tributary in the upper Wimmera catchment that supports western swamp crayfish and rakali (water rats) as well as many fish species, including southern pygmy perch, obscure galaxias and flathead gudgeon.

In very high-flow periods, the Wimmera River discharges to Lake Hindmarsh and Lake Albacutya, large sub-terminal lakes. Lake Albacutya is a Ramsar-listed wetland, and Lake Hindmarsh is Victoria's largest freshwater lake. Both provide significant habitat for waterbirds when wet.

When conditions are very dry and the Wimmera River diminishes to a series of disconnected pools, the pockets of permanent water that can be supplied via the pipeline network allow the maintenance of high-quality water in refuges for aquatic and terrestrial plants and animals. If appropriate water levels, quality and conditions can be maintained in these refuges during dry periods, they provide essential habitat for water-dependent species (such as fish, algae, wetland plants and waterbugs), maintaining populations until wetter conditions return and allow the survivors to disperse.

Environmental objectives in the Wimmera system

A1 – Maintain frog populations by providing feeding and breeding habitat

B1 – Maintain waterbird populations by providing roosting, feeding and breeding habitat in floodplain wetlands

F1 – Protect and increase native fish populations, including one of Victoria's few self-sustaining freshwater catfish populations

G1 – Maintain the channel's capacity and diversity

MI1 – Increase the abundance and diversity of waterbugs to break down dead organic matter and support the waterway's food web

MI2 – Maintain crayfish populations by providing feeding and breeding habitat

PR1 – Increase the abundance and distribution of platypus populations by providing places to breed and feed, as well as opportunities for juveniles to disperse

T1 – Maintain turtle populations by providing feeding and breeding habitat

V1 – Maintain the condition, abundance and diversity of native aquatic, emergent and streamside vegetation

V2 – Prevent the establishment of terrestrial plans in the stream bed

WQ1 – Maintain water quality to provide suitable conditions for waterbugs, native fish and other water-dependent animals and plants

Traditional Owner cultural values and uses

The Wimmera's waterways are the lifeblood of the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk people, collectively known as the Wotjobaluk Nations and represented by the Barengi Gadjin Land Council Aboriginal Corporation (BGLC).

In August 2022, the Victorian Government and the Wotjobaluk Nations entered into a Recognition and Settlement Agreement. In the agreement, the Victorian Government recognised that the Wotjobaluk Nations have a special relationship with *Barringgi Gadyin*, and that the river has a central place in their culture. The Victorian Government acknowledged in the agreement the aspirations of the Traditional Owners regarding water, including to monitor and manage cultural and environmental flows associated with waterways. In December 2005, the Federal Court made its first determination that native title existed in south-east Australia, including in much of the lower *Barringgi Gadyin*.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

In planning for environmental flows in *Barringgi Gadyin*, BGLC and the Wimmera CMA work together to support cultural objectives and values, including supporting contemporary cultural events (such as the Wimmera River Challenge).

Environmental flows may be planned to align with cultural benefits so long as environmental outcomes are not compromised. In the Wimmera system, the Wimmera CMA and BGLC work in partnership to support cultural values at Ranch Billabong. Works to permanently reconnect the Wimmera River to the Ranch Billabong anabranch have been completed, with infrastructure installed to permanently reconnect *Barringgi Gadyin* to the Ranch Billabong anabranch. This infrastructure, which BGLC manages, improves water flow and water quality into the billabong and improves BGLC's capacity to manage the site and reinstate a more natural flow regime. The delivery of water at Ranch Billabong aims to provide a more natural flooding regime, restore indigenous plant species (such as old man weed and sneezeweed) and animal habitats, control selected weed species and improve amenity and suitability for gatherings and events (such as earth oven and bark canoe cultural activities). If the river flow is too low to connect via the new infrastructure, pumping water for the environment remains a management option.

Environmental flows during the past five years have improved water quality and vegetation condition, consistent with the cultural objectives of the Traditional Owners. BGLC manages the site and has controlled weed species and enhanced accessibility by building walking tracks and culvert crossings around the billabong.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 4.3.1** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 4.3.1**, the Wimmera CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, fishing, rowing and water skiing)
- riverside recreation and amenity (such as birdwatching, cycling, running and walking)
- community and tourism events (such as fishing competitions at Dimboola, Jeparit and Horsham; rowing at Dimboola; the Kannamaroo Festival at Horsham, including the Wimmera River Duck Race; the Wimmera River Park Run; and the Peter Taylor Memorial Barefoot Water Ski Tournament and Night Jump at Dimboola)

- supporting small businesses, including chartered river cruises, pop-up food vendor caravans and general visitation
- socioeconomic benefits (such as for diverters for irrigation, stock needs and domestic use; water levels and water quality, which can rely on environmental water delivery, particularly in summer; and associated tourism events).

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 4.3.1** by an icon, as pictured opposite and also explained in **Figure 1.2.3**. This includes when the Wimmera CMA, in consultation with stakeholders, refrains from releasing environmental water from water storages at peak recreational times. It does so only when this does not compromise environmental outcomes in Wimmera waterways to ensure maximum water levels in these storages.

Water for the environment can temporarily raise water levels in Horsham, Dimboola and Jeparit weir pools to improve conditions for community events, including fishing competitions and water skiing and rowing events. Water for the environment held in the weir pools is released after community events to support environmental objectives further downstream when required.

	Watering will also support angling activities
	Watering will also support water sports activities (e.g. canoeing, kayaking, rowing, swimming, water skiing)

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 4.3.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 4.3.1 Wimmera system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Wimmera River – reach 4		
Winter/spring low flow (5-30 ML/day during June to November)	• Maintain access to habitat for native fish, waterbugs and in-stream vegetation At 30 ML/day, the effects above plus: • an increased-magnitude low flow will allow for this action to reach lower parts of the reach and open increasing areas of habitat • flow variability to maintain habitat diversity	F1 MI1 V1
Small winter/spring fresh(es) (one to five freshes of 70 ML/day for one to four days during June to November)	• Increase water depth to provide a stimulus for fish movement • Provide flow variability to maintain water quality and fish habitat diversity • Prevent a decline in water quality by flushing pools during periods of low flow	F1 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Medium winter/ spring fresh(es) (one to three freshes above 200 ML/day for one to three days during June to November)	• Provide variable flow during the high-flow season for fish movement • Provide flow variability to maintain water quality and fish habitat diversity • Wet lower benches, entrain organic debris and maintain habitat for waterbugs and fish • Flush surface sediments from hard substrates to support waterbugs	F1 MI1 WQ1 V1
Large winter/spring fresh(es) (one to two freshes of above 500 ML/day during June to November)	• Cue fish spawning and movement	F1
Summer/autumn low flow (15 ML/day or natural during December to May)	• Maintain edge habitats in deeper pools and in-stream habitat to support native fish populations and waterbugs • Maintain soil moisture for streamside vegetation and a near-permanently inundated stream channel for aquatic vegetation • Prevent the growth of terrestrial plants in the stream bed	F1 MI1 V1, V2
Summer/autumn fresh(es) (one to three freshes of 70-100 ML/day for two to seven days during December to May)	• Flush pools to prevent a decline in water quality and to maintain habitat for fish and waterbugs • Provide fish passage to allow fish to move through the reach	F1 WQ1 MI1
Year-round, pipeline-supplied drought refuge top-ups (Lochiel, Arkona, Antwerp and Tarranyurk)	• Maintain edge and shallow-water habitat for native fish and waterbugs • Maintain water quality • Maintain soil moisture for streamside vegetation	F1 MI1, MI2 WQ1 V1

Potential environmental watering action	Expected watering effects	Environmental objectives
MacKenzie River – reach 2		
Winter/spring low flow (2-27 ML/day during June to November)	• Maintain a near-permanently inundated stream channel for aquatic vegetation and prevent the growth of terrestrial plants in the stream bed Above 10 ML/day, the effects above plus: • maintain edge habitats and deeper pools and runs for waterbugs and platypus • maintain soil moisture for streamside vegetation • maintain pool habitat for native fish and crayfish populations	F1, MI1, MI2, PR1, V1, V2
Winter/spring freshes (one to five freshes of 15-55 ML/day for two to seven days during June to November)	• Maintain soil moisture for streamside vegetation At 55 ML/day, the effects above plus: • stimulate fish movement by increasing flow rates and water depth, and increase habitat availability for platypus and waterbugs • flush pools to prevent a decline in water quality	F1, MI1, MI2, PR1, WQ1
Summer/autumn low flow (2-10 ML/day during December to May)	• Maintain edge habitats and deeper pools and runs for waterbugs and platypus • Maintain soil moisture for streamside vegetation and a near-permanently inundated stream channel for aquatic vegetation, and prevent the growth of terrestrial plants in the stream bed • Maintain pool habitat for native fish and crayfish populations	F1, MI1, MI2, PR1, V1, V2
Summer/autumn freshes (one to four freshes of 5-50 ML/day for two to seven days each during December to May)	• Flush pools to prevent a decline in water quality At 50 ML/day, the effects above plus: • provide variable flow during the low-flow season for waterbugs (over wood debris to increase biofilm abundance as a food source) and fish movement • maintain water quality and habitat diversity	F1, PR1, WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
MacKenzie River – reach 3		
Winter/spring low flow (2-10 ML/day during June to November)	• Maintain a near-permanently inundated stream channel for aquatic vegetation and prevent the growth of terrestrial plants in the stream bed At 10 ML/day, the effects above plus: • maintain edge habitats and deeper pools and runs for waterbugs and platypus • maintain soil moisture for streamside vegetation • maintain pool habitat for native fish and crayfish populations	F1 MI1, MI2 V1, V2
Winter/spring freshes (three to five freshes of 35 ML/day for two to seven days during June to November)	• Stimulate fish movement • Maintain water quality and habitat diversity	F1 WQ1
Summer/autumn low flow (2-10 ML/day during December to May)	• Maintain a near-permanently inundated stream channel for aquatic vegetation and prevent the growth of terrestrial plants in the stream bed At 10 ML/day, the effects above plus: • maintain edge habitats and deeper pools and runs for waterbugs and platypus • maintain soil moisture for streamside vegetation • maintain pool habitat for native fish and crayfish populations	F1 MI1, MI2 V1, V2
Summer/autumn freshes (three or four freshes of 35 ML/day for two to seven days during December to May)	• Provide variable flow during the low-flow season for waterbugs and fish movement • Maintain water quality and habitat diversity	F1 MI1, MI2 WQ1
Upper Burnt Creek		
Year-round low flow (1 ML/day)	• Maintain edge habitats and shallow-water habitat for waterbugs • Maintain soil moisture for streamside vegetation and a near-permanently inundated stream channel for aquatic vegetation, and prevent the growth of terrestrial plants in the stream bed • Maintain a sufficient area of pool habitat for native fish and crayfish populations • Maintain water quality	F1 MI1, MI2 WQ1 V1, V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Winter/spring fresh(es) (one to five freshes of 15-60 ML/day for three to seven days during June to November)	• Maintain soil moisture for streamside vegetation and a near-permanently inundated stream channel for aquatic vegetation, and prevent the growth of terrestrial plants in the stream bed • Allow fish to move throughout the reach Above 30 ML/day, the effects above plus: • flush sediments from hard substrates to increase biofilm production and food for waterbugs • maintain edge habitats and shallow-water habitat for waterbugs	F1 MI1, MI2 V1, V2
Summer/autumn fresh(es) (one to three freshes of 15-30 ML/day for two to seven days during December to May)	• Prevent a decline in water quality by flushing pools in the low-flow season • Allow fish to move throughout the reach • Flush sediments from hard substrates to increase biofilm production and food for waterbugs	F1 MI1, MI2 WQ1
Lower Burnt Creek		
Freshes (four freshes of 15 ML/day for three to seven days at any time)	• Inundate streamside vegetation to maintain plant condition and facilitate recruitment • Move organic debris in the channel to support waterbugs • Maintain the structural integrity of the channel • Maintain water quality • Maintain a sufficient area of pool habitat for native fish and crayfish populations	F1 MI1, MI2 WQ1 V1, V2 G1
Bankfull fresh (one fresh of 45 ML/day for two days at any time)	• Inundate streamside vegetation to maintain plant condition and facilitate recruitment • Move organic debris in the channel to support waterbugs • Maintain the structural integrity of the channel and prevent the loss of channel capacity	MI1 V1 G1
Bungalally Creek		
Bankfull fresh (one fresh of 60 ML/day for two days at any time)	• Inundate the streamside zone to maintain its condition and facilitate the recruitment of streamside vegetation communities • Maintain the structural integrity of the channel and prevent the loss of channel capacity	V1 G1

Potential environmental watering action	Expected watering effects	Environmental objectives
Lower Mount William Creek		
Winter/spring freshes (three to seven freshes of 30-40 ML/day for two to seven days during July to November)	• Maintain edge habitats and shallow-water habitat for waterbugs and endemic fish • Maintain soil moisture for streamside vegetation and a near-permanently inundated stream channel for aquatic vegetation, and prevent the growth of terrestrial plants in the stream bed • Maintain water quality	F1, MI1, MI2, WQ1, V1, G1
Winter/spring fresh(es) (one to five freshes of 100 ML/day for three to seven days during June to November)	• Wet benches to entrain organic debris and allow native fish to move throughout the reach • Flush surface sediments from hard substrates to support waterbugs • Inundate the streamside zone to maintain its condition and facilitate the recruitment of streamside vegetation communities • Improve water quality	F1, MI1, MI2, WQ1, V1
Summer/autumn freshes (three freshes of 30-50 ML/day for seven days during December to May)	• Prevent a decline in water quality by flushing pools during low flow • Provide a variable flow and allow the movement of fish and waterbugs throughout the reach during the low-flow season	F1, MI1, MI2, WQ1
Upper Mount William Creek		
Top-up of pools (summer/autumn)	• Maintain edge and shallow-water habitat for native fish and waterbugs • Maintain water quality	F1, MI1, MI2, WQ1
Dock Lake		
Winter/spring partial fill	• Trigger the growth and germination of wet-phase wetland vegetation communities • Support feeding and breeding habitat for waterbirds, frogs, waterbugs and turtles	F1, MI1, MI2, WQ1, V1, B1, T1

Potential environmental watering action	Expected watering effects	Environmental objectives
Ranch Billabong		
Top-ups (winter/ spring and summer/ autumn)	• Inundate wetland vegetation to maintain plant condition and facilitate recruitment • Improve water quality for turtles, fish, frogs and waterbirds	WQ1 V1
Mt Cole Creek drought refuge pools		
Year-round, pipeline-supplied drought refuge top-ups	• Maintain edge and shallow-water habitat for native fish and waterbugs • Maintain water quality	F1 MI1, MI2 WQ1

Scenario planning

Table 4.3.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

Rainfall across the Wimmera catchment in 2024-25 was very much below the long-term average. Low natural river flows meant environmental water was used to target actions planned for delivery in the very dry planning scenario. Very dry conditions and blue-green algae outbreaks in Lake Lonsdale and Taylors Lake diminished the ecological value of environmental water carried over in 2024-25 to Wimmera system waterways. The recovery of catchments after fires across large areas of the Grampians and Little Desert national parks in summer 2024-25 is expected to be an important factor in water availability and quality in 2025-26, which will guide the delivery of potential watering actions. In the drought, very dry and dry planning scenarios, the expected conditions will limit our ability to substantially alter flows and will restrict objectives to the maintenance of the Wimmera system's environmental values. If there is average or above-average rainfall, as expected in the average and wet planning scenarios, natural streamflows will increase our ability to influence flows with environmental water, and our objectives will extend to improving ecological values.

Wimmera River

In all planning scenarios, the highest-priority potential watering actions in the Wimmera River include a low flow and small freshes throughout the year. These flows will help maintain diverse aquatic habitats and suitable water quality along the length of the river and provide opportunities for fish to move to access resources or breed. In the drought and very dry planning scenarios, a low flow may be delivered below the recommended magnitude to conserve water, but it may be increased at any time or supplemented with freshes if needed to manage potential water quality issues. In the average and wet planning scenarios, there should be enough water to deliver a low flow at the recommended magnitude year-round and additional freshes to boost the river's environmental health.

The Wimmera CMA may temporarily restrict or cease deliveries of water for the environment during the spring low-flow period to encourage carp to congregate below the Horsham weir (and potentially at other suitable locations) so they can be removed using electrofishing. Any cease-to-flow event would have a short duration and be followed by a fresh to avoid water quality problems and prevent harm to native fish. Restricting the flow to manage carp will only be attempted in the cooler seasons to avoid potential water quality problems and may not be possible in wetter conditions.

Increased water availability and greater contributions from natural run-off in dry, average and wet conditions will allow larger freshes to be delivered to provide opportunities for broader fish movement, improve the composition and condition of vegetation on banks and benches within the channel and wash organic matter into the river to support riverine food webs. More frequent and larger freshes will likely be delivered in average and wet conditions, although they may also occur naturally.

A large spring fresh may be trialled in average and wet conditions in 2025-26 to trigger golden perch spawning. A regular stocking program mainly sustains golden perch populations in the Wimmera River, but numerous fish exhibited spawning behaviour in response to a large natural event in November 2021, and the Wimmera CMA is keen to see if natural spawning and recruitment can be supported with environmental watering. The flow volume to trigger golden perch spawning in the Wimmera River is unknown, and there is also some uncertainty about the maximum environmental flow that can be delivered through reach 4 of the Wimmera River. The Wimmera CMA aims to work with Grampians Wimmera Mallee Water (the storage manager) to coordinate releases from multiple storages to deliver the largest possible flow to reach 4 (within current system constraints) during the spring golden perch breeding season. The trial will only proceed if suitable monitoring is used to assess fish responses. The peak flow volume will also be measured to understand the largest flow that can be delivered through the system and to inform future flow plans.

If connections are established to drought refuge pools in the lower Wimmera in 2025-26 and conditions are such that these pools cannot be supported with releases from headworks storages, four sites — at Lochiel, Arkona, Antwerp and Tarranyurk — may receive deliveries of environmental water via the pipeline network in the drought and very dry planning scenarios. These actions have been included in planning as tier 2 actions, as the delivery infrastructure had not been completed at the time of writing.

In the wet planning scenario, actions planned for the Wimmera and MacKenzie rivers may provide an increased volume of water reaching lakes Hindmarsh and Albacutya.

MacKenzie River/Burnt Creek/ Bungalally Creek

Limited water availability from Lake Wartook in the drought, very dry and dry planning scenarios is expected to reduce the influence on flow in MacKenzie River reach 3. In these conditions, the highest priority will be to maintain connectivity by delivering a low flow in MacKenzie River reach 2 and supporting drought refuge pools in upper Burnt Creek. If supply and conditions allow, any environmental water that reaches Distribution Heads Weir may be used to support drought refuge pools in the upper section of MacKenzie River reach 3 as well. In the drought, very dry and dry planning scenarios, freshes may be targeted but will only be delivered as needed to prevent poor water quality and are likely to be delivered at the lower end of the planned magnitude and duration to conserve the available supply.

The expected conditions in the average and wet planning scenarios would result in higher natural and operational flows and provide for increased access to water for the environment from Lake Wartook. In these conditions, target watering will extend to MacKenzie River reach 3 and deliver a low flow year-round and small-to-medium freshes throughout the year. The low flow will aim to maintain habitat for native fish, platypus and crayfish that recruited or improved their condition in recent years. The freshes will aim to improve water quality, transport organic material, support fish and platypus dispersal and water streamside vegetation. In the average and wet planning scenarios, freshes in the MacKenzie River may be delivered at their full recommended magnitude and duration to increase opportunities for native fish and platypus to disperse and to increase the quality and quantity of their food to improve their condition and provide potential breeding opportunities. The target volume of winter/spring freshes in the MacKenzie River and upper Burnt Creek will vary depending on the weather and the observed environmental conditions, including the vegetation's response to wetting. Watering actions for MacKenzie River reach 3 typically provide a suitable flow to meet objectives in reach 2.

A bankfull flow may be delivered to Bungalally Creek and lower Burnt Creek in the average and wet planning scenarios to maintain the channel's form and improve the health of the streamside vegetation. Freshes of 15 ML per day may also be delivered to the lower Burnt Creek to top up and refresh refuge pools in the same planning scenarios. These flows can only be delivered during periods of high natural flow throughout the system, so they are not included in the drought, very dry or dry planning scenarios.

Mount William Creek

Limited water availability in Lake Lonsdale is expected to restrict the use of water for the environment to a low flow and modest freshes targeting lower Mount William Creek in the drought, very dry and dry planning scenarios. In the average and wet planning scenarios, water from Lake Lonsdale will be used to help meet environmental flow targets in the Wimmera River. This water will be delivered via lower Mount William Creek and is expected to meet the planned environmental watering actions for lower Mount William Creek en route.

Water from Lake Fyans may be used in any planning scenario in 2025-26 to top up refuge pools in upper Mount William Creek to improve water quality and habitat availability for native fish.

Ranch Billabong, Dock Lake and Mt Cole Creek

Water for the environment will likely be used to top up water levels in Ranch Billabong in drought, very dry and dry conditions to maintain water quality and support the ongoing recovery of the river red gum and associated understorey vegetation surrounding the billabong. In wet and average conditions, the billabong is expected to fill naturally.

Environmental flow objectives for Dock Lake require large volumes of water that can only be achieved with significant contributions from natural events and only when Green Lake is full. These conditions will only likely be met in the wet planning scenarios in 2025-26.

If the new delivery infrastructure is established to Mt Cole Creek in 2025-26 and conditions are such that the drought refuge pools at Lochiel, Arkona, Antwerp and Tarranyurk require support, they may receive deliveries of environmental water via the pipeline network. Deliveries to Mt Cole Creek have been included in planning as a tier 2 action in the drought, very dry and dry planning scenarios, given the delivery infrastructure had not been completed at the time of writing.

Carryover

Carryover will be vital to ensure sufficient water is available to deliver the highest-priority potential watering actions during summer and autumn 2026-27 if there are low allocations during 2025-26. The VEWH will work with the Wimmera and Glenelg Hopkins CMAs to set a carryover target for 2026-27 once winter and spring storage inflows are known and the potential resource outlook for the following year is clear.

Table 4.3.2 Wimmera system environmental watering planning scenarios

Planning scenario	Drought	Very dry	Dry	Average	Wet
Expected river conditions	• Infrequent, unregulated flow for reach 2 of the MacKenzie River, upper Burnt Creek and lower Mt William Creek • Regulated releases provide flow at other times and locations	• Periodic, unregulated flow for reach 2 of the MacKenzie River, upper Burnt Creek and lower Mt William Creek • Regulated releases provide flow at other times and locations	• Periodic, unregulated flow for reach 2 of the MacKenzie River, upper Burnt Creek and lower Mt William Creek • Regulated releases provide flow at other times and locations, apart from the modest passing flow	• Regular, unregulated flow for reach 2 of the MacKenzie River, upper Burnt Creek and lower Mt William Creek • Regular passing flow and unregulated releases for the Wimmera River and lower Mt William Creek • Regulated releases provide flow at other times and locations	• Regular, unregulated flow for reach 2 of the MacKenzie River, upper Burnt Creek and lower Mt William Creek • Frequent passing flow and unregulated releases for the Wimmera River and lower Mt William Creek • Regulated releases provide flow at other times and locations
Predicted supply of water for the environment under the Wimmera-Glenelg environmental entitlement[1]	• 38,204 ML	• 43,883 ML	• 57,673 ML	• 71,058 ML	• 78,764 ML
Predicted supply of water for the environment under the CEWH's entitlement[2]	• 5,108 ML	• 5,108 ML	• 5,108 ML	• 5,108 ML	• 33,108 ML

Planning scenario	Drought	Very dry	Dry	Average	Wet
Wimmera River – reach 4					
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow (at 5 ML/day) • Small winter/spring freshes (two freshes each of three days) • Summer/autumn low flow (partially achieved at 5 ML/day) • Summer/autumn freshes (three freshes)		• Winter/spring low flow (at 30 ML/day) • Small winter/spring freshes (three freshes each of two days) • Summer/autumn low flow (at 15 ML/day) • Summer/autumn freshes (three freshes)	• Winter/spring low flow (at 30 ML/day) • Small winter/spring freshes (two freshes each of three days) • Medium winter/spring fresh (one fresh of two days) • Large winter/spring fresh (one fresh of two days) • Summer/autumn low flow (at 15 ML/day) • Summer/autumn freshes (three freshes)	• Winter/spring low flow (at 30 ML/day) • Small winter/spring fresh (one fresh of four days) • Medium winter/spring fresh (one fresh of three days) • Large winter/spring freshes (two freshes of three days) • Summer/autumn low flow (at 15 ML/day) • Summer/autumn freshes (three freshes)
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow (at higher-magnitude range) • Summer/autumn low flow (fully achieved at 15 ML/day) • Year-round, pipeline-supplied drought refuge top-ups (Lochiel, Arkona, Antwerp and Tarranyurk)		• N/A	• N/A	• N/A

Planning scenario	Drought	Very dry	Dry	Average	Wet
MacKenzie River – reach 2					
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow (at 2 ML/day) • Winter/spring fresh (one fresh for two days) • Summer/autumn low flow (at 2 ML/day) • Summer/autumn fresh (one fresh at 5 ML/day for four to seven days)			• Winter/spring low flow (at 27 ML/day) • Winter/spring freshes (three freshes for five days each) • Summer/autumn low flow (at 10 ML/day) • Summer/autumn freshes (three freshes at 50 ML/day)	• Winter/spring low flow (at 27 ML/day) • Winter/spring freshes (five freshes for seven days each) • Summer/autumn low flow (at 10 ML/day) • Summer/autumn freshes (three freshes at 50 ML/day)
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow (at 10 ML/day) • Summer/autumn low flow (at 10 ML/day) • Summer/autumn freshes (three freshes at 5 ML/day for four to seven days)				
MacKenzie River – reach 3					
Potential environmental watering – tier 1 (high priorities)	• N/A			• Winter/spring low flow (at 5 ML/day) • Winter/spring freshes (three freshes) • Summer/autumn low flow (at 5 ML/day) • Summer/autumn freshes (three freshes)	• Winter/spring low flow (at 10 ML/day) • Winter/spring freshes (two freshes) • Summer/autumn low flow (at 10 ML/day) • Summer/autumn freshes (four freshes)
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow (at 2 ML/day) • Summer/autumn low flow (at 2 ML/day)			• Winter/spring freshes (five freshes) • Summer/autumn freshes (four freshes)	• N/A

<table>
<tr><th>Planning scenario</th><th>Drought</th><th>Very dry</th><th>Dry</th><th>Average</th><th>Wet</th></tr>
<tr><td colspan="6">Upper Burnt Creek</td></tr>
<tr><td>Potential environmental watering – tier 1 (high priorities)</td><td colspan="3">• Year-round low flow (partial duration achieved)
• Winter/spring freshes (two freshes at 15 ML/day)
• Summer/autumn fresh (one fresh at 15 ML/day)</td><td>• Year-round low flow
• Winter/ spring freshes (three freshes at varying magnitudes)
• Summer/ autumn freshes (two freshes at 20 ML/day)</td><td>• Year-round low flow
• Winter/ spring freshes (five freshes at a minimum of 35 ML/day)
• Summer/ autumn freshes (three freshes at 30 ML/day)</td></tr>
<tr><td>Potential environmental watering – tier 2 (additional priorities)</td><td colspan="3">• Year-round low flow (fully achieved)
• Winter/spring freshes (tier 1 freshes at 55 ML/day)
• Summer/autumn fresh (tier 1 fresh at 30 ML/day)</td><td>• Winter/ spring freshes (tier 1 freshes at 55 ML/day)
• Summer/ autumn freshes (three freshes at 30 ML/day)</td><td>• Winter/ spring freshes (tier 1 freshes at 55 ML/day)</td></tr>
<tr><td colspan="6">Lower Burnt Creek</td></tr>
<tr><td>Potential environmental watering – tier 1 (high priorities)</td><td colspan="3">• N/A</td><td>• Freshes (two freshes)</td><td>• Freshes (four freshes)</td></tr>
<tr><td>Potential environmental watering – tier 2 (additional priorities)</td><td colspan="3">• N/A</td><td>• Freshes (four freshes)</td><td>• Bankfull fresh (one fresh)</td></tr>
<tr><td colspan="6">Bungalally Creek</td></tr>
<tr><td>Potential environmental watering – tier 1 (high priorities)</td><td colspan="3">• N/A</td><td>• Bankfull fresh</td><td>• Bankfull fresh</td></tr>
</table>

Planning scenario	Drought	Very dry	Dry	Average	Wet
Lower Mount William Creek[3]					
Potential environmental watering – tier 1 (high priorities)	• Winter/spring freshes (three to seven freshes of 30-40 ML/day for two to seven days during July to November) • Summer/autumn freshes (three freshes of 30-50 ML/day for two to seven days during December to May)		• Winter/spring freshes (three to seven freshes of 30-40 ML/day for two to seven days during July to November) • Summer/autumn freshes (three freshes of 30-50 ML/day for two to seven days during December to May)	• Winter/spring freshes (three to seven freshes of 30-40 ML/day for two to seven days during July to November) • Winter/spring fresh(es) (one to five freshes of 100 ML/day for three to seven days during June to November) • Summer/autumn freshes (three freshes of 30-40 ML/day for two to seven days during December to May)	• Winter/spring freshes (three to seven freshes of 30-40 ML/day for two to seven days during July to November) • Winter/spring fresh(es) (one to five freshes of 100 ML/day for three to seven days during June to November) • Summer/autumn freshes (three to six freshes of 30-40 ML/day for two to seven days during December to May)
Potential environmental watering – tier 2 (additional priorities)	• N/A		• N/A	• N/A	• N/A
Upper Mount William Creek					
Potential environmental watering – tier 1 (high priorities)	• Top-ups				
Mt Cole Creek					
Potential environmental watering – tier 1 (high priorities)	• N/A				
Potential environmental watering – tier 2 (additional priorities)	• Year-round, pipeline-supplied drought refuge top-ups			• N/A	

Planning scenario	Drought	Very dry	Dry	Average	Wet
Dock Lake					
Potential environmental watering – tier 1 (high priorities)	• N/A				
Potential environmental watering – tier 2 (additional priorities)	• N/A				• Winter/ spring partial fill
Ranch Billabong					
Potential environmental watering – tier 1 (high priorities)	• Top-ups (winter/spring and summer/autumn)			• N/A	• N/A
Possible volume of water for the environment required to achieve objectives[4]	• 13,692 ML (tier 1) • 684 ML (tier 2)	• 12,542 ML (tier 1) • 627 ML (tier 2)	• 16,582 ML (tier 1) • 829 ML (tier 2)	• 20,370 ML (tier 1) • 1,018 ML (tier 2)	• 18,895 ML (tier 1) • 944 ML (tier 2)
Priority carryover requirements for 2026-27	• The VEWH will work with the Wimmera and Glenelg Hopkins CMAs to refine a carryover target for 2026-27 once winter and spring storage inflows are known and the potential resource outlook for the following year is clear.				

1 Volumes represent the available water for the Wimmera and Glenelg systems under the shared *Wimmera and Glenelg Rivers Environmental Entitlement 2010* and are the total of carryover and estimated new allocations.

2 Volumes represent the available water for the Wimmera system held by the Commonwealth Environmental Water Holder under the *Bulk Entitlement (Wimmera and Glenelg Rivers – GWMWater) Order 2010* and are the total of carryover and estimated new allocations.

3 All deliveries targeting Wimmera River reach 4 are expected to provide a flow that meets the requirements of this reach. Demands for water for the environment for these actions are zero as a result.

4 Models used to estimate the possible volume of water for the environment required to achieve objectives are insufficiently specific about the required volume in the wetter planning scenarios, and they likely overstate the potential demands. Demands in wet conditions would likely be much lower than this, as the natural flow would meet the requirements for most actions.

4.4 Wimmera-Mallee wetlands system

Waterway managers – Mallee, North Central and Wimmera catchment management authorities

Storage manager – Grampians Wimmera Mallee Water

Environmental water holder – Victorian Environmental Water Holder

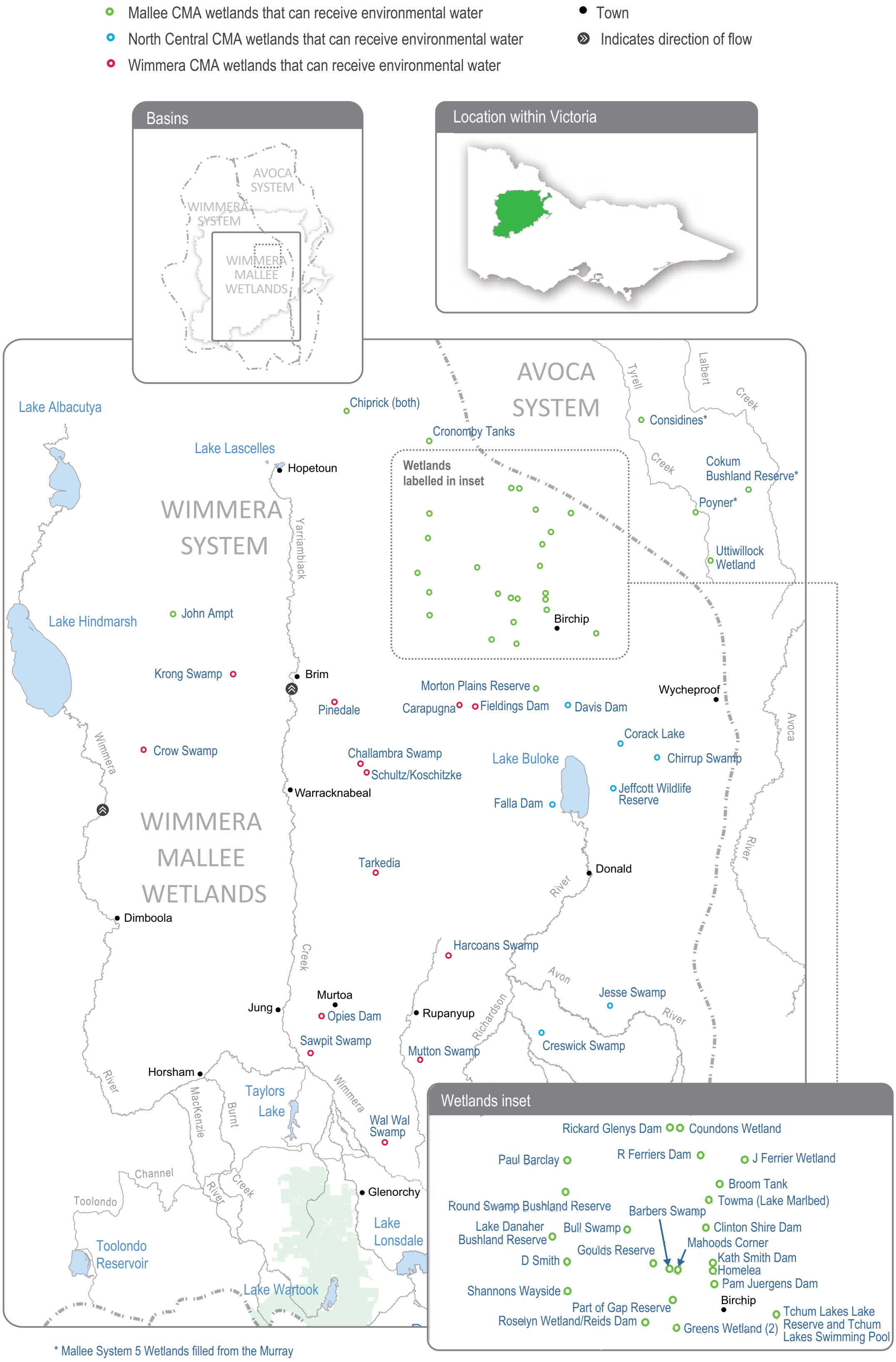
System overview

The Wimmera-Mallee wetlands include 52 sites on public and private land spread across north-west Victoria (Figure 4.4.1). From the early 20th century until the construction of the Wimmera-Mallee Pipeline Project (WMPP) in 2010, the deeper areas of these wetlands received water most years from the open channels associated with the Wimmera Mallee Domestic and Stock Channel System.

The WMPP replaced stock and domestic supply dams with tanks and the open-channel distribution system with pipelines to improve water efficiency. A portion of the water savings from the WMPP was converted to an environmental entitlement to improve the condition of the area's flow-stressed rivers, creeks and wetlands; the rest was used to create regional development opportunities and boost supply reliability for other users. The WMPP reduced the amount of open-water habitat in predominantly agricultural areas formerly supplied by the open-channel system, so a separate 1,000 ML environmental entitlement was created to water some of the wetlands that were previously supplied through the channel system. Fifty-two priority wetlands can receive water from this environmental entitlement.

Water for the environment can only be delivered to the wetlands when there is sufficient capacity in the Wimmera-Mallee Pipeline system, which can be affected by demand from other pipeline customers. The North Central, Mallee and Wimmera CMAs work closely with Grampians Wimmera Mallee Water and land managers (including Parks Victoria, the Department of Energy, Environment and Climate Action and private landowners) to take account of pipeline capacity constraints when ordering environmental deliveries to wetlands.

Figure 4.4.1 Wimmera-Mallee wetlands system



* Mallee System 5 Wetlands filled from the Murray

Environmental values

There are many wetland types in the Wimmera-Mallee wetlands system, including freshwater meadows, open freshwater lakes and freshwater marshes. This diversity provides various wetland habitats for plants and animals across the Wimmera-Mallee region. The wetlands also vary in size and support different vegetation communities. Some support native waterbird populations, including brolgas, egrets, blue-billed ducks, freckled ducks, Australian painted snipes and glossy ibis. The vulnerable growling grass frog, turtles and many other native animals may use the wetlands as drought refuges and drinking holes. Rare and vulnerable vegetation species (such as spiny lignum, ridged water-milfoil, chariot wheels, cane grass and reintroduced marbled marshwort) are also present in some wetlands.

Several water-dependent animal species have been recorded at Mallee CMA pipeline sites, including the listed freshwater catfish, Murray River turtle, hardhead and eastern great egret. Several listed terrestrial animal species have also been recorded using the wetlands as drought refuges and drinking holes, including the indirectly water-dependent regent parrot, carpet python and vulnerable growling grass frog.

In 2024, the Wimmera CMA and the Victorian Fisheries Association released 50 southern purple-spotted gudgeon and 50 olive perchlet into Fieldings and Tarkedia dams and Wal Wal, Mutton and Harcoans swamps as part of a surrogacy program. These fish species are threatened in the Murray-Darling Basin.

Marbled marshwort has been reintroduced at Davis Dam, Creswick Swamp, Jesse Swamp, Cherrip Swamp and Jeffcott Swamp by the North Central CMA. Also, Falla Dam is being used as a reserve site for critically endangered Murray hardyhead as part of the ***National Recovery Plan For The Murray Hardyhead***. Over 300 Murray hardyhead were introduced in November 2023 and November 2024 to restock populations at sites outside the Wimmera-Mallee wetlands system that have been harmed by drought and other disturbances and to reduce the risk of extinction by improving populations.

Environmental objectives in the Wimmera-Mallee wetlands system

A1 – Maintain frog populations and provide suitable habitat

B1 – Maintain populations of waterbirds and other native birds by providing resting, feeding and breeding habitat

F1 – Maintain native fish populations

T1 – Maintain turtle populations

TA1 – Provide watering holes for native animals and terrestrial birds across the landscape

V1 – Maintain the condition of aquatic and fringing plants, including lignum, river red gum and black box communities and improve the diversity of wetland vegetation communities

Traditional Owner cultural values and uses

The broad geographic area that includes the Wimmera-Mallee wetlands has a longstanding cultural connection for the Traditional Owners of the region, including groups represented by the Barengi Gadjin Land Council Aboriginal Corporation (BGLC) and the Dja Dja Wurrung Clans Aboriginal Corporation (DJAARA), and to Barapa Barapa Traditional Owners. Some sites have artefacts and scar trees recorded in or adjacent to them, and further cultural surveys could better inform the management of water for the environment at those sites.

BGLC is the Registered Aboriginal Party (RAP) for a significant land area of the Wimmera-Mallee wetlands. The council represents the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagalk peoples.

In May 2022, BGLC and the North Central CMA undertook a cultural values assessment at Creswick Swamp. Cultural values identified at the site include river red gums and eastern grey kangaroos.

In early 2024, BGLC and the Wimmera, North Central and Mallee CMAs attended a Wimmera-Mallee wetlands community field day. They visited six sites along the Wimmera-Mallee Pipeline, and BGLC communicated important cultural values and how environmental water can help protect those values.

In recent years, BGLC Water Officers and the Wimmera CMA have monitored Sawpit Swamp Wildlife Reserve, Wal Wal Swamp Wildlife Reserve, Carapugna (Watchem Bushland Reserve) and Mutton Swamp Wildlife Reserve, helping to understand environmental flow deliveries and values at the sites. BGLC also attended Fieldings Dam to release fish and plant aquatic vegetation to improve habitat. This was a joint effort between the BGLC, the Wimmera CMA, Yarrilinks Landcare and the Victorian Fisheries Authority.

In 2024-25, the Mallee CMA and BGLC attended site visits held at Goyura, Ranch Lagoon and Yallamjip-Walpeup Wetland and discussed possible *Water is Life* trial sites, environmental watering opportunities and aspirations and projects to help reconnect and heal Country. In October, the Mallee CMA and BGLC met at Ranch Lagoon to discuss planning for environmental water deliveries in 2025-26. In December 2024, the Mallee CMA and BGLC visited Lake Danaher and Greens Wetland to discuss the cultural values and uses of these sites, with BGLC noting the importance of revegetation and traditional plants, bush food and medical plants at the Wimmera-Mallee wetlands. They expressed interest in encouraging the growth of ice crystal plant and black box, as well as protecting turtles from pest species, including foxes and cats. The importance of cultural burning to allow plants and trees to germinate was also discussed.

A draft list of proposed watering sites for 2025-26 was provided to BGLC at an Aboriginal Reference Group meeting in February 2025 as part of feedback from earlier discussions in October and December. BGLC staff were happy with the sites planned to receive water and were interested in expanding the existing sites to include Goyura Wetland, where they can conduct plant and animal protection works.

BGLC has discussed with the CMAs the significance of the wetlands and their aspiration to undertake work at these sites in future. They provided the following statement when discussing environmental watering.

> "The Wimmera-Mallee is a living cultural landscape, and there is a lack of recorded data regarding the cultural values over many sections of the Wimmera-Mallee Pipeline. Several highly significant places are outlined through our Country Plan, but like all places across our Country, the rivers, creeks, lakes, wetlands and swamps and all other landscape features in this area are of high cultural significance. We wish to care for Country again through our traditional land management practices and revive and share the ancient narrative of this area. Mapping the cultural values of places along the Wimmera-Mallee Pipeline will be essential in contributing to integrated catchment management.
>
> "We are unable to identify places of particular cultural values and uses confidently until Aboriginal Water Assessment/Cultural Heritage Surveys are systematically undertaken across Wimmera-Mallee Pipeline sites. All the swamps, wetlands and soaks of this area are of high cultural significance as they are linked to Traditional trading routes that extend in all directions. It is essential that all of these places are managed correctly and water quality and biodiversity are improved."

DJAARA is the RAP for the area containing Jeffcott Swamp and Jesse Swamp. DJAARA provided the following statement for the 2025-26 seasonal watering proposals and plan.

> "DJAARA have a unique opportunity, as the first owners of the land and water that includes the Wimmera-Mallee Pipeline wetlands, to apply ancient Djaara Cultural principles and management practices to the current water management context.
>
> "Empowering DJAARA to manage water in the catchment enables DJAARA to provide overarching guidance to holistically manage water to meet environmental, social and economic values.
>
> "Cultural values do not sit as another competing value and use of the water. Rather, Cultural values provide the lens for all values to be viewed through and met. If we are enhancing Cultural values, uses and practices in the Wimmera-Mallee Pipeline wetlands, we are enabling environmental, social and economic values to be supported.
>
> "In November 2023, DJAARA launched its water strategy ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy***, setting a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.
>
> "Through implementation of the Dhelkunyangu Gatjin Strategy, facilitated by the Wanggal Partners Group, which has representation by the North Central CMA and water management agencies operating on Djaara *Djandak* (Country), the agencies continue to work to support DJAARA's increased engagement in planning and delivering environmental water, including identifying opportunities for DJAARA to play a greater role in its management and administration and the transfer of environmental water entitlements to DJAARA."

DJAARA have expressed that the resources allocated to managing environmental water on *Djandak* do not sufficiently allow for appropriate engagement with Djaara, for them to meaningfully articulate Cultural values and the Djaara Cultural lens, for the establishment of watering objectives to guide environmental water management, nor for the review of the six seasonal watering proposals on *Djandak*. For the development of the 2025-26 seasonal watering proposals, DJAARA and the North Central CMA agreed to allocate DJAARA's resource allowance to developing a joint management approach that would embed DJAARA in the development process, trialling the approach for Birchs Creek and Coliban River.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

The recreational and economic values of wetlands and dams are extremely important to the Wimmera-Mallee Pipeline region community.

While social, recreational and economic drivers are not the deciding factors when selecting and prioritising sites to receive water, community support can be important for determining the success of a watering event. Community feedback highlights the importance of these landscapes to the community and the additional benefits of delivering environmental water.

Face-to-face, online communication and community surveys indicate a high level of use of local wetlands and creeks, with a greater connection when water is present. The community regularly enjoys recreational activities at the wetlands proposed to receive water for the environment in 2025-26. Commonly mentioned activities associated with watering include on-water activities, birdwatching, picnicking, photography and nature walks. At some larger sites, people also mentioned boating, kayaking, fishing, swimming and camping, and during site visits, Wimmera CMA staff saw people fishing, yabbying, camping and on day visits.

Landowners also said that after watering, there were more waterbirds, frogs, goannas and snakes at the watered sites.

In planning the potential environmental watering actions in **Table 4.4.1**, the Mallee, North Central and Wimmera CMAs considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing, swimming and yabbying)
- riverside recreation and amenity (such as birdwatching, duck and quail hunting, photography, camping, picnicking and walking)
- community events and tourism (such as orienteering and citizen science, including collecting data about bird species and abundance, frog species and microbat recordings).

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 4.4.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 4.4.1 Wimmera-Mallee wetlands system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Mallee wetlands		
Barbers Swamp	• Stimulate the growth of aquatic and fringing vegetation and allow the plants, including cane grass, ridged water-milfoil, black box and spiny lignum, to complete their life cycles • Provide a permanent water source for refuge and to support feeding and breeding opportunities for frogs, turtles, waterbirds and terrestrial species • Increase habitat connectivity for animal species across an otherwise dry landscape	A1 B1 F1 T1 TA1 V1
Broom Tank		
Bull Swamp		
Chiprick Bushland Reserve		
Clinton Shire Dam		
Cokum Bushland Reserve		
Considines		
Coundons Wetland		
Cronomby Tanks		
D Smith Wetland		
Goulds Reserve		
Greens Wetland		
Homelea		

Potential environmental watering action	Expected watering effects	Environmental objectives
J Ferrier Wetland	• Stimulate the growth of aquatic and fringing vegetation and allow the plants, including cane grass, ridged water-milfoil, black box and spiny lignum, to complete their life cycles • Provide a permanent water source for refuge and to support feeding and breeding opportunities for frogs, turtles, waterbirds and terrestrial species • Increase habitat connectivity for animal species across an otherwise dry landscape	A1 B1 F1 T1 TA1 V1
John Ampt (House Dam)		
Kath Smith Dam		
Lake Danaher Bushland Reserve		
Mahoods Corner		
Morton Plains Reserve		
Pam Juergens Dam		
Part of Gap Reserve (Stephen Smith Dam)		
Paul Barclay		
Poyner		
R Ferriers Dam		
Rickard Glenys Dam		
Round Swamp Bushland Reserve (Marlbed Lake Swamp/Newer Swamp)		
Roselyn Wetland/ Reids Dam		
Shannons Wayside		
Tchum Lake – dam (Tcham Lakes Lake Reserve)		
Tchum Lake – Wetland (Tcham Lakes Lake Reserve)		
Towma (Lake Marlbed)		
Uttiwillock Wetland		

Potential environmental watering action	Expected watering effects	Environmental objectives
North-central wetlands		
Cherrip Swamp Corack Lake Creswick Swamp Davis Dam Jeffcott Wildlife Reserve Jesse Swamp	• Provide a permanent water source for refuge and to support feeding and breeding opportunities for frogs, waterbirds and turtles • Maintain varying depths of water to support aquatic and fringing plants' life cycles • Maintain varying depths of water to support a variety of feeding habitats for waterbirds	A1 B1 T1 TA1 V1
Falla Dam	• Maintain the water depth and submerged vegetation in a condition that can support translocated Murray hardyhead	F1 V1
Wimmera wetlands		
Carapugna (Watchem Bushland Reserve) Challambra Swamp Crow Swamp Fieldings Dam Harcoans Swamp (Burrereo Bushland Reserve) Krong Swamp Mutton Swamp Opie's Dam Pinedale Sawpit Swamp Schultz/Koschitzke Tarkedia Dam Wal Wal Swamp	• Provide a permanent water source for refuge and to support feeding and breeding opportunities for frogs, turtles, waterbirds and terrestrial species • Stimulate the growth of aquatic and fringing vegetation and allow the plants, including chariot wheels, sneezeweed, ridged water-milfoil and spiny lignum, to complete their life cycles	A1 B1 T1 V1
Fieldings Dam, Harcoans Swamp (Burrereo Bushland Reserve), Mutton Swamp, Opie's Dam, Tarkedia Dam, Wal Wal Swamp	• Maintain/improve habitat for translocated southern purple-spotted gudgeon and blackfish and to support increased abundance of fish	F1 V1

Scenario planning

Table 4.4.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

Rainfall in the Wimmera-Mallee during 2024-25 was well below the long-term average, with no allocation water received. This meant deliveries of water to sites were wholly reliant on the use of carryover. Wetlands that dropped below target levels in summer 2024-25 were topped up in autumn 2025. This ensured that most Wimmera-Mallee wetlands would be able to start 2025-26 with moderate water levels.

The wetlands proposed to be watered in each planning scenario in 2025-26 were determined according to the following principles. In drought conditions, the highest priority is to maintain permanent water in the deeper sections of the wetlands to provide drought refuge for waterbirds, frogs, turtles and terrestrial animals and to support the growth and life cycles of wetland plants. In wetter planning scenarios, water for the environment may be delivered, depending on the pipeline system's capacity, to water larger areas of a wetland. Large rainfall events and catchment inflows partially or entirely fill some wetlands in the average and wet planning scenarios, and water for the environment may be used in those cases to top up, fill or overtop wetlands to improve fringing wetland plant communities and provide additional habitat for waterbirds, frogs and turtles.

Barbers Swamp, Cokum Bushland Reserve, Roselyn Wetland/Reids Dam, Round Swamp Bushland Reserve (Marlbed Lake Swamp/Newer Swamp), Towma (Lake Marlbed) and Uttiwillock Wetland are all expected to receive environmental water in all planning scenarios, while part of Gap Reserve and Shannons Wayside will receive water in the dry, average and wet planning scenarios.

Cronomby Tanks and Falla Dam are being managed to support stocked threatened fish species, freshwater catfish and endangered Murray hardyhead, respectively. Therefore, they must be filled or topped up annually in all planning scenarios. The proposed water regime at Falla Dam in particular aims to maintain a permanent body of water with adequate salinity levels and submerged vegetation (ruppia) to provide cover and breeding habitat for the endangered Murray hardyhead. Fieldings, Tarkedia, Opie's, Wal Wal, Mutton and Harcoans wetlands are also being managed to support recent translocations of populations of southern purple-spotted gudgeon and blackfish.

Twenty-eight other wetlands are also likely to be watered in all planning scenarios to achieve the objectives for those sites and to maintain a range of wetland habitats across the region. Kath Smith Dam, Sawpit Swamp and Harcoans Swamp held water and remained wet after receiving sufficient inflows over the last few years, with no deliveries to Kath Smith Dam and Sawpit Swamp over 2024-25 to allow them to draw down.

Broom Tank, Chiprick Bushland Reserve, Coundons Wetland, Homelea, Kath Smith Dam, Part of Gap Reserve, Shannons Wayside and Tchum Lake – Dam (Tcham Lakes Lake Reserve) will potentially be topped up in dry, average and wet conditions but are not planned for watering in the drought planning scenario because they generally dry up quickly in very hot and dry conditions and are not effective drought refuges. Krong Swamp is also a poor drought refuge and will only potentially be watered in wet conditions.

If there are high environmental water allocations, the moderate water levels in many wetlands at the start of the year may provide opportunities to overtop some of the Wimmera-Mallee wetlands to improve the condition of surrounding wetland vegetation communities and provide additional feeding and breeding opportunities for frogs and possibly waterbirds.

Overtopping flows may be provided at six wetlands in all planning scenarios to consolidate the environmental benefits of potential wet conditions. If sufficient environmental water is available, additional wetlands will be overtopped in the dry, average and wet (11 further sites), average and wet (three further sites) and wet planning scenarios (two further sites).

Allocations to the environmental entitlement that supplies the wetlands in the Wimmera-Mallee wetland system are highly unreliable, averaging just 381 ML a year over the life of the entitlement. The ability to carry over water from one year to another allows waterway managers and the VEWH to manage the system in dry periods effectively. High allocations in wet and average years are needed to support watering actions for multiple years when dry conditions return, as observed in 2024-25, with no new allocation to the entitlement. The forecast carryover volume at the end of 2024-25 will help meet expected demands across the Wimmera-Mallee wetlands for at least the next two years in all planning scenarios. The North Central, Mallee and Wimmera CMAs and the VEWH will monitor climatic conditions and seasonal allocation outlooks during 2025-26 to inform a carryover target in the Wimmera-Mallee wetland system for 2026-27.

Table 4.4.2 Wimmera-Mallee wetlands system environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected availability of water for the environment	• 584 ML	• 584 ML	• 834 ML	• 1,584 ML
Mallee wetlands				
Potential environmental watering – tier 1 (high priorities)	• Barbers Swamp • Bull Swamp* • Clinton Shire Dam* • Cokum Bushland Reserve • Considines • Cronomby Tanks • D Smith Wetland • Greens Wetland* • J Ferrier Wetland • John Ampt (House Dam) • Lake Danaher Bushland Reserve • Mahoods Corner • Morton Plains Reserve • Pam Juergens Dam • Paul Barclay • Poyner • R Ferriers Dam • Rickard Glenys Dam	• Barbers Swamp • Broom Tank • Bull Swamp* • Chiprick Bushland Reserve* • Clinton Shire Dam* • Cokum Bushland Reserve • Considines • Coundons Wetland* • Cronomby Tanks • D Smith Wetland • Greens Wetland* • Homelea • J Ferrier Wetland • John Ampt (House Dam) • Kath Smith Dam • Lake Danaher Bushland Reserve • Mahoods Corner • Morton Plains Reserve	• Barbers Swamp • Broom Tank • Bull Swamp* • Chiprick Bushland Reserve* • Clinton Shire Dam* • Cokum Bushland Reserve • Considines • Coundons Wetland* • Cronomby Tanks • D Smith Wetland • Goulds Reserve • Greens Wetland* • Homelea • J Ferrier Wetland • John Ampt (House Dam) • Kath Smith Dam • Lake Danaher Bushland Reserve • Mahoods Corner • Morton Plains Reserve	• Barbers Swamp • Broom Tank • Bull Swamp* • Chiprick Bushland Reserve* • Clinton Shire Dam* • Cokum Bushland Reserve • Considines • Coundons Wetland* • Cronomby Tanks • D Smith Wetland • Goulds Reserve • Greens Wetland* • Homelea • J Ferrier Wetland • John Ampt (House Dam) • Kath Smith Dam • Lake Danaher Bushland Reserve • Mahoods Corner • Morton Plains Reserve

Planning scenario	Drought	Dry	Average	Wet
(continued) **Potential environmental watering – tier 1 (high priorities)**	• Round Swamp Bushland Reserve (Marlbed Lake Swamp/Newer Swamp) • Roselyn Wetland/Reids Dam* • Towma (Lake Marlbed) • Uttiwillock Wetland*	• Pam Juergens Dam • Part of Gap Reserve (Stephen Smith Dam)* • Paul Barclay • Poyner • R Ferriers Dam • Rickard Glenys Dam • Round Swamp Bushland Reserve (Marlbed Lake Swamp/Newer Swamp) • Roselyn Wetland/Reids Dam* • Shannons Wayside • Tchum Lake – dam (Tcham Lakes Lake Reserve) • Towma (Lake Marlbed) • Uttiwillock Wetland*	• Pam Juergens Dam • Part of Gap Reserve (Stephen Smith Dam)* • Paul Barclay • Poyner • R Ferriers Dam • Rickard Glenys Dam • Round Swamp Bushland Reserve (Marlbed Lake Swamp/Newer Swamp) • Roselyn Wetland/Reids Dam* • Shannons Wayside • Tchum Lake – dam (Tcham Lakes Lake Reserve) • Tchum Lake – wetland (Tcham Lakes Lake Reserve) • Towma (Lake Marlbed) • Uttiwillock Wetland*	• Pam Juergens Dam • Part of Gap Reserve (Stephen Smith Dam)* • Paul Barclay • Poyner • R Ferriers Dam • Rickard Glenys Dam • Round Swamp Bushland Reserve (Marlbed Lake Swamp/Newer Swamp) • Roselyn Wetland/Reids Dam* • Shannons Wayside • Tchum Lake – dam (Tcham Lakes Lake Reserve) • Tchum Lake – wetland (Tcham Lakes Lake Reserve) • Towma (Lake Marlbed) • Uttiwillock Wetland*
North-central wetlands				
Potential environmental watering – tier 1 (high priorities)	• Cherrip Swamp • Corack Lake • Creswick Swamp • Davis Dam • Falla Dam • Jeffcott Wildlife Reserve • Jesse Swamp	• Cherrip Swamp* • Corack Lake* • Creswick Swamp • Davis Dam • Falla Dam • Jeffcott Wildlife Reserve • Jesse Swamp*	• Cherrip Swamp* • Corack Lake* • Creswick Swamp * • Davis Dam* • Falla Dam • Jeffcott Wildlife Reserve • Jesse Swamp*	• Cherrip Swamp* • Corack Lake* • Creswick Swamp* • Davis Dam* • Falla Dam • Jeffcott Wildlife Reserve • Jesse Swamp*

Planning scenario	Drought	Dry	Average	Wet
Wimmera wetlands				
Potential environmental watering – tier 1 (high priorities)	• Carapugna (Watchem Bushland Reserve)* • Challambra Swamp • Crow Swamp • Fieldings Dam • Harcoans Swamp (Burrereo Bushland Reserve) • Mutton Swamp • Opie's Dam • Pinedale • Schultz/ Koschitzke • Tarkedia Dam • Wal Wal Swamp	• Carapugna (Watchem Bushland Reserve)* • Challambra Swamp* • Crow Swamp* • Fieldings Dam • Harcoans Swamp (Burrereo Bushland Reserve) • Mutton Swamp* • Opie's Dam • Pinedale • Schultz/ Koschitzke • Tarkedia Dam • Wal Wal Swamp*	• Carapugna (Watchem Bushland Reserve)* • Challambra Swamp* • Crow Swamp* • Fieldings Dam • Harcoans Swamp (Burrereo Bushland Reserve)* • Mutton Swamp* • Opie's Dam • Pinedale* • Sawpit Swamp* • Schultz/ Koschitzke • Tarkedia Dam • Wal Wal Swamp*	• Carapugna (Watchem Bushland Reserve)* • Challambra Swamp* • Crow Swamp* • Fieldings Dam* • Harcoans Swamp (Burrereo Bushland Reserve)* • Krong Swamp* • Mutton Swamp* • Opie's Dam • Pinedale* • Sawpit Swamp* • Schultz/ Koschitzke • Tarkedia Dam • Wal Wal Swamp*
Possible volume of water for the environment required to achieve objectives	• 127 ML	• 165 ML	• 287 ML	• 392 ML
Priority carryover requirements for 2026-27	• The VEWH will work with CMAs to refine a carryover target for 2026-27 once winter and spring storage inflows are known and the potential resource outlook for the following year is clear.			

* Delivery to the site is expected to provide temporary, shallow inundation of at least part of the surrounding wetland or floodplain.

SECTION 5:
Northern region

5.1 Northern region overview

The northern region has six river systems, four major floodplain sites and many wetlands that can receive water for the environment. The Broken, Campaspe, Goulburn, Loddon and Ovens river systems are tributaries of the Murray River. The four major floodplain sites along the Murray River corridor are Barmah Forest, Gunbower Forest, Hattah Lakes and Lindsay, Mulcra and Wallpolla islands. The other wetlands are distributed across the Broken, Goulburn, Loddon and Murray floodplains. The Goulburn Broken, Mallee, North Central and North East CMAs manage the rivers and wetlands in the northern region.

Many of the water systems in the northern region are connected through infrastructure. For example, the Goulburn Weir and Waranga Western Channel are used to deliver water from the Goulburn River to the Loddon and Campaspe systems. Water trading can also transfer allocation between systems. Within the limitations of each mechanism, water for the environment can be moved between systems for delivery to environmental sites across northern Victoria, although most is used to provide benefits in the systems in which the water is held.

Environmental values, objectives and planned actions for each system in the northern region are presented in the following system sections.

Traditional Owners in the northern region

Traditional Owners in the northern region have a deep connection to Country that has endured for tens of thousands of years. This includes inherent rights and cultural obligations to Country and the community.

The Traditional Owner groups in northern Victoria include Barapa Barapa, Bangerang, Dja Dja Wurrung, Duduroa, Dhudhuroa, Latji Latji, Ngintait, Nyeri Nyeri, Taungurung, Tati Tati, Wadi Wadi, Wamba Wemba, Waywurru, Weki Weki, Yorta Yorta and Yaithmathang.

The Dja Dja Wurrung Clans Aboriginal Corporation (trading as DJAARA), the First People of the Millewa-Mallee, the Taungurung Land and Waters Corporation (TLaWC), the Wamba Wemba Aboriginal Corporation and the Yorta Yorta Nation Aboriginal Corporation (YYNAC) are Registered Aboriginal Parties (RAPs) under the Victorian *Aboriginal Heritage Act 2006*. DJAARA and TLaWC each have a Recognition and Settlement Agreement with the Victorian Government, and YYNAC has a Traditional Owner Land Management Agreement to jointly manage Barmah National Park.

Engagement

Program partners engage extensively with Traditional Owners, stakeholders and local communities to understand community priorities for delivering water for the environment in the coming year and to understand how cultural, social, economic and recreational values, uses and objectives may be supported by delivering environmental flows, provided environmental outcomes are not compromised.

Engagement also informs environmental objectives in regional catchment and waterway strategies, environmental flows studies and environmental management plans.

Table 5.1.1 Program partners and stakeholders that engaged with the Goulburn Broken CMA to develop seasonal watering proposals and key documents informing the proposals for the Barmah Forest, Goulburn system, Goulburn wetlands, Broken wetlands, Broken River and upper Broken Creek and lower Broken Creek (in alphabetical order)[1]

Partner/ stakeholder	Barmah Forest	Goulburn system	Goulburn wetlands	Broken wetlands	Broken River and upper Broken Creek	Lower Broken Creek
Community groups and environment groups	• Goulburn Murray Landcare Network	• Goulburn Valley Environment Group	• Goulburn Valley Environment Group • Murrundindi Shire Council community meeting, Molesworth • Turtles Australia • Wider community members	• Goulburn Valley Environment Group • Turtles Australia	• Goulburn Valley Environment Group	• Goulburn Valley Environment Group
Government agencies	• Commonwealth Environmental Water Holder • Goulburn-Murray Water • Moira Shire Council • NSW Department of Climate Change, Energy, the Environment and Water • NSW National Parks and Wildlife Service • Parks Victoria • Victorian Environmental Water Holder	• Commonwealth Environmental Water Holder • Goulburn-Murray Water • Murray-Darling Basin Authority/ the Living Murray • Parks Victoria • Victorian Environmental Water Holder • Victorian Fisheries Authority	• Goulburn-Murray Water • Greater Shepparton City Council • Moira Shire Council • Murrundindi Shire Council • Parks Victoria • Victorian Environmental Water Holder	• Commonwealth Environmental Water Holder • Goulburn-Murray Water • Greater Shepparton City Council • Moira Shire Council • Parks Victoria • Victorian Environmental Water Holder	• Commonwealth Environmental Water Holder • Goulburn-Murray Water • Parks Victoria • Victorian Environmental Water Holder	• Commonwealth Environmental Water Holder • Goulburn-Murray Water • Parks Victoria • Victorian Environmental Water Holder

Partner/ stakeholder	Barmah Forest	Goulburn system	Goulburn wetlands	Broken wetlands	Broken River and upper Broken Creek	Lower Broken Creek
Landholders/ farmers	• None in Victoria (NSW consults with Bullatale Creek landholders)	• Goulburn Environmental Water Advisory Group • Individual landholders	• Local landholders	• Individual landholders who are on the Broken Environmental Water Advisory Group or the Goulburn Broken Environmental Water Advisory Group	• Individual landholders who are on the Broken Environmental Water Advisory Group	• Individual landholders who are on the Broken Environmental Water Advisory Group
Local businesses	• Barmah Information Centre	• Local ecotourism operator • Trellys Fishing and Hunting	• Molesworth Recreation Reserve Caravan and Camping Park management • Trellys Fishing and Hunting	• Trellys Fishing and Hunting		
Recreational users	• Goulburn Broken Environmental Water Wetland Advisory Group members	• Burnanga Indigenous Fishing Club			• Individual community members on the Broken Environmental Water Advisory Group	• Individual community members on the Broken Environmental Water Advisory Group

Partner/ stakeholder	Barmah Forest	Goulburn system	Goulburn wetlands	Broken wetlands	Broken River and upper Broken Creek	Lower Broken Creek
Technical experts		• Goulburn to Murray Trade Review Scientific Advisory Panel • Scientific leads from the Commonwealth Environmental Water Holder • Monitoring, Evaluation and Research Program – Goulburn River	• Arthur Rylah Institute scientists • Department of Energy, Environment and Climate Action scientists • Water's Edge Consulting • Wetland Revival Trust			
Traditional Owners	• Yorta Yorta Nation Aboriginal Corporation	• Taungurung Land and Waters Council • Yorta Yorta Nation Aboriginal Corporation	• Taungurung Land and Waters Council • Yorta Yorta Nation Aboriginal Corporation	• Taungurung Land and Waters Council • Yorta Yorta Nation Aboriginal Corporation	• Taungurung Land and Waters Council • Yorta Yorta Nation Aboriginal Corporation	• Taungurung Land and Waters Council • Yorta Yorta Nation Aboriginal Corporation

1 The listed partners/stakeholders include partners and stakeholders who engaged with the Taungurung Land and Waters Council, which developed a seasonal watering proposal for Molesworth billabongs.

Table 5.1.2 Program partners and stakeholders that engaged with the Mallee CMA to develop seasonal watering proposals and key documents informing the proposals for the Hattah Lakes, lower Murray wetlands and Lindsay, Mulcra and Wallpolla islands (in alphabetical order)[1]

Partner/ stakeholder	Hattah Lakes	Lower Murray wetlands	Lindsay, Mulcra and Wallpolla islands
Community groups and environment groups	• Mallee CMA Land and Water Advisory Committee • Wider community	• Friends of Merbein Common • Mallee CMA Land and Water Advisory Committee • Mildura Birdlife Club • OzFish Unlimited • Wider community	• Mallee CMA Land and Water Advisory Committee • OzFish Unlimited • Wider community
Government agencies	• Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Goulburn-Murray Water • Mildura Rural City Council • Murray-Darling Basin Authority • Parks Victoria • Victorian Environmental Water Holder	• Department of Energy, Environment and Climate Action • Lower Murray Water • Mildura Rural City Council • New South Wales Department of Climate Change, Energy, the Environment and Water • Parks Victoria • Swan Hill Rural City Council • Victorian Environmental Water Holder • Victorian Murray Floodplain Restoration Project Team • Victorian Fisheries Authority	• Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Floodplain Restoration Project Team • Lower Murray Water – Victorian Murray • Mildura Rural City Council • Murray-Darling Basin Authority • New South Wales Department of Climate Change, Energy, the Environment and Water • Parks Victoria • Victorian Environmental Water Holder
Landholders/ farmers	• Landholders and farmers who live around the Hattah Lakes	• Neighbouring landholders • Trust for Nature	
Local businesses	• Mildura Visitor Information and Booking Centre • Murray Offroad Adventures • Sunraysia Apiarists' Association • Visit Mildura	• Mildura Visitor Information and Booking Centre • Murray Offroad Adventures • Sunraysia Apiarists' Association • Visit Mildura	• Mildura Visitor Information and Booking Centre • Murray Offroad Adventures • Sunraysia Apiarists' Association • Visit Mildura • Wildside Outdoors

Partner/ stakeholder	Hattah Lakes	Lower Murray wetlands	Lindsay, Mulcra and Wallpolla islands
Recreational users	• BirdLife Mildura	• BirdLife Mildura • Cabarita Community Inc.	• BirdLife Mildura
Traditional Owners	• Culpra Milli • Dadi Dadi/Weki Weki • Gilbie Corporation • Kilpara Mukwara • Munatunga Elders • Njeri Njeri • Tati Tati Land & Water • Wadi Wadi Land & Water	• Culpra Milli • Dadi Dadi/Weki Weki • First People of the Millewa-Mallee Aboriginal Corporation • Gilbie Corporation • Kilpara Mukwara • Munatunga Elders • Njeri Njeri • Tati Tati Land and Water • Wadi Wadi Land & Water • Wadi Wadi Nation	• First People of the Millewa-Mallee Aboriginal Corporation

1 The listed partners/stakeholders include partners and stakeholders who engaged with the First People of the Millewa-Mallee Aboriginal Corporation, which developed a seasonal watering proposal for Musk Duck.

Table 5.1.3 Program partners and stakeholders engaged by North Central Catchment Management Authority in developing seasonal watering proposals for Gunbower Creek and Forest, central Murray wetlands, Campaspe system, Coliban River, Loddon system (including Boort wetlands) and Birchs Creek and other key foundation documents that have directly informed the proposals (grouped in alphabetical order)

Partner/ stakeholder	Gunbower Creek and Forest	Central Murray wetlands	Campaspe system	Coliban River	Loddon system (including Boort wetlands)	Birchs Creek
Community groups and environment groups	• Individual community members	• Birdlife Australia • Turtles Australia	• Ashbourne Landcare • Strathallan Family Landcare	• Malmsbury and District Landcare Group	• Birdlife Australia • Lake Meran Committee of Management • Turtles Australia	• Tullaroop Tributaries Project Reference Group
Government agencies	• Campaspe Shire Council • Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Forestry Corporation of NSW • Gannawarra Shire Council • Goulburn-Murray Water • Murray-Darling Basin Authority • Parks Victoria • Victorian Environmental Water Holder	• Department of Energy, Environment and Climate Action • Goulburn-Murray Water • Parks Victoria • Victorian Environmental Water Holder	• Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Goulburn-Murray Water • Victorian Environmental Water Holder	• Coliban Water • Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Victorian Environmental Water Holder	• Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Goulburn-Murray Water • Parks Victoria • Victorian Environmental Water Holder	• Central Highlands Water • Department of Energy, Environment and Climate Action • Goulburn-Murray Water • Parks Victoria • Victorian Environmental Water Holder

Partner/ stakeholder	Gunbower Creek and Forest	Central Murray wetlands	Campaspe system	Coliban River	Loddon system (including Boort wetlands)	Birchs Creek
Landholders/ farmers	• Enhancing Northern Waterways Advisory Group • Individual landholders	• Enhancing Northern Waterways Advisory Group • Individual landholders and community members	• Individual landholders and community members, including via the Campaspe Environmental Water Advisory Group	• Coliban Water's Rural Advisory Group • Individual landholders and community members	• Individual landholders and community members, including via the Loddon Environmental Water Advisory Group	• Individual landholders and community members
Recreational users		• Field & Game Australia	• Game Management Authority • Local canoe clubs • VRFish	• VRFish	• Boort Angling Club • Field & Game Australia	• VRFish
Technical experts	• Vegetation, fish and bird ecologists					
Traditional Owners	• Barapa Barapa Traditional Owners • Yorta Yorta Nation Aboriginal Corporation	• Barapa Barapa Traditional Owners • Wamba Wemba Traditional Owners • Yorta Yorta Nation Aboriginal Corporation	• Dja Dja Wurrung Clans Aboriginal Corporation • Taungurung Land and Waters Council	• Dja Dja Wurrung Clans Aboriginal Corporation	• Barapa Barapa Traditional Owners • Dja Dja Wurrung Clans Aboriginal Corporation • Wamba Wemba Traditional Owners	• Dja Dja Wurrung Clans Aboriginal Corporation

Table 5.1.4 Program partners and stakeholders that engaged with the North East CMA to develop seasonal watering proposals and key documents informing the proposals for the Ovens system and upper Murray wetlands (in alphabetical order)

Partner/ stakeholder	Ovens system	Upper Murray wetlands
Community groups and environment groups	• Wangaratta Landcare and Sustainability Inc.	• Parklands Albury Wodonga
Government agencies	• Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Goulburn-Murray Water • Victorian Environmental Water Holder	• Commonwealth Environmental Water Holder • Department of Energy, Environment and Climate Action • Goulburn-Murray Water • North East Water • Victorian Environmental Water Holder
Landholders/ farmers	• Borinya Community Partnership School • Galen Catholic College	• Private landholders on surrounding farmland
Technical experts	• Arthur Rylah Institute • Sally Mann (wetland botanist)	
Traditional Owners	• Bangerang Aboriginal Corporation • Taungurung Land and Waters Council • Yorta Yorta Nation Aboriginal Corporation	

Integrated catchment management

Altered water regimes are one of many threats to the health of Victoria's waterways. Many of the environmental objectives of water for the environment in the northern region are complemented by simultaneously addressing issues such as barriers to fish movement, high nutrient loads, loss of streambank vegetation and invasive species.

Some examples of complementary programs that support environmental flow outcomes in the northern region are:

- a strategic action plan to protect floodplain marshes in Barmah Forest by removing invasive animals and controlling invasive plants
- a fishway on Taylors Creek Weir north of Kow (Ghow) Swamp to allow native fish to migrate up and down rivers in the region and to support diverse, healthy populations
- fishways at Koondrook and Cohuna weirs in Gunbower Creek and at Box Creek and Kerang Weir
- a fish screen in Gunbower Creek to reduce the number of native fish lost to irrigation channels
- an additional 270 km of native fish habitat and refuge opened up to native fish in the Ovens River with the construction of the Tea Garden Weir fishway in April 2023
- planting native aquatic plants and reintroducing woody habitat (such as snags) in lower Broken Creek to help accelerate the recovery of in-stream vegetation.

For more information about integrated catchment management programs in the northern region, see the Goulburn Broken, Mallee, North Central and North East CMAs' regional catchment strategies and regional waterway strategies.

Risk management

When developing seasonal watering proposals for the northern region systems, environmental watering program partners assessed risks associated with assessed risks associated with potential environmental water delivery in 2025-26 and identified appropriate mitigating strategies. Risks and mitigating actions are continually assessed by program partners throughout the year (see **subsection 1.2.7**).

Northern Victoria and the southern Murray-Darling Basin

Rivers, creeks and floodplains in northern Victoria form part of the southern connected Murray-Darling Basin. Water flows directly from the Victorian rivers and floodplains into the Murray River, which means that environmental flows delivered in northern Victorian systems can achieve environmental objectives at multiple sites throughout the southern Murray-Darling Basin. For example, water for the environment delivered in the Goulburn River flows into the Murray River and can be managed to make sure it flows all the way to the Lower Lakes and Coorong in South Australia, providing environmental outcomes at Gunbower Forest, Hattah Lakes, Lindsay Island and the Chowilla floodplain along the way.

Planning

The ***Murray-Darling Basin Plan 2012*** (Basin Plan) and the ***Basin-wide environmental watering strategy*** (second edition, 2019 and currently under review) guide the long-term planning of water for the environment in the Murray-Darling Basin. Under the Basin Plan, environmental objectives are met by achieving outcomes for connectivity, native vegetation, waterbirds and native fish. These objectives and outcomes reflect local site and state-based objectives. The VEWH coordinates its activities with other environmental water holders and managers in northern Victoria, NSW and South Australia to achieve environmental outcomes at the southern connected Murray-Darling Basin scale. Collaborative planning focuses on how upstream and downstream objectives align and how the broader operation of the Murray River system can help support environmental outcomes. The Southern Connected Basin Environmental Watering Committee (SCBEWC) decides on the use of the Living Murray entitlements, River Murray Increased Flows entitlement and River Murray Unregulated Flows entitlement, and it facilitates planning of coordinated environmental flows for the major rivers. The Murray Lower Darling River Indigenous Nations (MLDRIN) is a part of SCBEWC. MLDRIN directly engages with First Nations communities, and its ***Statement on environmental water use*** is also important for understanding Traditional Owners' objectives and desired outcomes.

Planning is documented in the Murray-Darling Basin Authority's basin annual environmental watering priorities, the Commonwealth Environmental Water Holder's annual portfolio management plans and the VEWH's annual seasonal watering plan (this document). SCBEWC publishes its annual operational scenarios for coordinating environmental flows in the Murray River. In Victoria, all water for the environment must be delivered in line with the VEWH's seasonal watering plan, meaning coordination during annual planning is fundamental to successful basin-scale outcomes.

Delivery coordination and monitoring

Environmental water holders and managers in the Murray-Darling Basin coordinate water deliveries to achieve landscape-scale environmental outcomes when possible. Examples include:

- delivering a winter fresh in the Goulburn River, which subsequently passed through to the Lower Lakes in South Australia and through the barrages to the Coorong to trigger upstream migration of fish (such as lamprey)
- delivering a spring flow from Hume Dam to support floodplain sites (such as Barmah-Millewa Forest) that meets downstream tributary flows from the Goulburn, Murrumbidgee and lower Darling rivers to support the river channel from the mid-Murray to the lower Murray all the way to the Lower Lakes and Coorong in South Australia. This event carries carbon and nutrients from the floodplain to the river and transports them through the system, increasing food availability, helping native fish to move and breed, and supporting native aquatic plants.

To assess the effectiveness of landscape-scale responses to environmental flows, the Southern Connected Basin Environmental Watering Committee developed the ***River Murray Channel Monitoring Plan 2021-22 to 2025-26***. The plan focuses on productivity and fish indicators to inform the management of environmental flows. This monitoring complements site-based monitoring programs across the Murray system.

Seasonal overview

Hydrological conditions

During 2024-25, the temperature in northern Victoria was very much above average, tending towards the warmest on record in the north-east of the state. Rainfall was generally below average to average across northern Victoria.

Due to below-average rainfall, there were no unregulated high flows in all river systems, and inflows to all major storages across northern Victoria were well below average. This contrasts with conditions in the previous two years, when high rainfall caused most storages to fill and spill multiple times, providing elevated high flows for long periods of the year and major flood events.

Water for the environment was managed in line with dry planning scenarios across northern Victoria in 2024-25 and in line with average planning scenarios in some areas where there was sufficient available water. For most of the year, the natural flow was insufficient to meet planned watering actions, and water for the environment was used in waterways, including the Campaspe, Loddon and Goulburn rivers, to deliver low flows and spring freshes and to cue fish movement and spawning. Most floodplains and wetlands did not receive active deliveries of environmental water in 2024-25 and were left to draw down and support dry-phase ecological processes.

Large volumes of inter-valley transfers were released from the Goulburn and Campaspe systems to the Murray system, which offset the need to deliver environmental water to the Goulburn, Campaspe and Broken river systems for prolonged periods.

The Bureau of Meteorology's climate outlook on 27 May 2025 predicted a 70 per cent chance of unusually high minimum and maximum temperatures and a 40 to 60 per cent chance of exceeding median rainfall across the northern region during winter and early spring 2025. A reliable forecast beyond early spring 2025 was not available at the time of writing.

Water availability outlook

The **seasonal determination outlook** provided by the Northern Victoria Resource Manager in May 2025 indicated all systems would reach 100 per cent high-reliability allocation in 2025-26 in average-to-wet conditions. The Campaspe system holds sufficient water to allocate 100 per cent at the beginning of July. In extreme dry to dry conditions, small systems such as the Broken and Bullarook systems are forecast to receive severely low allocations (between zero and 6 per cent high-reliability allocation). The larger Murray, Goulburn and Loddon systems have more reserves to smooth out annual variability. They are forecast to reach at least 38 per cent allocation to high-reliability water shares in an extreme dry scenario and at least 70 per cent in a dry scenario.

In May 2025, the Northern Victoria Resource Manager indicated the risk of spill at the start of July 2025 was expected to be about 45 per cent in the Murray and Campaspe systems, and 30 per cent in the Goulburn system. Inflow conditions during 2025-26 will determine how seasonal determinations and the spill risk change through the year.

Water delivery outlook

Environmental watering actions across northern Victoria in 2025-26 have been planned to consolidate and, where possible, build on the environmental gains of the natural flooding between 2022 and 2024 and environmental water delivery in 2024-25. The forecast water availability is less than in recent years, but it is expected to be sufficient to support the planned watering actions in all planning scenarios.

Most major floodplain sites need to continue to draw down for a second successive year to support important dry-phase ecological processes, so large floodplain deliveries are not planned except to Barmah Forest (in the average and wet planning scenario) and Gunbower Forest (which would commence in winter 2026 in the dry, average and wet planning scenarios).

Many wetlands are predicted to have sufficiently dried over the previous 12–18 months, priming them for rewetting in 2025-26, so wetland watering demands in the Murray system are larger than in recent years.

Environmental flows to river systems are planned to be variable, depending on climatic conditions. The largest volume is expected to be used in dry and average planning scenarios, although when conditions are dry, operational water deliveries such as inter-valley transfers (IVTs) can offset the need for delivery of environmental water and also limit opportunities to use return flows for environmental outcomes further downstream in the Murray system and South Australia. In the drought and wet planning scenarios, environmental watering demands are lowest. In drought conditions, environmental water deliveries will be limited to critical needs. In wet conditions, demand for environmental water deliveries is offset by natural and unregulated flows.

5.2 Victorian Murray system

Waterway managers – Goulburn Broken, Mallee, North Central and North East catchment management authorities

Storage managers – Goulburn-Murray Water, Lower Murray Water, Murray-Darling Basin Authority (River Murray Operations), SA Water and Water NSW

Environmental water holders – Victorian Environmental Water Holder (including the Living Murray program) and Commonwealth Environmental Water Holder

The lands and waters of the Murray River system are central to the culture of the many Traditional Owner groups that have lived along the Murray River for tens of thousands of years. Traditional Owners along the Murray have distinct cultural boundaries, languages and cultural practices. The Murray River has many different names in Aboriginal languages; for example, the Yorta Yorta people know the Murray as *Dhungulla*. The Victorian Murray system referred to in this plan includes waterways, storages, weirs, locks and regulators managed under state and Commonwealth Government legislation. This system overlays many Traditional Owner boundaries.

Within the Victorian Murray system, there are many significant floodplains and wetland systems within the areas of the North East, Goulburn Broken, North Central and Mallee CMAs. They are sites of significance for Traditional Owners, with tangible and intangible cultural connections dating back thousands of years and continuing to the present day. The Barmah Forest, Kerang wetlands and the Hattah Lakes are internationally recognised Ramsar-listed sites due to the significance of their wetland types and the abundance and range of waterbird species that use them. Many other wetlands in the system are either nationally or regionally significant.

Victorian Murray system water availability

Water for the environment can be supplied to the Victorian Murray system from various sources. These include entitlements held by the VEWH (a subset of which the VEWH holds on behalf of the Living Murray program), the Commonwealth Environmental Water Holder and the re-use of return flows. In some instances, operational water can be delivered to downstream users in a way that helps meet environmental outcomes within the river system en route.

The source of water used for individual watering actions and the ability to deliver all watering actions will depend on water availability, water commitments by other environmental water holders and operational requirements. The VEWH works with the Living Murray program and the Commonwealth Environmental Water Holder to supply Victorian Murray system demands, as well as broader southern Murray-Darling Basin demands across other jurisdictions.

At the time of writing, we cannot predict which sources of water will be available to meet Victorian Murray system demands, so the following Victorian Murray system sections do not specify the expected availability of water for the environment, nor do they classify potential environmental watering actions in each Victorian Murray system subsection as tier 1 or tier 2, based on water availability.

5.2.1 Upper Murray wetlands

System overview

The upper Murray wetlands are on the Murray River floodplain between Lake Hume and Lake Mulwala. The wetland system includes the Ryans Lagoon wetland complex, which has two main lagoons: Ryans Lagoon 1 and Ryans Lagoon 2 (Figure 5.2.1).

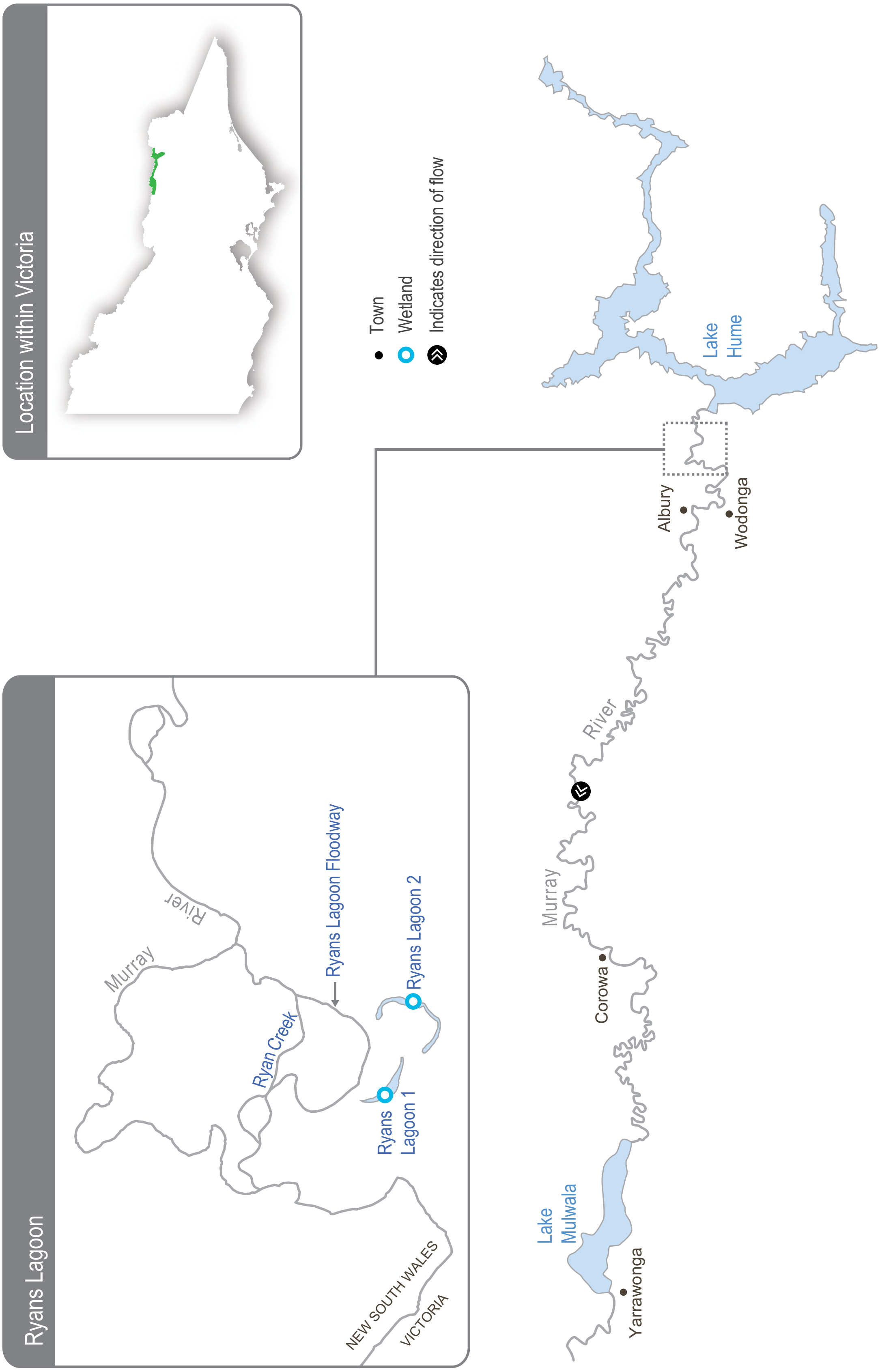
The Ryans Lagoon wetland complex is a network of wetlands positioned downstream of Lake Hume and upstream of the Kiewa River confluence with the Murray River.

Flows into the complex are mainly influenced by regulated releases from Lake Hume, which travel via Ryans Creek, an anabranch of the Murray River. The complex begins to fill from Ryans Lagoon Floodway through a culvert when the flow in the Murray River at the Heywoods gauge immediately below Lake Hume exceeds 23,000 ML per day, but sustained flows above 24,000 ML per day are needed to fill both lagoons completely.

It is proposed to use a temporary pump to deliver water for the environment to restore the ecological health of the complex by providing a wetting and drying regime closer to the natural flow regime that existed before the Murray River was regulated. Water can be pumped into Ryans Lagoon 2 from the Ryans Lagoon Floodway when the flow in the Murray River exceeds 12,000 ML per day and fills the floodway to a suitable depth for a pump to operate.

A spring pulse for the Hume-to-Yarrawonga reach of the Murray may be required to fill Ryans Lagoon Floodway to a sufficient height and duration for pumping.

Figure 5.2.1 Upper Murray wetlands



Environmental values

The North East CMA's ***North East Waterway Strategy*** recognises the Ryans Lagoon wetland complex as a high-value wetland system, and it is listed as a nationally significant wetland in the ***Directory of Important Wetlands in Australia***. The complex provides habitat for five bird, two fish, one frog, two reptile, one mammal and two perennial plant species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and/or the Victorian *Flora and Fauna Guarantee Act 1988*. Ecological surveys conducted at the site since 1975 have recorded 250 species of waterbugs and over 30 species of waterbirds, including the Australian white ibis, eastern great egret, little egret, intermediate egret, musk duck and rufous night heron. The complex also supports native wetland vegetation communities expected to benefit from a seasonally aligned, more variable watering regime.

Three species of freshwater turtle were observed at Ryans Lagoon wetland complex in 2024 after environmental water was delivered, including the endangered broad-shelled turtle, the critically endangered Murray River turtle and the eastern long-necked turtle. These turtle species hold cultural significance to the Duduroa Dhargal people.

Environmental objectives in the upper Murray wetlands

A1 – Increase habitat for frogs and increase their population
B1 – Provide feeding habitat for a range of waterbird species
CN1 – Restore carbon and nutrient cycling within the wetlands to increase ecosystem productivity
F1 – Increase habitat for native fish and increase their population
MI1 – Increase the abundance and diversity of waterbugs to support aquatic food webs
V1 – Increase the extent of fringing and aquatic vegetation **V2** – Decrease weed coverage and redgum encroachment
T1 – Provide food and breeding habitat for turtle populations

Traditional Owner cultural values and uses

Traditional Owners have lived on and cared for the upper Murray floodplain for tens of thousands of years. Wetlands in the region have immense cultural value to Traditional Owners. There is no Registered Aboriginal Party (RAP) for the Ryans Lagoon area. Several Traditional Owner groups are within the upper Murray area, including those represented by the Duduroa Dhargal Aboriginal Corporation (DDAC), the Dhudhuroa Waywurru Nations Aboriginal Corporation and the Dalka Warra Mittung Aboriginal Corporation.

In 2023, Traditional Owners from DDAC received funding through to 2026 to help manage the Ryans Lagoon Nature Conservation Reserve along with Parklands Albury Wodonga Ltd. The funding has employed a DDAC Elder as a part-time ranger to undertake management activities, including ecological thinning, weed management, pest control and revegetation of native grasses and wetland plants for traditional uses. The ranger will also train First Nations people in cultural burning, cultural harvesting and cultural education activities. DDAC has also received funding to employ two Aboriginal Water Officers to undertake water management activities for self-determined purposes.

Since 2023, the North East CMA and DDAC have partnered to plan and deliver environmental water to Ryans Lagoon, providing opportunities for DDAC to explain important cultural values at Ryans Lagoon and some of their objectives for managing Country, including water.

DDAC wants environmental water delivered to Ryans Lagoon annually and a more natural water regime restored. DDAC would like to improve habitat for wetland plants, birds, frogs, turtles and fish, including through the planned environmental water deliveries, which will support management actions for the ecological and cultural values of the Duduroa Dhargal people.

> "The overall ideological reason (for the on-ground work) is to increase the biomass (meaning increase the native animals and traditional plants in the area for traditional purposes and practices) and create a refuge for species in this wetland complex, ensuring their survival and succession for the future within the catchment."
>
> *– DDAC Program Manager, 2024*

> "We are water people. We lived on the river and lived on the wetlands. We used these waterways for foods, medicines and resources. When the wetlands dried up, we would have moved on. We moved to where the water was to sustain life. Water in these wetlands is essential to Cultural connection, learning and sharing knowledge with our people. Without water, we wouldn't be here today."
>
> *– DDAC Elders, 2024*

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

How watering actions may support cultural values and uses

The North East CMA and DDAC have reviewed and discussed spring 2024 environmental water deliveries, the rate of drawdown and the initial ecological response. DDAC have asked that environmental water be delivered to fill the wetlands in 2025-26, to improve productivity and the health and abundance of culturally significant species, and suppress weeds, which is a key management action of DDAC's *Ryans Lagoon Cultural Wetland Management Plan*. The delivery of environmental water in winter/spring 2025 will provide the required watering regime and support the habitat of several species, including turtles, frogs, aquatic vegetation and waterbirds.

DDAC will develop a management plan in 2025 for the turtle and frog species that have been recently recorded at Ryans Lagoon, including culturally significant turtle species and the endangered Sloane's froglet. The plan will consider the desired watering regime for these species. Turtles were observed hatching from nests in the banks of Ryans Lagoon 2 in February 2025.

DDAC has ordered aquatic plants, including water ribbon, from Our Native Garden Nursery, Wodonga, and it plans to have them planted on the banks of Ryans Lagoon 2 before the delivery of environmental water in winter/spring 2025.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 5.2.1** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.2.1**, the North East CMA considered how environmental flows could support values and uses, including:

- recreation and amenity (such as birdwatching)
- community and cultural events (such as visitation by schools, Landcare groups and other community members)
- socioeconomic benefits (such as cultural tours and incidental visitation to local towns and businesses).

Environmental water deliveries will improve the function of the wetland by mimicking the natural flow regime, aiming to improve ecosystem function and provide multiple habitat niches for native plants and animals. This will align with a community benefit for members of the local Landcare group, Parklands Albury Wodonga and the Duduroa Dhargal Aboriginal Corporation, which have joint land management responsibilities and use the site for conservation-based events.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.2.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.2.1 Upper Murray wetlands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Ryans Lagoon 1 and Ryans Lagoon 2 (fill in winter/spring)	• Maintain permanent, deep, open-water habitat that supports food resources for waterbirds, turtles and native fish • Prevent the encroachment of river red gum saplings and reduce exotic vegetation species • Mobilise carbon and nutrients within the wetlands to support wetland processes • Inundate margins to provide refuge and feeding habitat for small and large-bodied native fish • Increase soil moisture to promote the growth of fringing vegetation and the surrounding river red gum community • Inundate beds of aquatic and semi-aquatic vegetation to stimulate growth and increase their extent • Inundate wetland margins to provide habitat for waterbugs and foraging opportunities for waterbirds	A1, B1, CN1, F1, MI1, V1, V2, T1

Scenario planning

Table 5.2.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The upper Murray wetlands were added to the VEWH's seasonal watering plan in 2022-23. However, pumping environmental water was not required in 2022-23 or 2023-24 because natural floods filled Ryans Lagoon 1 and Ryans Lagoon 2, as well as other wetlands across the upper Murray floodplain.

Environmental water was delivered to the Ryans Lagoon wetlands for the first time in spring 2024, with 184.7 ML of water pumped from the Ryans Lagoon Floodway over a nine-week period. This completely filled Ryans Lagoon 2, which reached the target height of 154.4 m AHD and partially filled Ryans Lagoon 1, which reached a height of 153.2 m AHD. The drawdown rate within the wetlands was monitored over summer, following the spring watering. The 2024-25 summer months experienced below-average rainfall and below-average inflows into Hume Dam. At the end of January 2025, Lagoon 1 had drawn down to two isolated pools, and the gauge board site was dry. Lagoon 2 had drawn down to 153.8 m AHD, which is a 60 cm drop from the target fill height. This rate of drawdown can be attributed to high evaporation over the summer months, low soil moisture before the watering event due to dry conditions for most of 2024, and mostly lower-than-average rainfall for the 12 months to January 2025. The wetlands are expected to further draw down before spring 2025.

The two lagoons would have naturally filled every year before the river was regulated, and they require frequent watering to maintain permanent water to sustain native fish and provide a reliable foraging site for waterbirds. For these reasons, the planned winter/spring watering is a high priority in all planning scenarios in 2025-26. Water for the environment, delivered via a temporary pump, will likely be needed to fill both lagoons in drought, very dry, dry and average conditions.

Unregulated flows and natural floods in the Murray River system are likely to inundate the wetlands in wet conditions, and water for the environment will only be used in these conditions to top up water levels in each lagoon if they do not fill naturally.

Pumping to the lagoons is only possible if there is sufficient water depth and for a sustained duration in Ryans Lagoon Floodway. In the drought, dry and average planning scenarios, if the floodway does not provide the conditions required to allow pumping, there is a risk that the planned watering actions may not be delivered.

The volume of water for the environment required to achieve objectives in 2025-26 is greater than 2024-25 to accommodate the higher-than-expected losses observed during delivery in 2024-25. The increased volume also provides the option of further filling Lagoon 1 to better deal with terrestrial vegetation encroachment and weed management.

Table 5.2.2 Upper Murray wetlands environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• No unregulated flow below Hume Dam • Regulated flow from Hume Dam may connect Ryans Floodway to allow pumping into Ryans Lagoon 2	• Unregulated flow is unlikely below Hume Dam • Regulated flow from Hume Dam may connect the Ryans Floodway to allow pumping into Ryans Lagoon 2 • Possible spring pulse could deliver water to Ryans Floodway to allow pumping to Ryans Lagoon 2	• Unregulated flow is possible below Hume Dam if storages are near capacity • Unregulated flow may achieve a partial or complete fill of Ryans Lagoon 1 and 2 • Regulated flow from Hume Dam may connect the Ryans Floodway to allow pumping into Ryans Lagoon 2 • Possible spring pulse could deliver water to the Ryans Floodway to allow pumping to Ryans Lagoon 2	• Periods of unregulated flow below Hume Dam are likely and may achieve a partial or complete fill of Ryans Lagoon 1 and 2 • Pumping into Ryans Lagoon 2 to top up Ryans Lagoons 1 and 2 could be considered to achieve a complete fill if a sufficient water height in Ryans Floodway can be achieved
Potential environmental watering – tier 1 (high priorities)	• Ryans Lagoon 1 and 2 (fill in winter/spring)			
Possible volume of water for the environment required to achieve objectives	• 240 ML (tier 1)			

5.2.2 Barmah Forest

System overview

The Barmah Forest is located within Yorta Yorta's traditional boundaries. The forest reserve is 29,305 ha in size and forms the Victorian component of the broader Barmah-Millewa Forest that covers about 66,000 ha where it spans the New South Wales/Victorian border between Tocumwal, Deniliquin and Echuca (Figure 5.2.2).

The Barmah-Millewa Forest is listed under the Convention on Wetlands of International Importance (the Ramsar Convention) as well as included in the ***Directory of Important Wetlands in Australia***, and it is one of six Living Murray icon sites. The forest's Victorian components are the Barmah National Park and part of the River Murray Reserve, protecting a river red gum forest and associated wetlands that support a broad diversity of significant plant and animal species and culturally significant sites.

Flooding in the Barmah-Millewa Forest depends on the flow in the Murray River. A natural narrowing of the river (commonly referred to as the Barmah Choke) restricts the flow and causes overbank flooding when the flow below Yarrawonga Weir exceeds the channel's capacity. This restriction influences both the operation of Yarrawonga Weir and the magnitude of environmental flows that can be delivered to the forests. The Yorta Yorta people see this narrow part of *Dhungalla* (Murray River) as a culturally significant creation story, and it provides ecosystem services from both a culturally and environmentally significant viewpoint. The name 'Barmah Choke' is culturally inappropriate for the Yorta Yorta, and it is seen as a negative way to view their traditional lands and waters. Yorta Yorta People refer to this as the 'Pama Narrows', or more simply 'The Narrows'.

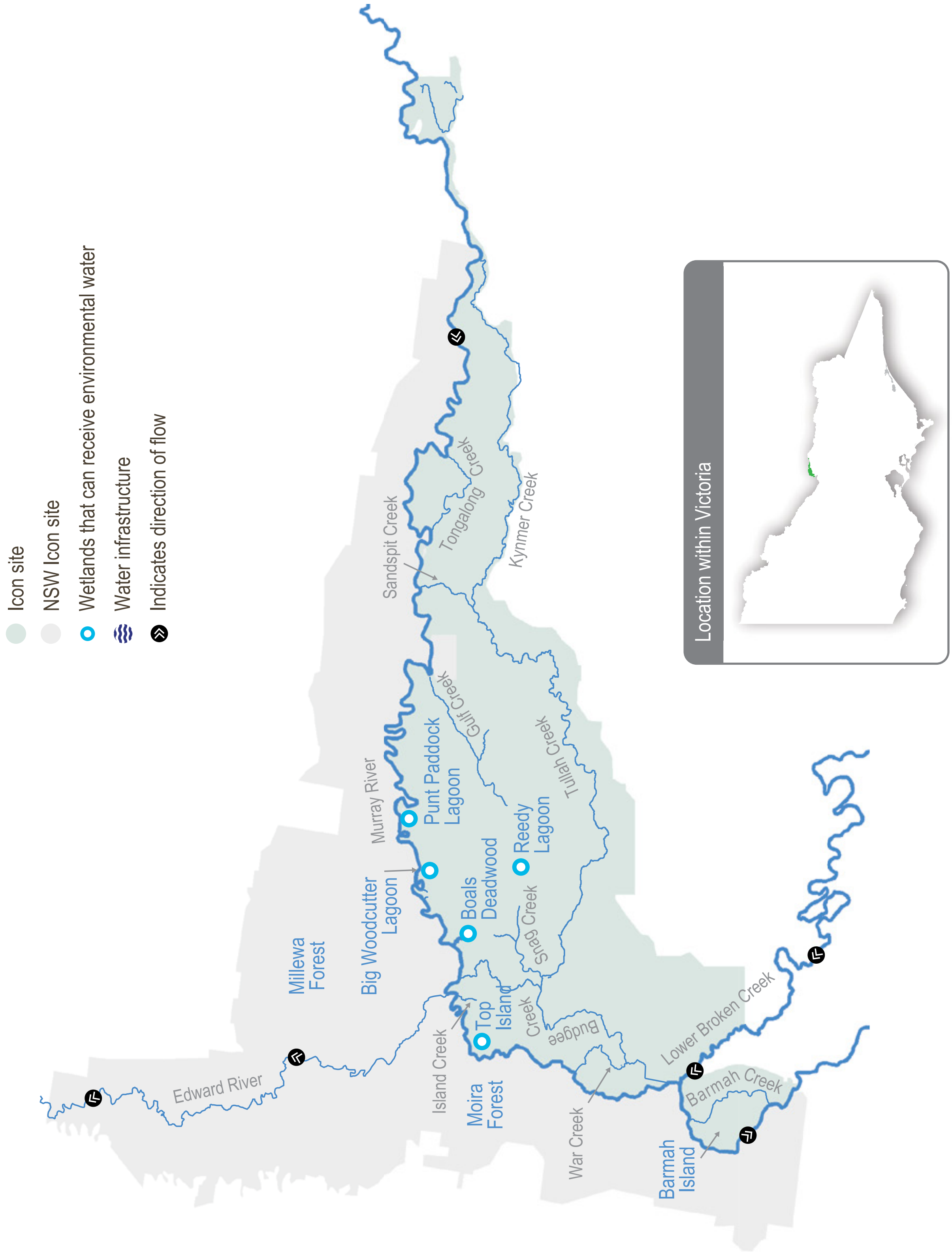
Before the river was regulated, Barmah-Millewa Forest was regularly flooded with high flows from rainfall and snowmelt in winter and spring. These regular floods shaped a rich, productive floodplain. The construction and operation of Hume Dam and Dartmouth Dam have greatly reduced the size and frequency of natural winter/spring floods in Barmah-Millewa Forest.

Operational deliveries that supply water to users downstream of The Narrows can cause unseasonal, low-level floods, which can damage the forest and erode riverbanks, depending on the timing and volume of the flow. Country for the Yorta Yorta people continues to change, but the changes have been rapid post-European settlement due to the installation of infrastructure and river regulation. This has changed Country culturally and environmentally for the Yorta Yorta people.

The delivery of irrigation water during summer/autumn is now managed to minimise the unseasonal flooding of the forest. Regulators along the banks of the Murray River that control the flow between the river and the forest remain closed during summer and autumn to restrict the flow through low-lying flood runners to simulate natural conditions. The delivery of water to Barmah-Millewa Forest is also limited by a flow constraint below Yarrawonga Weir that aims to minimise impacts to adjacent farming operations in NSW. The current constraint limits the regulated flow to a maximum river level of 3.3 m at the Tocumwal gauge (subject to conditions). Until recently, the 3.3 m limit would be met with a flow of about 18,000 ML per day downstream of Yarrawonga Weir, but owing to reduced river capacity due to sediment accumulation, the height limit is now met with a 17,000 ML per day flow. A regulated flow up to a river level of 3.0 m on the Tocumwal gauge (historically about 15,000 ML per day, now 14,500 ML per day downstream of Yarrawonga Weir) can be delivered at any time during the year and is not subject to conditions. To overcome this constraint, most environmental flows are alternated between the Barmah and Millewa forests to deliver water to low-lying wetlands in each forest at least every second year. It is currently not possible to achieve the desired flood depth and duration for floodplain marsh vegetation in both forests at the same time without larger natural flooding.

Water management at Barmah-Millewa Forest seeks to build on natural flow and the delivery of consumptive and operational water to optimise environmental outcomes when possible. As Barmah-Millewa Forest is located towards the upper reaches of the regulated portion of the Murray River, water for the environment that passes through the forest and returns to the river can often be used at sites further downstream as part of multi-site watering events.

Figure 5.2.2 Barmah Forest



Environmental values

The Barmah-Millewa Forest is the nation's largest river red gum forest and the most intact freshwater floodplain system along the Murray River. The forest supports important floodplain vegetation communities, including the threatened Moira grass plains. It is an important feeding and breeding site for waterbirds, including bitterns, ibis, egrets, spoonbills and night herons. Significant populations of native fish, frogs and turtles also live in the forest's waterways. Barmah Forest is known to support 74 plant and animal species protected under state and national legislation.

Environmental objectives in the Barmah Forest

A1 – Increase frog populations

B1 – Support the successful recruitment of colonial nesting waterbirds

CN1 – Enable carbon and nutrient cycling between the floodplain and river through connectivity

F1 – Increase habitat for native fish and increase their populations

G1 – Protect forest waterways from increased erosion

T1 – Increase turtle populations

V1 – Improve the health of river red gum communities and aquatic vegetation in the wetlands and watercourses

V2 – Increase the extent and improve the condition of floodplain marsh vegetation communities, with a particular focus on Moira grass

WQ1 – Reduce the risk of low-oxygen events in summer

Traditional Owner cultural values and uses

> "We are the First People of this place. We were here even before the Murray River flowed through Barmah."
>
> – *Uncle Des Morgan, Yorta Yorta Elder,* ***Joint Management Plan for Barmah National Park***

The Yorta Yorta Nation Aboriginal Corporation (YYNAC) manages Barmah National Park with Parks Victoria under a Traditional Owner Land Management Agreement with the State of Victoria. The ***Joint Management Plan for Barmah National Park*** and the ***Yorta Yorta Whole-Of-Country Plan 2021-2030*** inform environmental water management in Barmah National Park. Ongoing interaction on land and water management at Barmah also occurs with Yorta Yorta through the Living Murray Indigenous Partnerships Program.

YYNAC continues to pursue the Yorta Yorta people's inherent rights to water for Country. Rights to water will address their spiritual, cultural, environmental, social and economic needs, in line with the *Yorta Yorta Whole-Of-Country Plan 2021-2030*.

Yorta Yorta values encompass an inherent and living connection to land (*woka*), water (*wala*) and caring for Country. Examples of Yorta Yorta cultural values and uses in Barmah Forest that are supported through deliveries of water for the environment include:

- maintaining refuges that protect turtles, an important totemic species for the Yorta Yorta people, and southern pygmy perch, where reintroduced
- watering to support floodplain marsh vegetation, which includes important food, fibre and medicinal plants (such as sneezeweed and weaving sedge)
- improving the health of river red gums, which has benefits for important Yorta Yorta sites and significant markings (such as a scarred tree) and furthers connections to Country
- broader restoration to achieve healthy Country.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.2.3**, the Goulburn Broken CMA, in conjunction with Yorta Yorta and Parks Victoria as joint managers, considered how environmental flows could support values and uses, including:

- water-based recreation (such as boating, fishing, kayaking and canoeing)
- riverside recreation and amenity (such as birdwatching, picnicking, photography, camping and the general physical, mental and social benefits of being in nature)
- community events and tourism
- socioeconomic benefits (such as for apiarists and improved water quality).

Generally, sites along the major rivers have high visitor numbers, and the increased flows from environmental water deliveries can benefit people fishing, yabbying and birdwatching, particularly if previous flooding has strengthened the tree canopy and resulted in flowering.

Economic benefits include more tourism opportunities, better water quality of diverted flows returning to the river (by reducing turbidity), and a greater ability to bypass Murray Choke restrictions for downstream irrigation water deliveries in spring when environmental water and other flows must be diverted through the forest. These diversions occur when a substantial percentage of the flows return to the river after floodplain inundation and are re-credited to river operations and environmental water accounts as appropriate. These flows are therefore reallocated to downstream irrigation, domestic and environmental water use.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.2.3 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.2.3 Barmah Forest potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Winter/spring forest low flow to various waterways in Barmah Forest (variable flow rates and duration during July to December 2025 and June 2026)	• Provide a gradual connection of waterways with the Murray River to minimise erosion within those waterways • Provide flow in forest waterways to make sure adequate refuge pools persist for native fish (including southern pygmy perch release sites) and turtles • Provide adequate depth and connection between floodplain waterways and the river to facilitate the movement of native fish • Remove accumulated organic matter from waterways to cycle carbon to the river system and minimise the risk of low-oxygen blackwater by ensuring through-flow	CN1 F1 G1 T1 WQ1
Winter/spring/summer low flow in the Murray River (greater than 7,500 ML/day below Yarrawonga Weir during August to December)	• Maintain a sufficient water level in the Murray River main channel to prevent Murray cod from abandoning their nests, increase juvenile survival and improve dispersal opportunities	F1

Potential environmental watering action	Expected watering effects	Environmental objectives
Spring/summer fresh(es) in the Murray River channel (one to three freshes that increase flow by at least 500 ML/day and maintain it for two to eight days during November to December)	• Provide variable water levels once water temperatures exceed 22°C to trigger the spawning of native fish species, primarily silver perch	F1
Spring/summer/ autumn freshes to Gulf and Boals creeks (100 ML/ day for three to five days as required during November to April)	• Maintain critical refuge pools to provide habitat for native fish (including southern pygmy perch release sites) and turtles • Flush refuge pools to maintain water quality	F1 T1 WQ1
Spring/summer/ autumn low flow to floodplain waterways, including Kynmer, Sandspit, Gulf, Big Woodcutter, Boals and Island creeks and Punt Paddock Lagoon (200 ML/ day for 30-60 days during November to April)	• Replenish refuge pools in permanent waterways to maintain water quality, fish (including southern pygmy perch release sites) and turtle populations • Maintain connectivity between the forest and the river • Remove accumulated organic matter, cycle carbon to the river system, and minimise the risk of low-oxygen blackwater	CN1 F1 T1 WQ1
Boals Deadwood, Harbours Lake, Reedy Lagoon and Top Island wetlands fill or top-up (200-400 ML/day for four and a half months during September to February)	• Provide a cue to initiate waterbird breeding and maintain a depth of at least 0.5 m beneath reed beds supporting group-nesting waterbirds • Maintain wetting duration and depth to grow the wetland vegetation	B1 V1

Potential environmental watering action	Expected watering effects	Environmental objectives
Spring wetting of floodplain marshes (variable flow rates between 8,300-14,500 ML/day below Yarrawonga Weir for three months during September to December)	• Inundate open plains to a sufficient depth and for a sufficient duration to allow the growth of floodplain marsh vegetation • Inundate forest wetlands and low-lying floodplain areas to create foraging opportunities for waterbirds and increase available habitat for turtles, frogs and small-bodied native fish • Support waterbird breeding by maintaining a depth of at least 0.5 m beneath reed beds supporting group-nesting waterbirds	A1 F1 T1 V2 B1
Autumn/winter low flow in the Murray River (4,000-5,000 ML/day downstream of Yarrawonga during May to June)	• Increase water depth in the Murray River channel to provide habitat for large-bodied native fish in the Murray River and unregulated anabranches in Barmah-Millewa Forest	F1

Scenario planning

Table 5.2.4 outlines potential environmental watering and expected water use in a range of planning scenarios.

In April 2025, the Bureau of Meteorology was forecasting continuing dry weather for much of the south-east Murray-Darling Basin catchment for the remainder of autumn and early winter, with warmer-than-average day and night temperatures. This will reduce inflows to upper storages and tributaries and reduce the likelihood of natural flooding to Barmah Forest, especially with upper storages currently at relatively low levels.

Barmah Forest experienced only one, brief natural flood peak in 2024-25, which inundated an area slightly greater than can be achieved with environmental water releases alone under current delivery constraints. Had no water for the environment been delivered outside of this natural flood event, the duration of flooding on the Moira grass plains would have been inadequate. However, both combined to achieve a suitable flood regime on the lower parts of the floodplain. The broader forest remains very dry, especially given the very hot and dry conditions that have prevailed since parts were previously flooded in winter/spring 2023. The last broad-scale flooding of the forest was in spring 2022. However, seasonal forecasts for the important spring period have yet to be made, especially as the autumn forecast period is generally less accurate. High reliance on using water for the environment is therefore likely in 2025-26, but not certain. The potential watering actions in this plan are required in most or all years to support the identified environmental values and objectives. For these reasons, the potential watering actions in each planning scenario are similar to those in previous plans.

The ecological objectives for Barmah-Millewa Forest require a sustained flow in the Murray River through winter and spring. Flow-control structures are used to direct water from the Murray River channel into the forest and to facilitate the later return of most of that water back to the river, transporting carbon and nutrients for use downstream. Current flow constraints mean environmental watering will primarily target Millewa Forest in 2025-26, aiming to meet the depth and duration targets for wetlands. Barmah Forest will still receive a flow, but depth and duration targets for some forest wetlands may not be fully met. These arrangements alternate between the Barmah and Millewa forests each year.

Demands for water for the environment in Barmah Forest vary significantly in response to seasonal conditions. A variable winter/spring managed flood of the forest and spring/summer freshes are required in all planning scenarios. The variable winter/spring flow in the forest aims to connect waterways in the forest to the Murray

River, to maintain habitat and provide movement opportunities for aquatic animals (such as native fish). This watering action will be achieved by keeping regulating structures open between June/July and December to allow water to move in and out of the forest in response to variations in the flow of the Murray River, which is most prone to experiencing natural flooding in spring. The spring/summer freshes specifically aim to trigger silver perch to spawn when the water temperature exceeds 22°C and are achieved by varying the flow in the Murray River below Yarrawonga Weir.

In drought and dry conditions, potential environmental flows primarily aim to maintain water levels and water quality in refuge habitats within the forest to sustain fish (including at southern pygmy perch release sites) and turtle populations. To achieve these objectives, spring/summer/autumn freshes provide the relatively small volumes of water needed in the forest and are unlikely to return much water to the Murray River for downstream use. They may also be used in average and wet conditions to lessen water quality issues that sometimes occur when forest regulators are closed to allow the forest wetlands to dry during summer.

Given moderate storage levels and the forecast moderate water availability in 2025-26, larger-volume watering actions (such as continuous spring wetting of floodplain marshes) might not be possible. Some inundation to reduce the recession of a natural flood peak might instead occur, or drought and dry planning scenario water actions might be more likely. Multi-site environmental watering actions that support whole-of-Murray-River environmental objectives in winter/spring may also increase the flow through Barmah Forest, or water for the environment may be used to piggyback operational transfers from Hume Dam to achieve local objectives (such as supporting waterbird nesting events).

The winter/spring/summer flow in the Murray River channel aims to maintain sufficient water levels for successful Murray cod nesting and recruitment in the average and wet planning scenarios to increase local Murray cod populations and help the species recover across the broader region. The volume needed to achieve this low flow depends on the contribution of the natural flow and the delivery of operational water downstream through Barmah Choke. This action will provide an environmental water return flow that can be used further downstream at other sites along the Murray River.

In the average and wet planning scenarios, the focus shifts to building resilience in the system by enhancing ecological responses to unregulated floods. Actions in these planning scenarios (such as spring wetting of floodplain marshes) may include extending the duration of unregulated floods (within flow constraints) to increase the vigour and resilience of wetland communities (such as Moira grass plains) and extending watering in river red gum forests to maintain the health of the trees. Large volumes of water will be directed into the forest, with water for the environment provided as a directed release from Hume Dam targeting specific flow rates downstream of Yarrawonga Weir and managed using forest regulators. Most of the water used for these actions eventually returns to the Murray River through the natural shedding action of the Barmah-Millewa floodplain.

Forest regulators are usually closed in summer and autumn (and sometimes in spring if water availability is low) to keep unnaturally high river flows out of the forest and allow a natural drying phase. However, there have been instances of fish trapped behind regulators — fish unable to return to the Murray River before regulator gates were closed — that have then died in mass casualty events from asphyxiation when oxygen levels have dropped too low. The main waterways behind regulators at Gulf, Punt and Boals creeks may be needed for critical refuge by improving oxygen levels for native fish using only a small volume of water.

Table 5.2.4 Barmah Forest environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Unregulated flow periods are unlikely • Flow in the Murray River will remain within the channel all year	• Some small, unregulated flow in late winter/spring • Low chance of overbank flow in late winter/ spring	• Likely chance of small-to-medium unregulated flow in winter/ spring • Likely chance of overbank flow in winter/ spring	• High probability of moderate to large unregulated flow in winter/ spring • Expected large overbank flow
Potential environmental watering – tier 1 (high priorities)	• Winter/spring forest low flow • Spring/summer fresh(es) in the Murray River (one to three freshes) • Spring/ summer/ autumn freshes (to Gulf and Boals creeks)	• Winter/spring forest low flow • Spring/summer fresh(es) in the Murray River (one to three freshes) • Spring/ summer/ autumn freshes to Gulf and Boals creeks • Spring/ summer/ autumn low flow to floodplain waterways • Fill or top up Boals Deadwood	• Winter/spring forest low flow • Winter/spring/ summer low flow in the Murray River • Spring/summer fresh(es) in the Murray River (one to three freshes) • Spring/ summer/ autumn fresh(es) to Gulf, Punt and Boals creeks • Spring/summer low flow to floodplain waterways • Fill or top up Boals Deadwood, Harbours Lake, Reedy Lagoon and Top Island wetlands • Spring wetting of floodplain marshes • Autumn/winter low flow in the Murray River	• Winter/spring forest low flow • Winter/spring/ summer low flow in the Murray River • Spring/summer fresh(es) in the Murray River (one to three freshes) • Spring/ summer/ autumn fresh(es) to Gulf, Punt and Boals creeks • Spring/summer low flow to floodplain waterways • Fill or top up Boals Deadwood, Harbours Lake, Reedy Lagoon and Top Island wetlands • Spring wetting of floodplain marshes • Autumn/winter low flow in the Murray River

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• Spring/ summer/ autumn low flow to floodplain waterways • Spring wetting of floodplain marshes • Autumn/winter low flow (in the Murray River)	• Fill or top up additional wetlands such as Harbours Lake, Reedy Lagoon and Top Island wetlands • Spring wetting of floodplain marshes • Autumn/winter low flow in the Murray River	• N/A	• N/A
Possible volume of water for the environment required to achieve objectives[1, 2]	• 9,000 ML (tier 1)	• 19,000 ML (tier 1)	• 267,000 ML (tier 1)	• 168,000 ML (tier 1)

1 The volume of water for the environment required to deliver the tier 2 watering actions in drought and dry planning scenarios will depend on demands for multi-site environmental events or operational transfers and is therefore not estimated in **Table 5.2.4**.

2 The possible volumes of water for the environment required in Barmah Forest are estimates and highly variable, depending on factors such as seasonal conditions and the contributions of operational and/or unregulated flows. Much of the water for the environment delivered to Barmah Forest is returned to the Murray River — around 80 per cent in the dry, average and wet planning scenarios — and can be re-used at downstream sites.

5.2.3 Gunbower Forest and Creek

System overview

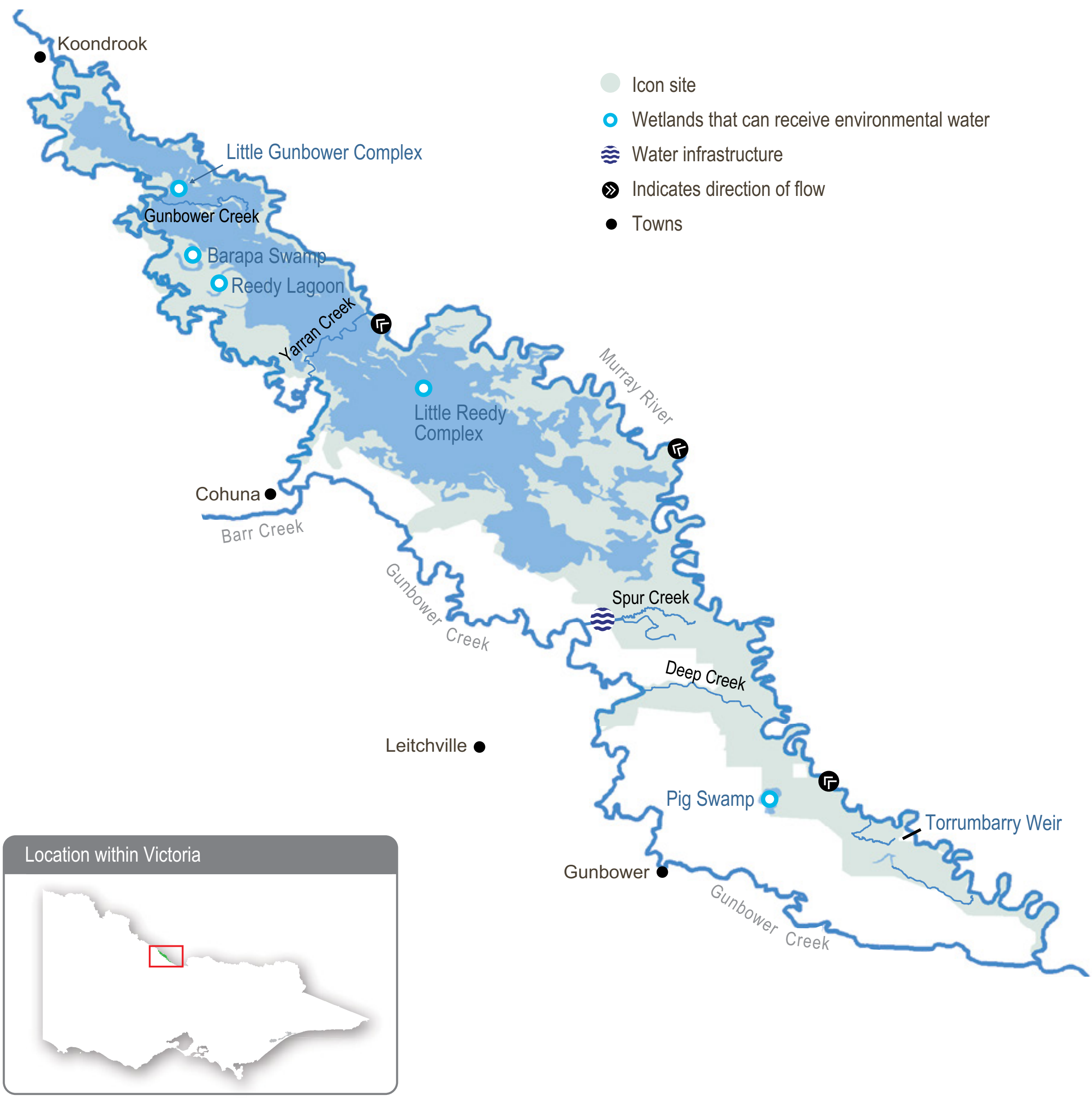
Gunbower Forest is a large (19,450 ha), flood-dependent forest situated on the Murray River floodplain in northern Victoria between Torrumbarry and Koondrook (Figure 5.2.3).

Gunbower Forest is bounded by the Murray River to the north and Gunbower Creek to the south. It is an internationally significant site under the Ramsar Convention and forms part of the Living Murray Gunbower-Koondrook-Perricoota Forest icon site. Regulation of the Murray River and water extraction has reduced the frequency, duration and magnitude of flood events in Gunbower Forest over the long term. This has affected the extent and condition of floodplain habitats and the health of native plants and animal communities (such as river red gum and black box communities, native fish, birds, platypus, frogs and turtles) that depend on those habitats.

Gunbower Creek is a natural creek that has been modified to supply irrigation water from the Murray River to the Torrumbarry Irrigation Area. There are 12 lagoons, largely located in the upper reaches of the creek system, that are permanently or seasonally connected to Gunbower Creek. Water for the environment is used in Gunbower Creek to improve habitat for native fish, especially Murray cod.

The Living Murray environmental works program in the middle and lower forest was completed in 2013-14. The works allow up to 4,500 ha of the wetlands and floodplain to be watered with considerably less water than would be required if the watering infrastructure was not in place. The works enable efficient watering through Gunbower Creek and the forest to maintain the wetland and floodplain condition and provide connectivity between the creek, forest floodplain and the Murray River. Frequent connections between the river and floodplain habitats allow animals to move between habitats and support critical ecosystem functions (such as carbon exchange).

Figure 5.2.3 Gunbower Forest and Creek



Environmental values

Gunbower Forest contains many important environmental values. It includes rare and diverse wetland habitats and large areas of remnant vegetation communities (such as river red gum forest and woodlands). It is home to vulnerable and endangered plants and animals, including river swamp wallaby grass, wavy marshwort, Murray-Darling rainbowfish and eastern great and intermediate egrets. Gunbower Forest also supports internationally recognised migratory waterbird species.

Gunbower Creek provides important habitat for native fish (such as Murray cod, golden perch and freshwater catfish). It is a valuable refuge for native fish and provides a source of fish to recolonise surrounding waterways.

The overarching ecological objectives for Gunbower Forest and Gunbower Creek are currently under review to incorporate new information and better align with the Murray-Darling Basin Plan. However, the intent of the original objectives is expected to remain similar. For this seasonal watering plan, the original objectives remain and will be updated through the environmental water management plan update process.

Environmental objectives in Gunbower Forest and Creek

A1 – Increase the diversity and abundance of native frog species within the forest

B1 – Provide feeding, breeding and refuge habitat for waterbirds, including colonial nesting species (such as egrets, cormorants and herons)

CN1 – Enable carbon and nutrient cycles in the forest and wetlands, and periodically deliver carbon and nutrients from the forest to adjacent waterways to support food webs

F1 – Maintain healthy populations of native fish in wetlands and increase opportunities for riverine fish to access floodplain resources

F2 – Increase the abundance and improve the age class distribution of small- and large-bodied native fish species in Gunbower Creek

F3 – Increase connectivity to promote movement and migration of native fish

F4 – Rehabilitate populations of native fish that are poorly represented or absent in the system (such as silver perch)

T1 – Maintain freshwater turtle populations by providing suitable feeding, breeding and refuge habitat

V1 – Improve the health and increase the abundance of native vegetation in permanent and semi-permanent wetlands

V2 – Improve the health of river red gums and maintain the health of black box communities

WQ1 – Maintain the water quality in Gunbower Creek

Traditional Owner cultural values and uses

Yorta Yorta Nation Aboriginal Corporation (YYNAC) is a Registered Aboriginal Party (RAP) representing Traditional Owners with connections to the upper areas of Gunbower Forest. The Barapa Barapa First Nations People have connections to the middle and lower areas of Gunbower Forest.

The North Central CMA supports self-determined involvement by Traditional Owners in environmental water planning and delivery, and environmental watering at Gunbower Forest is guided by ongoing consultation with the Yorta Yorta and Barapa Barapa First Nations People, to make sure opportunities to participate are readily available and can be prioritised if desired.

The Yorta Yorta First Nations People's participation in environmental water planning and delivery is facilitated by YYNAC. YYNAC has not provided specific cultural watering objectives or aspirations at Gunbower Forest but continues to be involved in the collaborative delivery of many monitoring and cultural heritage projects at Gunbower Forest. The North Central CMA remains committed to supporting the involvement and input of Yorta Yorta First Nations People at Gunbower Forest and making sure environmental watering actions are culturally informed and can support their aspirations for looking after Country.

Barapa Barapa have clearly expressed their aspirations for an active role in the management of land and water to fulfil custodianship obligations and contribute to improvements in the health of Country. Barapa Barapa have been working in partnership with the North Central CMA to deliver the Water for Country project in Gunbower Forest since 2015. The project builds on the work of the previous Barapa Barapa Cultural Heritage Mapping of lower Gunbower Forest project, delivered in 2013-14 to map a catalogue of cultural heritage assets in the forest. The Water for Country project aims to investigate how cultural and spiritual values may be better represented in water management. In 2018, the Water for Country group evolved to include the Wamba Wemba First Nations People and continues to focus on Gunbower Forest.

The Barapa Barapa Water for Country project led to the development of the Barapa Barapa Cultural Watering Objectives Framework in 2017, which aims to ensure cultural priorities and outcomes are considered and incorporated in environmental watering actions. The framework was used for the first time in 2018 to help develop cultural objectives for proposed environmental watering activities for Gunbower Forest and Creek included in the *2018-19 Seasonal Watering Plan*, and it is now used annually to help inform planning. Applying elements of the framework during engagement with Barapa Barapa ensures environmental watering activities incorporate Barapa Barapa's cultural objectives and that water managers are culturally informed when delivering environmental water.

The cultural objectives that can be supported in 2025-26 have been informed by the Cultural Watering Objectives Framework, seasonal watering proposal engagement and formal and informal engagement with Barapa Barapa Traditional Owners throughout the year. The cultural objectives that can be achieved will depend on which environmental water operations are implemented, which will be guided by climatic conditions.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential watering actions in **Table 5.2.5**, the North Central CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as boating, canoeing, fishing, stand-up paddle boarding and water skiing)
- recreation and amenity (such as birdwatching, camping, photography and walking)
- community events and tourism (such as park visitation and tours and activities)
- socioeconomic benefits (such as firewood harvesting, tourism and education opportunities).

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 5.2.5** by an icon, as pictured below and also explained in **Figure 1.2.3**. For example, in 2025-26, the Hipwells Road channel watering will start in July 2025, after the autumn firewood collection period. This will ensure that access to the designated firewood collection area between Five Sleeper Track and Thompson Track is not affected. Deliveries via the Hipwells Road channel will not continue beyond November, achieving ecological outcomes while also reducing the likelihood that tracks will be inundated during the peak summer visitation period.

	Gunbower Forest watering and the Gunbower Creek flow provide opportunities for kayaking
	Gunbower Forest watering and the Gunbower Creek flow provide opportunities for birdwatching
	Gunbower Creek flows provide opportunities for anglers and support events such as fishing competitions

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.2.5 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.2.5 Gunbower Forest and Creek potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Gunbower Forest		
Yarran Creek fish attractant flows (winter/spring)	• Provide flows via the Yarran Creek regulator in winter/ spring to cue the movement of stocked golden and silver perch towards the regulator and help with their recapture and translocation	F4
Wetlands and flood runners inundation via Hipwells Road channel and/or lower landscape regulators (LLRs) (variable flow rates during winter/ spring)	• Provide water at a depth and extent that supports the growth and successful recruitment of flood-dependent vegetation in wetlands, flood runners and low-lying areas • Create connectivity between wetland complexes for the exchange of propagules, nutrients and aquatic organisms • Maintain a diversity of water depths throughout the season and maintain areas of feeding, foraging and refuge habitat for water-dependent plants and animals, including waterbirds, fish, turtles, and frogs	A1, B1, F1, T1, V1
Extend natural flooding of the floodplain, flood runners and wetlands via the Hipwells Road channel (variable flow rates during winter/spring) *Trigger: unregulated inflows predicted to reach the 4,500 ha Hipwells Road channel footprint*	• Support the continued recovery of floodplain understorey and river red gums, which are still recovering from the Millennium Drought, by extending the duration of natural inundation, if it occurs • Maintain a diversity of water depths throughout the season and maintain areas of feeding, foraging and refuge habitat for water-dependent plants and animals, including waterbirds, fish, turtles and frogs	A1, B1, F1, T1, V2
Yarran Creek fresh (winter/spring) *Trigger: dependent on water levels in Gunbower Forest, the Murray River and Gunbower Creek*	• Provide lateral connectivity between Gunbower Creek, the Murray River and the Gunbower Forest floodplain to allow the exchange of carbon, nutrients and propagules as well as the movement of fish and other aquatic animals	F1, F3, F4, CN1

Potential environmental watering action	Expected watering effects	Environmental objectives
Top up Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex (summer)	• Maintain an appropriate water depth, extent and quality to support the growth and successful recruitment of wetland vegetation • Maintain an appropriate water depth and extent and stable water levels surrounding group-nesting waterbirds to support successful breeding, if triggered This action will also provide suitable feeding, breeding and refuge habitat for waterbirds (including juveniles), small-bodied native fish, frogs, turtles and other water-dependent animals	A1 B1 F1 T1 V1
Top up Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex (autumn)	• Trigger the early germination of aquatic vegetation on the margins of wetlands, which helps promote early establishment • Increase habitat for water-dependent animals	B1 A1 F1 T1 V1
Floodplain, flood runners and wetlands inundation (variable flow rates during autumn/ winter 2026)[1] **Part A: May-June 2026** **Part B: July-November 2026**	• Inundate river red gums and flood-dependent and flood-tolerant understorey species to support their continued recovery • Create connectivity between wetland complexes for the exchange of propagules, nutrients and aquatic organisms • Provide diverse habitats throughout autumn and winter for feeding, foraging and refuge for water-dependent plants and animals, including waterbirds, fish, turtles, and frogs	A1 B1 F1 T1 V1, V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Gunbower Creek (targeting Cohuna Weir)		
Autumn/winter low flow (150-250 ML/day during July to August 2025 and April to June 2026)	• Maintain connectivity through the length of Gunbower Creek and between lagoons during the off-irrigation period, and prevent sections drawing down to isolated pools • Provide access to food resources over the cooler months and reduce predation pressure on juvenile fish	F2, F3
Spring/summer stable high flow (above 400 ML/day during September to December)	• Maintain about 1.5 m depth in deep pools and 30 cm depth in the littoral zone to provide habitat and food resources for native fish • Minimise water level fluctuations to less than 0.5 m to support Murray cod and other native fish breeding and larval survival	F2, F3, F4
Summer/autumn high flow (above 300 ML/day during January to March)	• Maintain water to inundate fringing littoral habitat and provide resources for native fish, including adult and young-of-year Murray cod and small-bodied native fish • Maintain connectivity between habitats during the irrigation season	F2, F3, F4
Gunbower Creek (targeting Koondrook Weir)		
Year-round low flow (15-200 ML/day)	• Provide a flow cue to support the emigration of native fish species (such as golden and silver perch and bony bream) via the Koondrook Weir fishway to the Murray River	F3
Trigger-based spring/summer freshes (50-300 ML/day as required during September to February)	• Dilute low-oxygen return flows from Gunbower Forest at Three Corner Hole to improve the water quality (oxygen concentration) in lower Gunbower Creek if required	WQ1
Spring/summer/autumn fresh (up to 600 ML/day for three to 10 days from November to March)	• Provide a flow cue to attract native fish (such as Murray cod, golden perch, silver perch and bony bream) to migrate to the upstream reaches of Gunbower Creek, maximising the effect of the fishways at Koondrook and Cohuna weirs	F2, F3, F4

1 This potential watering action is proposed to commence in May or June 2026 and conclude in spring 2026. Part A represents the component proposed to be delivered in the 2025-26 water year, and part B represents the component proposed to be delivered in the 2026-27 water year. If part A is delivered, then part B will be included in the *Seasonal Watering Plan 2026-27*.

Scenario planning

Table 5.2.6 outlines potential environmental watering and expected water use in a range of planning scenarios.

Gunbower Forest

In 2025-26, the delivery of environmental water to Gunbower Forest aims to support wetland and flood-dependent vegetation to bounce back after most of the floodplain had a drying phase in 2024-25. It is planned to deliver environmental water via the Hipwells Road channel in winter/spring 2025 to inundate Gunbower Forest wetlands and low-lying areas of the floodplain to create a mosaic of habitat for waterbirds, frogs and other water-dependent animals. If large-scale, unregulated inflows occur, environmental water may be used to supplement natural inflows and optimise ecological outcomes across the floodplain.

Conditions across the Gunbower Forest floodplain over the last year have been dry, with no unregulated inflows. The delivery of environmental water to the Little Gunbower Wetland Complex and Barapa Swamp was the only forest watering action in spring/summer 2024. This contrasts with the two previous years, with Gunbower Forest receiving the largest flood since 1993 in 2022, which flooded about 80 per cent of Gunbower Forest. Multiple unregulated flood peaks also delivered significant inflows to Gunbower Forest in 2023 and January 2024.

The wetland vegetation showed a strong decline after the extensive and prolonged unregulated flooding. Annual vegetation condition monitoring shows that species diversity and cover both decreased between the autumns of 2022 and 2023. A small rebound in cover was recorded in autumn 2024, but a lack of diversity means that the benefits to fish, waterbirds and waterbugs are limited. These results are consistent with vegetation results following the 2010 and 2011-12 flooding, indicating that the depth and duration of inundation in wetlands from large, unregulated floods can cause short-term impacts to vegetation. This further highlights the need for environmental water deliveries that replicate small-to-medium-sized inundation floods and are more aligned with the hydrological requirements of wetlands.

Accordingly, a drying phase was implemented across the floodplain in 2024-25 to enable most wetlands to reset. A drying phase followed by managed environmental water deliveries has proven to be an effective way to help wetland vegetation rebound after prolonged inundation by unregulated flooding. This occurred in 2016, when large floods saw a sharp decline in species diversity and cover, but they then bounced back after a drying phase in summer/autumn 2017-18 with deliveries of environmental water in winter/spring 2018.

Waterbird surveys in Gunbower Forest have shown that despite consecutive waterbird breeding events at the Little Gunbower Wetland Complex in 2022 and 2023, waterbirds have not become more abundant at the site. This apparent bottleneck in recruitment into the adult population after breeding events is not isolated, and it appears that supporting young waterbirds to reach maturity is an important consideration for the long-term health of populations.

In the drought, dry and average planning scenarios, environmental water will be delivered to the Gunbower Forest wetlands and low-lying areas of the floodplain in winter/spring/summer 2025 to maintain floodplain vegetation, provide waterbird habitat and support recovering wetland vegetation. Consecutive years of environmental watering are planned, and delivering a floodplain watering event in winter 2026 via the Hipwells Road channel aims to meet the water requirements of river red gums, floodplain understorey species and permanent and semi-permanent wetlands, supporting the continued improvement in the health of these ecological values. Flows are proposed to commence in late autumn/early winter 2026 and continue from 1 July 2026 (the floodplain, flood runners and wetlands inundation part B potential environmental watering action). This highlights the ongoing nature of the event and will be included in the *Seasonal Watering Plan 2026-27* if delivery starts in 2025-26. Starting this watering action in late autumn/early winter 2026 aims to reduce the risk of high irrigation demand compromising the achievement of the extent and duration of the target inundation in winter/spring 2026-27.

Wetland top-ups may occur in all planning scenarios to optimise outcomes for the vegetation and for waterbirds and other water-dependent species by maintaining inundation. In the wet planning scenario, natural overbank flows into Gunbower Forest from the high Murray River are likely, but they may not be of the required duration. Water for the environment may be delivered to improve the environmental outcomes of natural inflows.

In Gunbower Forest, the reintroduction of locally extinct threatened small-bodied fish is an objective of the updated *Gunbower Forest Environmental Water Management Plan* and the ***Gunbower and Lower Loddon Native Fish Recovery Plan***. Reintroductions can be supported by delivering environmental water after the wetland resets, so stocked fish get first access to habitat with reduced competition. This may increase the success of reintroduction. The long-term conservation stocking strategy is to establish permanent populations of threatened small-bodied fish in the region — in Camerons Creek — and then create temporary populations in the Gunbower Forest wetlands that will provide the opportunity for dispersal to the broader landscape in flood years.

The Victorian Fisheries Authority is trialling the stocking of golden and silver perch larvae and fingerlings in sites that receive environmental water to test growth rates and understand if a more natural stocking strategy can be utilised to improve the survivability of stocked fish. Yarran Creek was managed as a trial site in 2024-25. It was partially filled to provide temporary fish habitat over winter, with small top-ups delivered when needed from March to June to maintain water levels, water quality and fish habitat.

A small attractant flow will be delivered from Gunbower Creek to Yarran Creek via the Yarran Creek regulator in July 2025 to facilitate the recapture of golden and silver perch. The Victorian Fisheries Authority will then translocate the recaptured fish to Gunbower Creek after monitoring their growth rates. Extra attractant flows may be delivered through winter/spring to provide additional opportunities for recapture.

Gunbower Creek

The flow in Gunbower Creek is highly influenced by irrigation demands, which can cause significant fluctuations in the creek's water level during the irrigation season. Without environmental water, there would be little or no flow from late autumn to the end of winter. Water for the environment is primarily used to smooth out these flow fluctuations to provide suitable habitat, breeding and dispersal opportunities for native fish throughout the year.

Native fish populations in Gunbower Creek are continuing to recover from several poor water quality events caused by unregulated flooding in 2022 and 2023-24 that are likely to have harmed native fish communities. Delivering a mix of a low flow, stable high flow and littoral zone flow throughout the year is a high priority in all planning scenarios, to provide suitable conditions for native fish to feed and breed and continue to recover.

The low-flow recommendations for Gunbower Creek aim to maintain habitat connectivity during the off-irrigation season when flows were historically ceased before the introduction of environmental water in 2013. The recommended autumn/winter low flow of 150-250 ML per day (measured at Cohuna Weir) during the non-irrigation season is considered the minimum flow required to maintain fish habitat within the main channel of Gunbower Creek and the connections between the main channel and the upper lagoons, which support freshwater catfish.

During the irrigation season, a high flow of between 300 and 400 ML per day will generally be delivered. The Murray cod breeding season extends from about September to December, depending on the weather and water temperature, and the flow aims to maintain a stable high flow above 400 ML per day during this period to support Murray cod nesting by preventing nest abandonment due to variable water levels. A littoral zone flow of at least 300 ML per day during summer/autumn will maintain important nursery habitat to support the recruitment of native fish, particularly Murray cod. From autumn, the flow will gradually be reduced from 300 ML per day to provide a smooth transition between the irrigation and non-irrigation seasons. All low-flow targets will be subject to the environment's share of channel capacity.

Other opportunistic or trigger-based watering actions may be delivered in Gunbower Creek during 2024-25 to manage risk and optimise ecological outcomes. In the wet planning scenario, there is a risk that unregulated flows will flood parts of Gunbower Forest and carry water with high concentrations of dissolved organic carbon from the floodplain into lower Gunbower Creek, potentially causing low-oxygen conditions in the creek. If this happens, a trigger-based dilution flow of 50-300 ML per day may be delivered downstream of Koondrook Weir to prevent fish deaths.

In all planning scenarios, opportunistic freshes to promote the movement of native fish into Gunbower Creek via the Koondrook Weir fishway may also be delivered from November to March if they can be accommodated within irrigation operations. There are also opportunities for small freshes throughout the year at Koondrook Weir to support native fish movement between Gunbower Creek and the Murray River. Autumn condition monitoring of fish in Gunbower Creek indicates positive signs of recovery after the declines seen following the 2022 floods. Improving connectivity between Gunbower Creek and the Murray River with the delivery of freshes over Koondrook Weir will contribute to the further recovery of populations in Gunbower Creek. It will also lead to landscape-scale outcomes by enhancing access to diverse habitats for breeding, spawning and foraging.

Gunbower Creek's ability to meet flow demands has changed in recent years, and the magnitude of planned environmental flows has been adjusted accordingly to achieve the targeted physical and ecological responses within the current operational environment. In 2024-25, the native fish flow regime for Gunbower Creek was reviewed and updated to incorporate the latest science and learnings to make sure flows continue to support native fish breeding, movement and access to habitat.

Carryover

Priority carryover volume ranges from 14,000 to 34,000 ML, depending on the planning scenario. This is to ensure winter/early spring supply to Gunbower Creek and complete the floodplain, flood runners and wetlands inundation. The part B potential environmental watering action is planned to start in late 2025-26 and continue into 2026-27.

Table 5.2.6 Gunbower Forest and Creek environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Natural inflows into Gunbower Forest are unlikely, with river flows expected to remain low	• Natural inflows into Gunbower Forest are unlikely, with river flows expected to remain low • Some run-off-producing rainfall is expected, with inflows into storages unlikely to cause spills and unregulated flow	• Natural inflows into Gunbower Forest during winter/spring are possible and could result in inundation of low-lying creeks and wetlands	• Overbank flow is likely in winter and/or spring • High inflows into full storages in autumn, winter and/or spring 2024 will likely result in spilling events and unregulated flooding

Planning scenario	Drought	Dry	Average	Wet
Gunbower Forest				
Potential environmental watering – tier 1 (high priorities)	• Wetlands and flood runners inundation via Hipwells Road channel and/or LLRs (variable flow rates during winter/ spring) • Yarran Creek fish attractant flows (winter/ spring/) • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex in summer • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex in autumn	• Wetlands and flood runners inundation via Hipwells Road channel and/or LLRs (variable flow rates during winter/ spring) • Yarran Creek fish attractant flows (winter/ spring/) • Yarran Creek winter/spring fresh (one fresh) • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex in summer • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex in autumn • Floodplain, flood runners and wetlands inundation (variable flow rates during autumn/winter 2026: part A)	• Wetlands and flood runners inundation via Hipwells Road channel and/or LLRs (variable flow rates during winter/ spring) • Yarran Creek fish attractant flows (winter/ spring) • Yarran Creek winter/spring fresh (one fresh) • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Complex in summer • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex in autumn • Floodplain, flood runners and wetlands inundation (variable flow rates during autumn/winter 2026: part A)	• Extend natural flooding of floodplain, flood runners and wetlands via the Hipwells Road channel (variable flow rates during winter/spring) • Yarran Creek fish attractant flows (winter/ spring/) • Yarran Creek winter/spring fresh (one fresh) • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Complex in summer • Top-ups: Little Reedy Complex, Reedy Lagoon, Barapa Swamp and Little Gunbower Wetland Complex in autumn • Floodplain, flood runners and wetlands inundation (variable flow rates during autumn/winter 2026: part A)

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• Yarran Creek winter/spring fresh (one fresh)	• N/A	• N/A	• N/A
Possible volume of water for the environment required to achieve objectives	• Tier 1: 49,000 ML • Tier 2: 1,000 ML	• Tier 1: 68,000 ML • Tier 2: N/A	• Tier 1: 68,000 ML • Tier 2: N/A	• Tier 1: 65,500 ML • Tier 2: N/A
Priority carryover requirements for 2026-27	• 10,000 ML	• 20,000 ML	• 30,000 ML	• 25,000 ML
Gunbower Creek (targeting Cohuna Weir)				
Potential environmental watering – tier 1 (high priorities)	• Autumn/winter low flow • Spring/summer stable high flow • Summer/ autumn high flow	• Autumn/winter low flow • Spring/summer stable high flow • Summer/ autumn high flow	• Autumn/winter low flow • Spring/summer stable high flow • Summer/ autumn high flow	• Autumn/winter low flow • Spring/summer stable high flow • Summer/ autumn high flow
Potential environmental watering – tier 2 (additional priorities)	• N/A			
Gunbower Creek (targeting Koondrook Weir)				
Potential environmental watering – tier 1 (high priorities)	• Year-round low flow • Spring/summer/autumn fresh (one fresh) • Trigger-based spring/summer freshes as required			
Potential environmental watering – tier 2 (additional priorities)	• N/A			
Possible volume of water for the environment required to achieve objectives	• 23,000 ML	• 18,000 ML	• 18,000 ML	• 19,000 ML
Priority carryover requirements for 2026-27	• 4 GL			

5.2.4 Central Murray wetlands

System overview

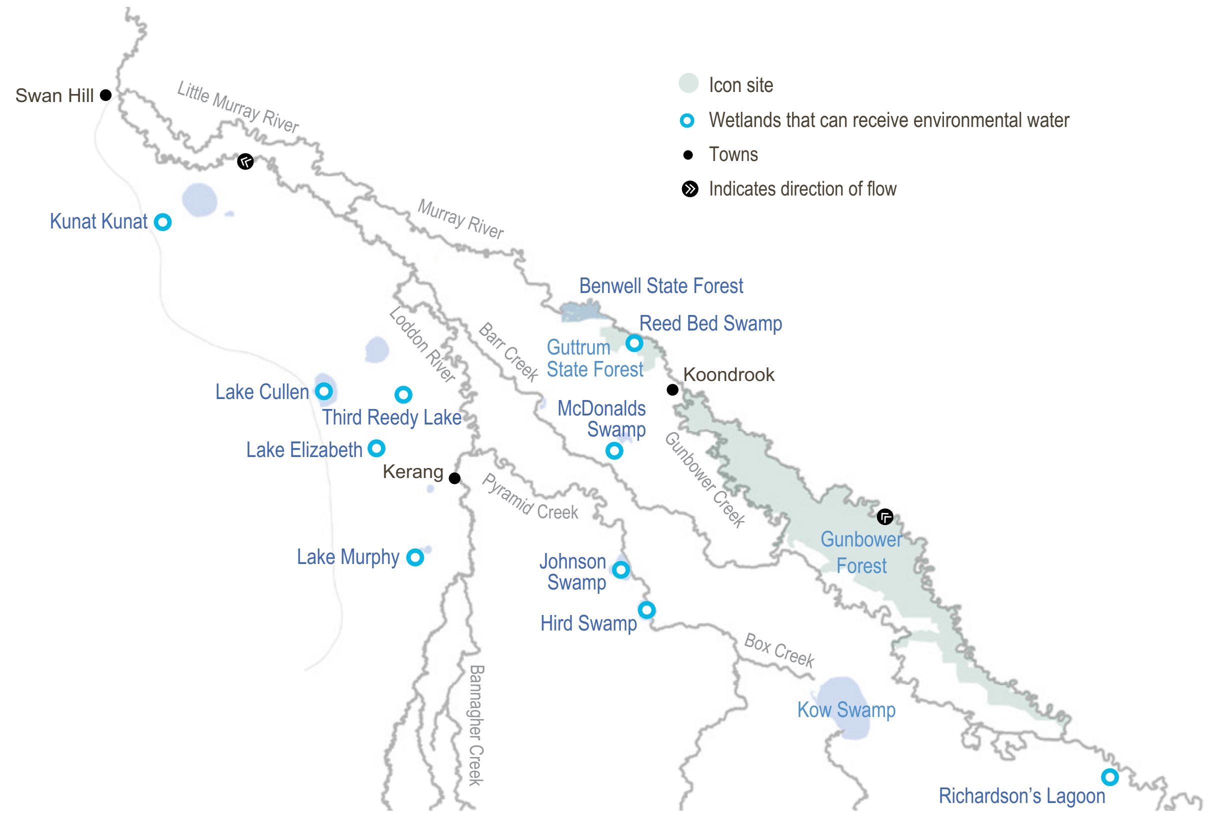
The central Murray wetlands are located on the lower Loddon River and Murray River floodplains (Figure 5.2.4). The wetland system includes Hird Swamp, Johnson Swamp, Kunat Kunat (Round Lake), Lake Cullen, Lake Elizabeth, Lake Murphy, McDonalds Swamp, Richardson's Lagoon, Third Reedy Lake and Reed Bed Swamp in Guttrum Forest.

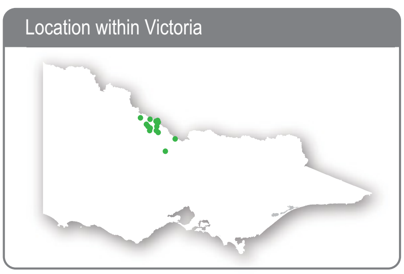
The central Murray wetlands are almost wholly contained within the Torrumbarry Irrigation Area and are all wetlands of regional or international significance. The area has experienced dramatic changes since European settlement with the construction of levees, roads and channels.

Most of the wetlands are now cut off from natural flow paths and are rarely filled, except by large natural floods. They rely on water for the environment to support their ecological character and health.

Nine of the central Murray wetlands can receive water for the environment from permanent infrastructure. These wetlands are Hird Swamp, Johnson Swamp, Kunat Kunat, Lake Cullen, Lake Elizabeth, Lake Murphy, McDonalds Swamp, Richardson's Lagoon and Third Reedy Lake. Temporary pumps are currently used to deliver water for the environment from the Murray River to Reed Bed Swamp in Guttrum Forest when required. More permanent water delivery infrastructure for the forest is proposed as part of the Victorian Murray Floodplain Restoration Project.

Figure 5.2.4 Central Murray wetlands





Environmental values

The central Murray wetlands support numerous listed threatened species ranging from vulnerable to critically endangered, including the Australasian bittern, Murray hardyhead, Australian painted snipe, growling grass frog and the southern purple-spotted gudgeon, which was presumed extinct in Victoria until it was found at Third Reedy Lake in spring 2019. When the wetlands receive environmental water, they can attract prolific birdlife and provide feeding and breeding habitat for many threatened and endangered bird species (including the eastern great egret and white-bellied sea eagle) listed under legislation and international agreements. Lake Cullen, Hird Swamp, Third Reedy Lake and Johnson Swamp are internationally recognised under the Ramsar Convention, while the other wetlands in the central Murray system have bioregional significance.

Environmental objectives in the central Murray wetlands

A1 – Maintain populations of common native frogs (such as barking marsh frog, Peron's tree frog and spotted grass frog)

B1 – Provide resting and feeding habitat for a variety of waterbirds, including threatened species (such as Caspian tern, Australasian bittern, little bittern and brolga)

B2 – Provide breeding habitat for a variety of waterbirds, including threatened species (such as brolga, Australasian bitterns and blue-billed ducks)

CN1 – Enable, maintain or increase carbon and nutrient cycling and connectivity

F1 – Maintain populations of small-bodied native fish, including listed threatened species (such as Murray hardyhead)

F2 – Protect and increase populations of native fish in Pyramid Creek

MI1 – Increase the diversity and biomass of waterbugs

T1 – Maintain populations of native turtles (such as the Murray River turtle and the common long-necked turtle)

V1 – Restore the extent of wetland trees (such as river red gums and black box)

V2 – Restore the extent of mudflat vegetation communities (such as tall marsh, herblands, rushes and sedges)

V3 – Restore the extent of native aquatic vegetation species (such as tassel, foxtail stonewort, milfoil and pondweed)

V4 – Maintain the extent of native aquatic vegetation species (such as tassel, foxtail stonewort, milfoil and pondweed)

V5 – Reduce the extent and density of invasive plant species

V6 – Support a mosaic of wetland plant communities across the region

Traditional Owner cultural values and uses

The wetlands and surrounding land in the central Murray region hold great significance for the Traditional Owners: the Barapa Barapa, Wamba Wemba and Yorta Yorta First Nations Peoples. Their traditional knowledge is a living culture evident throughout the landscape in tree markings, significant cultural sites and cultural tools for cultural practices. The rivers and floodplains are a source of food and fibre and contain many sites of significance (such as campsites and meeting places). We acknowledge their rights to practice their culture and identity as Traditional Owners, to maintain their relationship with the wetlands and to protect places and areas of importance on their land. The Traditional Owner people have rights as the primary guardians and keepers of Aboriginal cultural heritage and knowledge.

Environmental watering supports values including native fish, waterbirds and turtles, and it promotes the growth of culturally important plants that provide food, medicine and weaving materials for Traditional Owner groups. The presence of water itself can be a cultural value, as well as the quality of the water: healthy water promotes healthy Country.

In 2024-25, the VEWH, the North Central CMA and the Barapa Barapa Wamba Wemba Water for Country Steering Committee worked towards a potential Traditional Owner-led seasonal watering proposal for Third Reedy Lake.

The Barapa Barapa Wamba Wemba Water for Country Steering Committee provided the following statement for the *Seasonal Watering Plan 2025-26*:

> "In 2024-25, the Barapa Barapa Wamba Wemba Water for Country Steering Committee has been working towards developing a seasonal watering proposal for Third Reedy Lake. This effort is guided by the *Water for Country: Guidance provided by and for Traditional Owners Making Proposals for the use of Environmental Water in Victoria*, which was developed with input from members of the Steering Committee.
>
> "Third Reedy Lake was identified as the preferred site to trial a Traditional Owner-led seasonal watering proposal. The Steering Committee has been collaborating with the North Central CMA to gather and discuss relevant information to support this proposal. This includes identifying cultural values and associated objectives, as well as understanding how environmental water can be delivered to the site and determining the optimal watering regime to support both ecological and cultural values.
>
> "During cultural monitoring conducted in support of this project, significant cultural heritage was discovered in the wetland bed. This discovery underscores the wetland's high cultural significance. A process to determine the best management option for this cultural heritage is currently underway. Until a resolution is reached, the Steering Committee cannot determine what watering actions, if any, are appropriate to include in the seasonal watering proposal for Third Reedy Lake."

Yorta Yorta First Nations People's participation in environmental water planning and delivery is facilitated by the Yorta Yorta Nation Aboriginal Corporation (YYNAC). YYNAC has not provided specific cultural watering objectives or aspirations at Richardson's Lagoon but has expressed an interest in monitoring and cultural heritage projects at Richardson's Lagoon in future. The North Central CMA remains committed to working with Yorta Yorta Nation to support the involvement and input of Yorta Yorta First Nations People at Richarson's Lagoon and ensure environmental watering actions are culturally informed and can support their aspirations for looking after Country.

The Wamba Wemba First Nations People's participation in environmental water planning and delivery has been both formal and informal, with ongoing engagement with Traditional Owners throughout the year. In August 2024, the Wamba Wemba Aboriginal Corporation (WWAC) was registered as a Registered Aboriginal Party (RAP), and the North Central CMA has been working to build capacity within the organisation to increase its involvement in the delivery of environmental water. At the time of writing, WWAC was not yet in a position to provide specific cultural watering objectives or aspirations for Kunat Kunat (Round Lake). The North Central CMA is committed to collaborating with Wamba Wemba Traditional Owners to support their input and participation at Kunat Kunat, as well as other culturally significant sites that may be outside their RAP area. This ongoing collaboration will ensure that environmental watering actions are culturally informed and aligned with the Wamba Wemba people's aspirations for caring for Country. Moving forward, WWAC will facilitate the Wamba Wemba First Nations People's participation in environmental water planning and delivery and all other North Central CMA engagements.

The shared benefits that can be achieved in 2025-26 have been informed by seasonal watering plan engagement undertaken on 12 March 2025 with Barapa Barapa and Wamba Wemba Traditional Owners and other formal and informal engagement with Traditional Owners throughout the year. **Table 5.2.7** shows the expected shared benefits for all central Murray wetlands of delivering environmental water. Achievement of the benefits depends on what environmental water can be delivered in the prevailing climatic conditions.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Table 5.2.7 Barapa Barapa and Wamba Wemba cultural values and uses, central Murray wetlands

Values/uses/ objectives/ opportunities	How this opportunity will be considered in environmental watering in 2025-26
Cultural plants and cultural practices	• Water from environmental watering and natural flooding supports culturally important plants in the central Murray wetlands and allows the continuation of cultural practices, including harvesting of food, medicine and weaving plants. Two examples are the harvesting of cotton weed at Kunat Kunat for starting fires and the harvesting of black swans for cultural practices. • Watering actions in the central Murray wetlands will support cultural plants that Barapa Barapa and Wamba Wemba Traditional Owners value and provide opportunities for cultural practices to continue. • Barapa Barapa and Wamba Wemba Traditional Owners recognise the value of resources that occur on the drawdown after wetland inundation, providing food for animals as well as cultural plants (such as old man weed). This can be supported by allowing wetlands to draw down naturally after receiving water, to expose mudflats. • Having a diversity of habitat and vegetation responses is a priority for Barapa Barapa and Wamba Wemba Traditional Owners. They consider it important to have a variety of water depths to create a more diverse vegetation response, which results in a range of resources being available over a longer timeframe. • Barapa Barapa Traditional Owners have undertaken revegetation activities as part of the Decision Support Tool Revegetation Project at McDonalds Swamp and planting works at Third Reedy Lake. Opportunities for Traditional Owner involvement in monitoring and revegetation at several wetlands will be sought in 2025-26. Traditional Owners are keen to be involved with any planned revegetation works at the central Murray wetlands. • Environmental water deliveries can be managed so revegetated areas are provided with an appropriate water regime — plants receive water but are not drowned — to ensure their survival and provide opportunities for natural recruitment.
Cultural animals and cultural practices	• Environmental water deliveries can help preserve and improve cultural animals (totem species). Also, environmental water deliveries will aim to ensure culturally important animals — food sources, such as black swans — are supported and can continue to breed and thrive.

Values/uses/ objectives/ opportunities	How this opportunity will be considered in environmental watering in 2025-26
Healthy Country	• Providing drought refugia (such as Lake Cullen, Hird Swamp and Johnson Swamp) and maintaining areas with healthy habitat is a high priority for Barapa Barapa and Wamba Wemba Traditional Owners. In the absence of natural inflows, they consider it important to ensure that water is delivered to healthy areas (such as Hird Swamp, Johnson Swamp and McDonalds Swamp) to elicit a good vegetation response and support wetland animals. • Environmental watering actions will make sure there is water in high-priority central Murray wetlands, regardless of whether flooding occurs. This will provide refuge habitat for waterbirds, woodland birds, turtles and frogs and ensure high-quality habitat is available. Also, water can be delivered to any central Murray wetland that receives flood waters to support any waterbird breeding events.
Cultural heritage	• Cultural heritage artefacts are common at the central Murray wetlands, which have been important gathering sites for Traditional Owners. The loss of fringing trees and changes to natural watering regimes have left sediments around these wetlands exposed for prolonged periods, resulting in some cultural artefacts being uncovered. • Delivering environmental water can support the growth of fringing red gum trees and tall marsh, reduce erosion at the wetlands and help keep cultural heritage artefacts covered.

Barapa Barapa and Wamba Wemba input to watering actions for Guttrum Forest in 2025-26

Environmental water delivery to Guttrum Forest during 2025-26 has been planned in conjunction with the Barapa Barapa and Wamba Wemba peoples, for whom the wetlands and surrounding forest are places of high cultural significance. Traditional Owners are an important part of Guttrum Forest planning and management and have been directly involved in delivering environmental water to Reed Bed Swamp in 2019-20 and 2021-22. Due to large-scale natural flooding, no environmental water was delivered to Reed Bed Swamp in 2022-23 and 2023-24. In 2024-25, Guttrum Forest was allowed to draw down.

Barapa Barapa and Wamba Wemba collaborate with waterway managers to make sure that during watering events, their cultural heritage is protected and that the hydrological needs of important cultural values (such as food and medicinal plant species, scar trees and ring trees) are supported through the timing and duration of planned watering actions to the forest.

Table 5.2.8 shows the Barapa Barapa and Wamba Wemba values and uses considered in planning and managing water for the environment at Guttrum Forest in 2025-26.

Table 5.2.8 Barapa Barapa and Wamba Wemba cultural values and uses, Guttrum Forest

Value/use	Considerations
Food, fibre and medicinal plants	• In recent years, there has been a marked improvement in the abundance and diversity of culturally important plants in Reed Bed Swamp. In winter 2021, revegetation of plants characteristic of tall marsh, spike-sedge wetland and aquatic herbland included several culturally important plants. As well as revegetation, many plants regenerated naturally, including some small individuals or patches of cumbungi, nardoo, joyweed and giant rush. Old man weed was also observed in abundance on the drawdown in 2024. In previous years, Traditional Owners noted a positive trend in the presence and abundance of culturally important plants, though they were not abundant enough to harvest. This year, Barapa Barapa Traditional Owners noted that plants were now abundant enough to harvest and that the wetland has, in the words of one Barapa Barapa Traditional Owner, "come back to the way it was when I was a kid. You've got your waterbirds, rushes and the carpet of green (mudflat plants) back."
Cultural heritage	• Watering of Reed Bed Swamp supports fringing large old trees, including a couple of ring trees and scar trees. The condition of these trees was seen to improve following previous watering.
Spiritual wellbeing	• The improvement in the condition of the wetland and the presence of water and moisture contribute to a sense of spiritual wellbeing.
Sharing cultural knowledge	• Traditional Owners provide support and advice about which ecological values to target: about what the wetland used to look like and what values it previously supported. • Traditional Owners have been present during the set-up of infrastructure and have been able to advise about avoiding impacts on their cultural heritage.
Employment opportunities	• Traditional Owners want to become more involved in managing their Country through increased employment opportunities (such as ecological and cultural monitoring). This has occurred as part of the previous watering of Reed Bed Swamp.
Cultural landscape	• Maintaining the open-water habitat and mudflats underneath will be difficult if the river red gum saplings that germinated in recent floods are not removed. This is important for maintaining the cultural landscape and access to food and medicinal resources.
Cultural practice	• The Traditional Owners have indicated they would like a smoking ceremony to welcome water back to the forest. They said it should be a regular activity when water is delivered each year. It is what their ancestors would have done when the floodwaters arrived, representing a restoration of an important cultural practice. • Another priority in 2025-26 is to provide more opportunities for men and women to return to Country and undertake cultural practices (such as weaving, carving and discussing the wetlands' health related to women's and men's business). This was a key topic discussed during the central Murray wetlands Traditional Owner engagement day in March 2025 and the women's weaving workshop in May 2024, as well as gathering of material from Guttrum Forest.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Environmental flows may be planned to align with cultural benefits so long as environmental outcomes are not compromised. Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 5.2.9** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support cultural values and uses

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.2.9**, the North Central CMA considered how environmental flows could support values and uses, including:

- waterway recreation (such as canoeing, fishing, kayaking, swimming and water sports)
- waterway recreation and amenity (such as birdwatching, duck hunting, camping, cycling, running and walking)
- community events and tourism (such as visitation during the hunting and fishing seasons, Breakfast with the Birds events [hosted annually by the North Central CMA] and supporting Aboriginal cultural heritage and history-based tours)
- socioeconomic benefits (such as ecosystem services like groundwater recharge, flood mitigation, nutrient treatment, carbon storage and stock and domestic uses).

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.2.9 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.2.9 Central Murray wetlands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Hird Swamp (fill in winter/spring)	• Drown terrestrial weeds to limit their growth and reduce their extent • Promote the germination and establishment of aquatic vegetation • Continue supporting the growth of river red gums and black box trees • Inundate the wetland and wetland fringe to provide habitat for waterbirds, frogs and turtles and provide conditions suitable for waterbugs and small-bodied native fish that are food for waterbirds	A1, B1, F1, MI1, T1, V1, V2, V3, V5, V6
Hird Swamp (through-flow in spring/summer)	• Provide connectivity between Pyramid Creek and Hird Swamp to provide waterbugs, carbon and nutrient inputs into Pyramid Creek, boosting productivity and providing food resources for fish in Pyramid Creek • Flush carbon and old biofilms within Hird Swamp to promote new biofilm growth and increase waterbug productivity for native fish	F1, F2, MI1, CN1
Hird Swamp (top-up, trigger-based)	• Provide ongoing habitat for waterbirds to support significant waterbird breeding opportunities and allow juveniles to grow and become independent *Trigger: Significant bird breeding event*	B1, B2
Johnson Swamp (top-up, trigger-based)		
McDonalds Swamp (top-up, trigger-based)		
Johnson Swamp (partial fill in autumn)	• Drown terrestrial weeds and trigger the early germination of aquatic vegetation, so promoting the early establishment of aquatic vegetation • Facilitate the early establishment and proliferation of waterbug populations, which will become food for waterbirds • Provide wetland habitat for waterbirds, frogs and turtles over autumn/winter • Continue supporting the growth of planted river red gums and herbland vegetation established as part of the Ramsar program	A1, B1, MI1, T1, V1, V2, V3, V5, V6
McDonalds Swamp (partial fill in autumn)		

Potential environmental watering action	Expected watering effects	Environmental objectives
McDonalds Swamp (fill in winter/spring)	• Drown terrestrial weeds to limit their growth and reduce their extent • Promote the germination and establishment of aquatic vegetation • Inundate the wetland and wetland fringe to provide habitat for waterbirds, frogs and turtles and provide conditions suitable for waterbugs that are food for waterbirds, frogs and turtles • Continue supporting the growth of planted river red gums and other aquatic and herbland vegetation	A1, B1, B2, MI1, T1, V1, V2, V3, V5, V6
Kunat Kunat (Round Lake) (fill in spring, top-up as required)	• Maintain salinity within 15,000-80,000 EC and the water depth to support suitable habitat and breeding conditions for Murray hardyhead and growing conditions for submerged aquatic plants that provide habitat for Murray hardyhead • Maintain the water depth to provide permanent feeding, foraging and refuge habitat for waterbirds • Provide exposed mudflats over spring/summer to support feeding opportunities for migratory shorebirds	B1, F1, V4, V6
Lake Elizabeth (fill in spring, top-up as required)		
Lake Cullen (partial fill in autumn)	• Provide wetland habitat for waterbirds and frogs over autumn/winter • Provide high-quality drought refuge for waterbirds • Promote the germination and establishment of aquatic vegetation • Facilitate the early establishment and proliferation of waterbug populations, to provide food for waterbirds	A1, B1, MI1, V2, V3, V6
Lake Murphy (partial fill in autumn)	• Drown terrestrial weeds and trigger the early germination of aquatic vegetation, promoting the early establishment of aquatic vegetation • Facilitate the early establishment and proliferation of waterbug populations, to provide food for waterbirds • Provide wetland habitat for waterbirds and frogs over autumn and winter • Continue supporting the growth of planted river red gums and other aquatic and herbland vegetation established as part of the flood recovery program	A1, B1, MI1, V1, V2, V3, V5, V6

Potential environmental watering action	Expected watering effects	Environmental objectives
Reed Bed Swamp (fill in winter/spring, top-up as required)	• Wet the fringing large old river red gums to support their growth and drown river red gum seedlings within the wetland bed to maintain open-water habitat • Promote the growth and re-establishment of aquatic and tall marsh vegetation at various depths across the wetland • Maintain the depth of the wetland to support waterbugs, frogs, turtles and waterbird feeding and breeding	A1 B1, B2 MI1 T1 V2, V3, V5, V6
Reed Bed Swamp (partial fill in autumn/winter)	• Drown terrestrial weeds and trigger the early germination of aquatic vegetation, promoting the early establishment of aquatic vegetation • Facilitate the early establishment and proliferation of waterbug populations, to provide food for waterbirds • Provide wetland habitat for waterbirds, frogs and turtles over autumn and winter • Promote the growth and re-establishment of aquatic and tall marsh vegetation at various depths across the wetland	A1 B1 MI1 T1 V2, V3, V5, V6
Third Reedy Lake (top-up in winter/spring)	• Drown terrestrial weeds and support the growth of planted river red gums and other aquatic and herbland vegetation • Provide wetland habitat for waterbirds and frogs over winter/spring • Support the growth of waterbug populations to provide food for waterbirds	A1 B1, B2 MI1 V1, V2, V3, V5

Scenario planning

Table 5.2.10 outlines potential environmental watering and expected water use in a range of planning scenarios.

Fifteen watering actions across ten wetlands are planned for 2025-26, significantly more than in 2024-25, when six actions were planned in six wetlands. This reflects the drier conditions in 2024-25 and the drying out of many wetlands. The actions are broadly consistent across planning scenarios, except for Lake Murphy, Reed Bed Swamp, and several waterbird-breeding-triggered actions, which are explained below.

Planning has been strongly influenced by increased threats to waterbirds expected in 2025-26. New analysis by the Murray-Darling Basin Authority suggests that there will be a severe decrease in the proportion of waterbird habitat across the basin, and planning is for 12 per cent of priority habitat to be wet by December 2025.

Supporting revegetation efforts is also an important consideration in deciding the timing and duration of water deliveries. These efforts include providing sufficient soil moisture for plants to survive, inundating and killing terrestrial weeds and triggering the germination and establishment of native aquatics. For example, watering Lake Murphy is in all planning scenarios but is a lower priority in the wet scenario, when soil moisture is likely to be sufficient to support revegetation works. However, water would be delivered if needed for plants to survive, supply permitting.

The proposed watering actions for Lake Elizabeth and Kunat Kunat (Round Lake) — fill in spring and top up in autumn — are needed every year to maintain permanent habitat for the endangered Murray hardyhead. The flow-through action connecting Hird Swamp and Pyramid Creek is the other action targeting fish in 2025-26. It will flush biofilms in the swamp and transfer nutrients to the creek, boosting productivity and food resources, as well as providing a cue for fish to move into the creek to breed.

A new trigger-based action is included for 2025-26 to support waterbird breeding events should they occur in Hird, Johnsons or McDonalds swamps in the average and wet planning scenarios. Maintaining water levels provides some protection from predation for eggs and fledglings, as well as foraging habitat for young birds and adults during this vulnerable stage of their lives.

Reed Bed Swamp in Guttrum Forest is planned to be filled in winter/spring with top-ups as required in spring/early summer to support wetland vegetation and any waterbird breeding that may occur. The swamp is expected to draw down and dry out over summer, with some semi-aquatic and mudflat plants persisting into autumn. Reed Bed Swamp will then be partially filled in autumn or winter 2026 in the dry, average and wet planning scenarios to prime wetland vegetation, particularly species that are advantaged by a longer inundation period, for a potential spring fill in 2026-27 if climate and water availability are conducive.

Richardson's Lagoon is drying down and will not be watered in 2025-26, which will allow dry-phase processes to occur. Future watering will be contingent on the repair of delivery infrastructure.

Carryover of 2,200 ML is essential in the dry and drought planning scenarios (1,600 ML in the average and wet scenarios) to ensure water is available to maintain habitat for endangered fish in Lake Elizabeth and Kunat Kunat (Round Lake) in 2026-27. Up to 9,600 ML is also required for spring top-ups at various other wetlands in 2026-27 to build on partial fills planned for autumn 2026.

Table 5.2.10 Central Murray wetlands environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Catchment run-off and natural flow into the wetlands are highly unlikely	• Catchment run-off and natural flow into the wetlands are unlikely	• Catchment run-off and natural flow into the wetlands are possible, particularly in winter/spring	• Catchment run-off and natural flow into the wetlands are likely, with potential flooding in some wetlands, particularly in winter/spring
Potential environmental watering – tier 1 (high priorities)	• Hird Swamp (fill in spring) • Hird Swamp (through-flow in spring/summer) • Johnson Swamp (partial fill in autumn) • Kunat Kunat (Round Lake) (fill in spring, top-up as required) • Lake Cullen (partial fill in autumn) • Lake Elizabeth (fill in spring, top-up as required) • Lake Murphy (partial fill in autumn) • McDonalds Swamp (fill in winter/spring) • McDonalds Swamp (partial fill in autumn) • Reed Bed Swamp (fill in winter/spring) • Third Reedy Lake (top-up in winter/spring)	• Hird Swamp (fill in spring) • Hird Swamp (through-flow in spring/summer) • Johnson Swamp (partial fill in autumn) • Kunat Kunat (Round Lake) (fill in spring, top-up as required) • Lake Cullen (partial fill in autumn) • Lake Elizabeth (fill in spring, top-up as required) • Lake Murphy (partial fill in autumn) • McDonalds Swamp (fill in winter/spring) • McDonalds Swamp (partial fill in autumn) • Reed Bed Swamp (fill in winter/spring) • Reed Bed Swamp (partial fill in autumn/winter) • Third Reedy Lake (top-up in winter/spring)	• Hird Swamp (fill in spring) • Hird Swamp (through-flow in spring/summer) • Hird Swamp (top-up, trigger-based) • Johnson Swamp (partial fill in autumn) • Johnson Swamp (top-up, trigger-based) • Kunat Kunat (Round Lake) (fill in spring, top-up as required) • Lake Cullen (partial fill in autumn) • Lake Elizabeth (fill in spring, top-up as required) • Lake Murphy (partial fill in autumn) • McDonalds Swamp (fill in winter/spring) • McDonalds Swamp (partial fill in autumn) • McDonalds Swamp (top up, trigger-based) • Reed Bed Swamp (fill in winter/spring) • Reed Bed Swamp (partial fill in autumn/winter) • Third Reedy Lake (top-up in winter/spring)	• Hird Swamp (fill in spring) • Hird Swamp (through-flow in spring/summer) • Hird Swamp (top-up, trigger-based) • Johnson Swamp (partial fill in autumn) • Johnson Swamp (top-up, trigger-based) • Kunat Kunat (Round Lake) (fill in spring, top-up as required) • Lake Cullen (partial fill in autumn) • Lake Elizabeth (fill in spring, top-up as required) • McDonalds Swamp (fill in winter/spring) • McDonalds Swamp (partial fill in autumn) • McDonalds Swamp (top up, trigger-based) • Reed Bed Swamp (fill in winter/spring) • Reed Bed Swamp (partial fill in autumn/winter) • Third Reedy Lake (top-up in winter/spring)

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• N/A			• Lake Murphy
Possible volume of water for the environment required to achieve objectives	• 19,350 ML (tier 1) • N/A (tier 2)	• 17,400 ML (tier 1) • N/A (tier 2)	• 16,150 ML (tier 1) • N/A (tier 2)	• 14,800 ML (tier 1) • 800 ML (tier 2)
Priority carryover requirements for 2026-27	• 11,800 ML	• 11,800 ML	• 11,100 ML	• 10,200 ML

5.2.5 Hattah Lakes

System overview

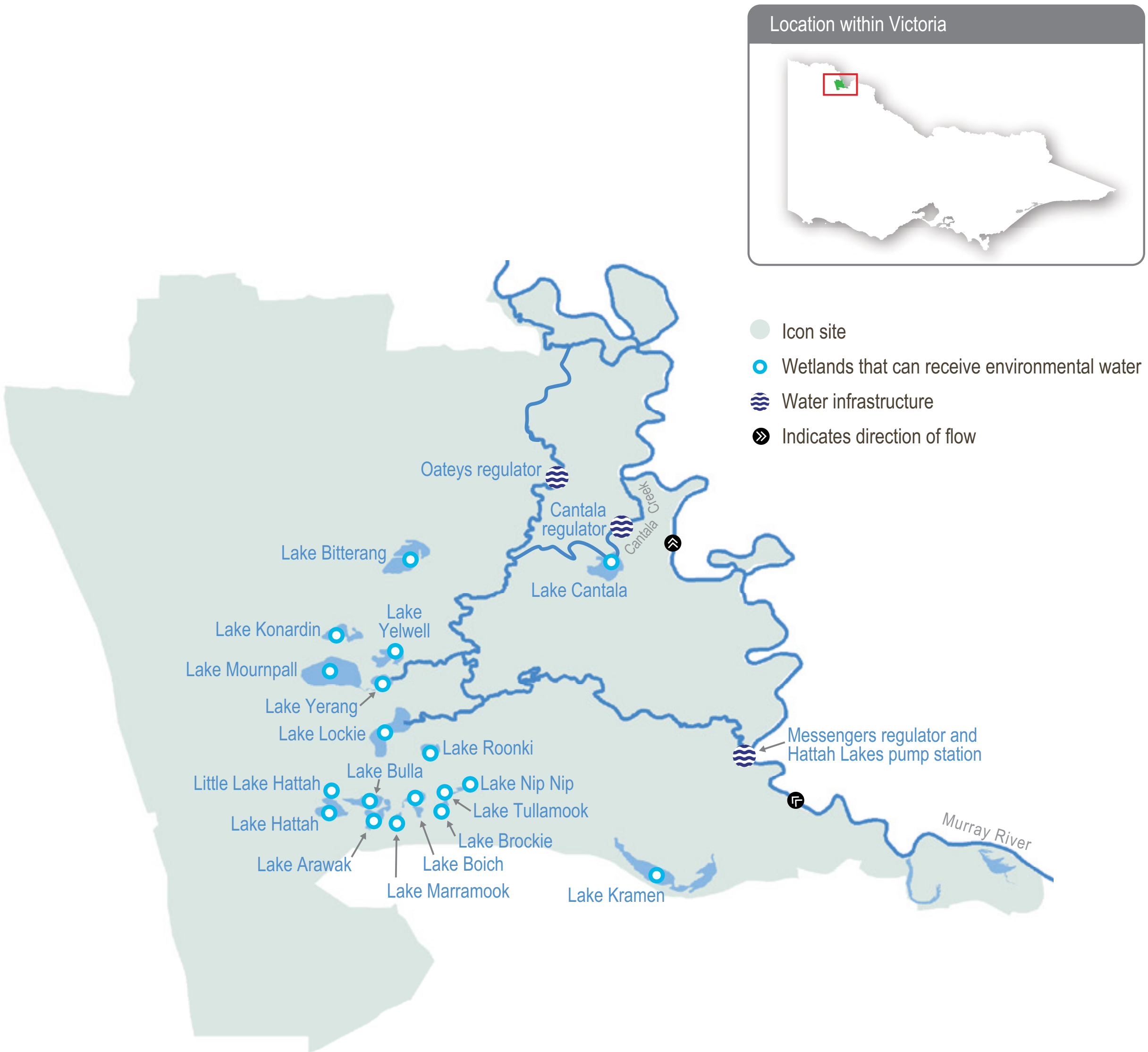
The Hattah-Kulkyne National Park is situated in north-west Victoria, adjacent to the Murray River (Figure 5.2.5). The national park contains a complex of more than 20 semi-permanent freshwater lakes known collectively as the Hattah Lakes.

The ecology of the Hattah Lakes and the surrounding floodplain is strongly influenced by the flooding regimes of the Murray River. The system fills when there is high flow in the Murray River, and some lakes hold water for several years after floods recede. Regulation of the Murray River has significantly reduced the frequency and duration of small- to medium-sized natural floods in the Hattah Lakes system. Over time, this has degraded vegetation communities and reduced the diversity and abundance of animals that use the vegetation and wetlands for habitat and food.

The Hattah Lakes complex can be broadly divided into the southern Hattah Lakes, which contain permanent to semi-permanent wetlands, and the higher-elevation northern Hattah Lakes, which are mostly episodic wetlands.

The Messengers, Oateys and Cantala regulators allow water to flow between the Murray River and the Hattah Lakes. When the flow in the Murray River is about 26,000 ML per day, water begins to flow through the Messengers regulator into Chalka Creek and through the Hattah Lakes complex. A permanent pump station can deliver up to 1,000 ML per day to the southern Hattah Lakes through Chalka Creek. The regulators and pump station are used in combination with several small, constructed levees to deliver a pattern of flooding to the lakes system that is recommended to improve environmental outcomes. Lake Kramen is in the south-east area of Hattah-Kulkyne National Park and is disconnected from the main Hattah Lakes complex. The Hattah Lakes pump station can deliver up to 145 ML per day to Lake Kramen. New infrastructure proposed under the Victorian Murray Floodplain Restoration Project will allow water to reach additional wetlands and floodplain areas in the northern Hattah Lakes.

Figure 5.2.5 Hattah Lakes



Environmental values

Hattah Lakes is home to a diverse range of flood-dependent vegetation that changes with the topography of the landscape. Vegetation types range from wetland communities in low-lying areas that require almost annual flooding to lignum and black box communities situated higher on the floodplain that only need flooding once every four to five years (on average).

A combination of natural flooding and the delivery of environmental flows since 2010 has improved tree canopy health and recruitment of black box and river red gum communities throughout the Hattah Lakes. Woodland birds, including the endangered regent parrot, have benefitted from improved tree health, and when lakes recede after watering, mudflats provide feeding opportunities for shorebirds, and plant germination occurs.

Hattah Lakes provides important waterbird breeding sites in an arid landscape. A total of 34 species of waterbirds are known to breed at the lakes when conditions are suitable. Another six species of waterbirds breed in the surrounding floodplain.

Wetland drought refuge sites are limited in the region, making the Hattah Lakes critically important for water-dependent plants, waterbirds and terrestrial animals during dry periods.

The Hattah Lakes support large-bodied native fish species (such as golden perch) and small-bodied wetland species (such as carp gudgeon). Fish move between the lakes and the Murray River when the flow is suitable. They also persist in wetlands that retain water in the Hattah Lakes during dry years before re-dispersing during floods.

Environmental objectives in the Hattah Lakes

F1 – Maintain populations of small- and large-bodied native fish

CN1 – Improve the function of water-dependent ecosystems by 2030 by improving productivity linkages between the river and floodplain/wetland habitats

V1 – Increase the richness of species and the abundance of native water-dependent floodplain and wetland aquatic vegetation by 2030

V2 – Maintain the extent and improve the condition of river red gum, black box and lignum by 2030, compared to 2006 baseline levels

B1 – Maintain regional waterbird populations by providing conditions for breeding and fledging at least three times every 10 years

B2 – Maintain regional waterbird populations by providing refuge during droughts

G1 – Maintain a variety of freshwater ecosystem types within the Hattah Lakes icon site, including semi-permanent lakes, persistent temporary wetlands, floodplain woodlands, shrublands and episodic wetlands

Traditional Owner cultural values and uses

Located on the border of two documented language groups — Latji Latji and Jari Jari — the Hattah Lakes system is highly significant in terms of Aboriginal cultural values. Key stakeholders with an interest in Hattah Lakes include Latji Latji, Latji Latji Mumthelang, Tati Tati Kaeijin, Tati Tati Land and Water, Wadi Wadi Land & Water, Murray Valley Aboriginal Corporation, Gilbie Corporation, Dadi Dadi/Weki Weki, Culpra Milli, Nyeri Nyeri and Munatunga Elders.

More than 1,000 archaeological sites at Hattah Lakes are registered on the **Aboriginal Cultural Heritage Register and Information System**. Freshwater lakes and wetlands provide focal points for trade and cultural exchanges among the region's Traditional Owners. Local Aboriginal communities maintain strong connections to the land and its resources, including by using native species for food and medicines.

The Mallee CMA held five environmental water planning sessions with Traditional Owners from September to December 2024. Engagement events were held with Tati Tati Land and Water, Wadi Wadi Land & Water, Dadi Dadi/Weki Weki, Culpra Milli, Munatunga Elders, Gilbie Corporation, Nyeri Nyeri and Kilpara Mukwara (formerly Latje Latje Mumthelang). At each event, Mallee CMA staff were able to express the immense value of Traditional Owner contributions to the environmental water program.

During September/October 2024, an overview of the spring environmental water plan was provided to Traditional Owners, along with a proposal to allow the lakes to draw down throughout 2025-26 to benefit various grasses, herbs, birds and animals, while removing carp.

Traditional Owners discussed their values and aspirations for environmental water management at Hattah Lakes in 2025-26 and identified activities and issues of importance to them, including:

- fishing and camping
- keeping water in the lakes to allow plants to grow and thrive, and for birds and animals to breed and flourish
- protecting threatened plant, animal and bird species
- ensuring the protection of burial sites from the impacts of water.

A Mallee CMA Talk Water event with Traditional Owners was held on 6 November 2024 to work through current events, future planning, the importance of various bird species at the lakes, and the benefits of letting the lakes dry for a period of time before rewatering.

There was also discussion about yabbies, birds, plants, the protection of Cultural Heritage and ensuring burial sites are not exposed to damage and weeds. Other topics of discussion included on-Country visits to view the sites before and after environmental water is delivered to assess environmental and Cultural Heritage impacts.

Two environmental water planning events were held in December 2024, and feedback about current planning for water delivery, including drawdown practices, was positive. All stakeholders agreed they would like to be more involved in monitoring the environmental and cultural impacts of environmental water delivery.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning for environmental watering at Hattah Lakes, the Mallee CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing, kayaking and swimming)
- riverside recreation and amenity (such as birdwatching, camping, photography and walking)
- community events and tourism (such as educational opportunities, including bushwalking, birdwatching and bug hunting; local school education programs; Melbourne-based schools' educational excursions; and tours involving kayaking, bike riding and camping)
- socioeconomic benefits (such as commercial beekeepers who rest bees away from horticultural orchards in native flowering trees around the lakes, multiple ecotourism operators who benefit directly when the lakes contain water, social wellbeing generated by connecting with nature, and social gatherings).

The Hattah Lakes system is a high-profile tourism destination, providing important recreation, amenity and cultural opportunities for tourists and the local community. The Mildura Information Centre recommends and promotes the destination on the Visit Mildura website and through Parks Victoria, the land manager.

The condition of Hattah Lakes directly affects social and economic outcomes for businesses, residents and visitors. When environmental conditions deteriorate, for example, as they did during the Millennium Drought, recreation and tourism-based industries suffer as visitor numbers drop and amenity and other social and cultural values decline. Environmental water deliveries outside times of natural flooding improve environmental conditions and thus amenity and recreational opportunities and help grow tourism income and jobs.

The local community greatly values Hattah Lakes as a place to connect with nature, which benefits their health and wellbeing. Conversations with Mallee CMA staff and survey results show the community enjoys activities including kayaking, walking, birdwatching, fishing and social gatherings. **Figure 5.2.6** shows what they value as a 'word cloud': the largest words are those most often used in recorded feedback. Social media posts by local clubs, including Mildura Birdlife, Sunraysia Bushwalkers and Sunraysia Inspired Photographers, also show how much people enjoy Hattah Lakes.

Figure 5.2.6 Word cloud of community values, Hattah Lakes

Apiarists, almond producers and tourism businesses also highly value Hattah Lakes, which are close to significant almond plantings along the Murray River in Sunraysia, Victoria. More than half of all the almonds grown in Australia are grown in Sunraysia, and almonds are Australia's most valuable horticultural export, worth more than $750 million in export revenue in 2022-23. Almond growers rely on bees to pollinate their trees, and hundreds of hives are moved into the region in August/September. Apiarists often 'rest' their bees at Hattah Lakes (subject to agreement with Parks Victoria), where water and food are readily available, before they start pollinating. Environmental water deliveries to Hattah Lakes ensure floodplain trees flower and understorey vegetation grows, helping maintain and improve the health of bees so they are in top condition for pollinating local orchards.

Hattah Lakes also draws many tourists, benefitting local accommodation and hospitality businesses. After the delivery of environmental water to the lakes in 2021 following a drying event, Parks Victoria recorded increased visitor numbers. The nearby general store has more customers during delivery periods and when the lakes have water. Local ecotourism operators (such as Mallee Tours, Wildside Adventure and Murray Off-road Adventures) also report increased bookings when the lakes have water.

Hattah Lakes is also popular with students, who learn about wetlands, build their field assessment skills and understand the importance of wetlands and environmental watering. Schools from as far as Melbourne visit the Hattah Lakes, and the Mallee CMA regularly receives positive feedback from local schools about the value to students of educational excursions to the lakes.

Table 5.2.11 shows the social, recreational and economic benefits of Hattah Lakes environmental watering.

Table 5.2.11 Social, recreational and economic benefits of environmental watering, Hattah Lakes

Beneficiary	Connection to the waterway	Values & uses	How have these benefits been considered?
Apiarists	• Local apiarists are licensed to use Hattah-Kulkyne National Park for their bee hives. Water in the lakes and flowering floodplain trees and vegetation help to improve the health of bees before pollinating almond trees and other horticultural crops.	• Commercial enterprise	• Simulating the natural water cycle of the lakes and implementing a drawdown benefits vegetation, supporting flower production and providing abundant resources for bees.
Birdwatchers	• Hattah Lakes is popular with the local community and visitors for birdwatching. Social media has numerous posts from visiting birdwatchers.	• Recreation opportunities	• Allowing the lakes to draw down provides food and habitat for wading and shorebirds, providing birdwatching opportunities.
Campers	• Water increases the lakes' water quality and beauty, drawing people to them.	• Recreation • Fishing • Birdwatching • Photography	• A drying phase will be implemented but there will still be water in the lakes and vegetation will continue to grow. • Campers generally prefer setting up close to water, and the drawdown will still provide for water access in the southern Hattah Lakes area.
Traditional Owners and Aboriginal community members	• Water improves the environment and attracts birds and animals. It is also spiritual and gives Aboriginal people a sense of belonging and being on Country.	• Culturally significant plants • Water is spiritual to Aboriginal people and important for the land. • Meeting place for Traditional Owners, Elders and the Aboriginal community	• Traditional Owners and Elders were involved in seasonal watering proposal planning and understand the importance of implementing a drawdown cycle. They enjoy being on Country and experiencing the benefits of water and drawdown (such as attracting birds and animals).

Beneficiary	Connection to the waterway	Values & uses	How have these benefits been considered?
Local businesses	• Nearby retail and hospitality businesses benefit from increased tourism. • Local ecotourism businesses take visitors on tours of the Hattah-Kulkyne National Park and participate in various activities.	• Local employment opportunities • Retaining money in local communities • Support local businesses	• The residual water increases visitation, benefitting nearby retail, hospitality and ecotourism businesses.
Researchers	• Studying the wetland, floodplain and rivers during different stages (wet, dry and during drawdown) increases understanding of the natural environment and the requirements of plants, animals and habitat processes.	• Condition monitoring • Intervention monitoring around watering • Large-scale system investigations	• Providing water to sites enables condition and intervention monitoring projects that inform future management planning and decisions. • Condition and intervention monitoring projects through the Living Murray Program are conducted at the site annually.
School students	• Schools from across Victoria use the Hattah Lakes for components of their curriculum, including for hiking and camping trips and studies.	• Natural resource education (e.g. food webs, effects of flooding, water uses) • Recreation/outdoor education (e.g. school camps) • Connection with Country and Indigenous/cultural education	• Site values are maintained by implementing a drying phase, making the site appealing for school trips and educational activities. • The Mallee CMA developed the ***Hattah-Kulkyne National Park Wildlife Detective Activity Book*** for primary school students to learn about the site's ecosystem and cultural values.

Beneficiary	Connection to the waterway	Values & uses	How have these benefits been considered?
Tourists	• Watering increases the quality and beauty of a water-dependant (floodplain/wetlands) area, which draws tourists. Hattah Lakes is a popular, high-value site for camping, fishing, swimming, photography and bush walking.	• Recreation opportunities • Tour operators	• The environmental water delivery program regularly conducts community consultation and engagement activities and uses the feedback received. • Site access is maintained where possible, and information about access is communicated.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.2.12 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.2.12 Hattah Lakes potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
No deliveries of water for the environment are planned for 2025-26.		

Scenario planning

Table 5.2.13 outlines potential environmental watering and expected water use in a range of planning scenarios.

Over the last five years, most Hattah Lakes (including Lake Kramen) were inundated by either naturally high river flows or through environmental watering from pumping infrastructure, which last occurred in spring 2024.

In 2025-26, there is no planned environmental watering for Hattah Lakes. The lakes will enter a major drying phase to manage risks to the diversity of wetland vegetation caused by too-frequent and long-duration inundation. The drawdown will allow native plants within lake-bed herbland communities to grow on exposed soils and provide foraging habitat for wading shorebirds. It will also set the lakes up for a major increase in foodweb productivity when carbon is released during a future watering. Most lakes in the system are currently dry or are expected to dry during 2025-26, but water from previous fills will be retained in larger and deeper lakes (such as lakes Hattah, Arawak, Bulla, Brockie and Kramen), which will maintain critical aquatic habitat at a landscape scale. The timing of the next refill of Hattah Lakes with environmental watering has not been decided, but if outcomes from the 2025-26 drying regime are achieved, a refill may be necessary in spring 2026. Carryover of up to 50,000 ML is prioritised in all planning scenarios for a refill of Hattah Lakes in spring 2026.

Table 5.2.13 Hattah Lakes environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected river conditions	• Low flow year-round in the Murray River and no natural inflow to the Hattah Lakes; substantial wetland drying will occur	• Rare high-flow events in the Murray River and no natural inflow to the Hattah Lakes	• Short periods of high flow in the Murray River with minor spills from storages, most likely in late winter/ spring, providing minor natural inflow to the Hattah Lakes	• Lengthy periods of high flow in the Murray River with major spills from storages resulting in widespread wetting of the Hattah Lakes and floodplain
Potential environmental watering – tier 1 (high priorities)	• N/A: no deliveries of water for the environment are planned for 2025-26.			
Possible volume of water for the environment required to achieve objectives	• There is no volume required for environmental watering in 2025-26. In consultation with the VEWH, the Mallee CMA and Parks Victoria, Goulburn-Murray Water may operate the Hattah Lakes pump station at any time during the 2025-26 year for testing, following pump maintenance and repairs. Water held by the Living Murray Program will be used if testing is required.			
Priority carryover requirements for 2026-27	• 50,000 ML			

5.2.6 Lower Murray wetlands

System overview

The lower Murray wetlands are dispersed across the Murray River floodplain between Swan Hill and the South Australian border (Figure 5.2.7). The system includes a myriad of interconnected creeks, wetlands and floodplains that are ecologically important and reflect the natural character and attributes of the floodplain. While there are hundreds of wetlands across the lower Murray region, only 37 have ever received water for the environment.

Regulation and diversion of the Murray River flow have substantially reduced the frequency and duration of the high river flow that would naturally water the lower Murray wetlands. This change to the water regime has been exacerbated by climate change and has reduced the variety and condition of environmental values associated with billabongs and other floodplain habitats.

Water for the environment can be delivered to some wetlands in the region by directly pumping from the Murray River and/or using irrigation supply infrastructure. Most wetlands that receive environmental flows can be managed independently of each other.

This year, for the first time, seasonal watering proposals were sent directly to the VEWH by some Traditional Owners. For the lower Murray wetlands, a seasonal watering proposal by the First People of the Millewa-Mallee Aboriginal Corporation (FPMMAC) is incorporated into this seasonal watering plan. The lower Murray wetlands can receive water via a temporary pump from the Murray River and have previously had water for the environment delivered by the Mallee CMA.

Figure 5.2.7 Lower Murray wetlands

Environmental values

The lower Murray wetlands comprise many wetlands, creeks and billabongs. The wetlands may be permanent or temporary, and freshwater or saline, depending on their location in the landscape, interactions with groundwater and management history.

Differences in water regime and water quality across the wetlands provide a range of habitats for plants and animals. For example, permanent, saline wetlands (such as Koorlong Lake) provide vital habitat for the endangered Murray hardyhead. Ephemeral wetlands support different ecological processes in their wet and dry phases. During the wet phase, they provide short-term boom periods when river red gums and wetland plants grow, spread and provide habitat for aquatic animals (such as waterbugs, birds, frogs and, in some cases, fish). During their dry phases, sediments are exposed to the air (which is important for carbon and nutrient cycles), and terrestrial plants grow and complete their life cycles.

Environmental objectives in the lower Murray wetlands

A1 – Maintain native frog populations, including the endangered growling grass frog

B1 – Provide feeding and breeding habitat for a range of waterbird species, including threatened and migratory species and colonial nesting species (such as egrets)

CN1 – Promote carbon and nutrient cycling to enable wetland processes for food webs

F1 – Increase the Murray hardyhead populations in permanent wetlands where they are known to persist

F2 – Maintain populations of other native fish in permanent wetlands

F3 – Trial growth rates of stocked juvenile large-bodied native fish in a natural wetland

V1 – Increase the diversity, extent and abundance of wetland plants

V2 – Improve the condition of river red gums, black box and lignum communities

Traditional Owner cultural values and uses

Watering of the Murray wetlands supports Traditional Owners' cultural values (such as traditional food sources, medicines and important species), and it provides opportunities for teaching, learning and storytelling.

The First People of the Millewa-Mallee Aboriginal Corporation (FPMMAC) is recognised as the Traditional Owner of Country in north-west Victoria that runs south of the Murray River to the Mallee Highway and west from the Calder Highway to the South Australian border, including the Murray-Sunset National Park. FPMMAC is a Registered Aboriginal Party (RAP).

There are many sites of cultural significance across the floodplain, including ceremonial grounds, earth ovens, culturally modified trees, shell middens, song lines, ancestral resting places and story places.

FPMMAC has maintained associations with the Murray River for thousands of generations. Indeed, the river and its surrounds are one of the richest sources of Aboriginal archaeological and heritage material in Australia. The floodplain provides vital resources, including food, water, shelter, medicine and tools. The Traditional Owners retain a strong connection to this Country.

The Mallee CMA has a strong working relationship with FPMMAC, which involves regular two-way communication, including planning, knowledge-sharing and discussions. Water in the landscape is critical to the spirituality of the people of the First People of the Millewa-Mallee, strengthening their connection to Country. The Mallee CMA and FPMMAC have frequent discussions about water, including planning and delivery of environmental water.

The area from Nyah to Red Cliffs is Country shared by a number of groups, including Nyeri Nyeri, Kilpara Mukwara (formerly Latje Latje Mumthelang), Culpra Milli, Gilbie Corporation, Munatunga Elders, Tati Tati Kaeijin, Tati Tati Land and Water, Wadi Wadi Land & Water, Dadi Dadi/Weki Weki and Wadi Wadi Nation. Each group has their own cultural identity, practices, beliefs and priorities. The Mallee CMA recognises all groups within this area and engages with each group to ensure their voices are heard and represented when planning for environmental water.

In the last two years, the Mallee CMA has made a concerted effort to ensure it was engaging with Traditional Owners much earlier in the planning process than in previous years. This was in response to feedback from a number of groups asking to be involved earlier in the process.

The Mallee CMA discussed the proposed 2025-26 watering of the Murray wetlands during several meetings and events with Traditional Owner groups, including FPMMAC, Nyeri Nyeri, Gilbie Corporation, Kilpara Mukwara, Tati Tati Land and Water, Wadi Wadi Land & Water, Dadi Dadi/Weki Weki, Culpra Millie, Munatunga Elders, and Wadi Wadi Nation. These meetings and events discussed where Traditional Owners would like to see environmental water delivered for 2025-26 and what activities they undertake at each site, raising much interest in cultural practices and helping prioritise areas for environmental water delivery. Discussions covered options for delivering environmental water in 2025-26 and traditional ecological needs, given the current climate. Feedback was positive and supported the proposed environmental watering. Drawdown and drying were discussed at length, and much knowledge was shared before agreement was reached.

Understanding the environmental responses to the 2022-23 Murray River flood and identifying and protecting cultural heritage were key topics for discussion. A common foundation of all groups was the importance of water in wetlands for their cultural spirituality and connection to Country.

Other discussions and comments by Traditional Owner groups included:

- wanting more native plants and animals in the areas
- increasing opportunities for Indigenous Landcare
- training opportunities (such as Indigenous ranger programs)
- ways to protect and preserve Aboriginal cultural heritage in the landscape
- sharing information and knowledge with the broader community
- increased usage of the Murray wetlands by birdwatching groups
- having on-Country visits scope out cultural areas of sensitivity before water delivery, which is especially important after floods that have uncovered sites.

There was a common theme of cultural priorities across different Traditional Owner groups. Groups commonly stated their priorities as being cultural activities, native plants and animals (birds, reptiles, frogs, kangaroos, possums, turtles and fish), fishing, bush foods, endangered plants and animals, changing carp control to carp eradication, scar trees, clay balls, plants of cultural significance, and aquatic vegetation.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Traditional Owner-led seasonal watering proposals for healthy Country

First People of the Millewa-Mallee Aboriginal Corporation

The Lower Murray wetlands system has included proposed watering actions for Musk Duck Wetland for 2025-26 presented by the First People of the Millewa-Mallee Aboriginal Corporation (FPMMAC).

FPMMAC has worked with the Mallee CMA, the Victorian Fisheries Authority, the Murray-Darling Basin Authority and the VEWH on a stocking trial of silver perch and golden perch at Musk Duck Wetland and has been monitoring the site several times a week to June 2025 to check the wetland can support the juvenile fish as it naturally draws down. Environmental water delivery is a valuable support for FPMMAC in caring for Country. Returning a successful wetting and drying regime to the site will support wide-ranging, culturally important species including yabby, shrimps, long-necked turtles and small-bodied fish species, and it will enable FPMMAC to care for Country.

> "When you go into a wetland, you identify what the wetland needs. When I go to a wetland, I know what's there. I know where we need water, when we need to draw down for the plants and what we need for the fish."
>
> – *FPMMAC Musk Duck Wetland seasonal watering proposal*

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 5.2.15** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.2.15**, the Mallee CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, fishing and kayaking)
- riverside recreation and amenity (such as bike riding, birdwatching, bushwalking, camping, geocaching, photography and running)
- community events and tourism (such as day trips and sightseeing; education programs for school, TAFE and university students; and citizen science projects about birds, frogs and plants)
- socioeconomic benefits (such as economic benefits for businesses in the accommodation, beekeeping, food and beverage, ecotourism, hospitality and retail sectors; creating a focal point for socialising; and providing natural, green spaces for the local community).

Water for the environment helps protect the ecosystems, plants and animals unique to the Murray wetlands. It also provides natural, green spaces for the local community. In the Mallee's semi-arid environment, water is a major focal point for locals and visitors alike. Therefore, it is important to preserve the wetlands and continue to understand how locals and tourists use them for social and recreational pursuits, including kayaking, walking, birdwatching and sport.

Social, recreational and economic values and uses are not the deciding factors when selecting and prioritising sites to receive water, but community support can be important for the success of watering events. Feedback from the community highlights the importance of the wetlands and the additional benefits of delivering environmental water.

Face-to-face, online communication and community surveys indicate high usage of local wetlands and creeks, and a greater connection when water is present. Commonly mentioned activities associated with watering include walking, on-water activities, camping, fishing, birdwatching, kayaking and bike riding. Favourite sites include Kings Billabong, Bottle Bend, Lake Hawthorn, Catfish Billabong, Cardross Lakes and Bullock Swamp. The list includes not just sites that receive environmental water annually, but also sites watered less frequently. These have great community support when environmental water is proposed and delivered, with the benefits of environmental watering evident long after the watering has occurred.

Figure 5.2.8 shows what people value (left) and favourite sites (right) as 'word clouds': the largest words are those most often used in recorded feedback.

Figure 5.2.8 Word clouds of community values and favourite sites, lower Murray wetlands

Local tourism also benefits from environmental watering at wetlands and floodplains across the Murray wetlands sites. Many tourists ask at the Mildura Information Centre about the best locations for birdwatching; their recommendations include Lake Hawthorn, Koorlong Lake, Brickworks Billabong, Cowanna Billabong and Butlers Creek. All these sites are managed with environmental flows.

Environmental watering increases visitation to the area, benefitting local hospitality businesses, ecotourism providers, tour operators and local retailers, including farmers markets. It directly benefits local contractors that provide pumps, earthworks and expertise, creating local jobs, retaining money in the community and increasing local knowledge. Apiarists also benefit, deploying their hives across watered sites to use streamside trees which flower in response to watering. This is particularly important for the almond industry.

Table 5.2.14 shows the social, recreational and economic benefits of lower Murray wetlands system environmental watering.

Table 5.2.14 Social, recreational and economic benefits of environmental watering, lower Murray wetlands

Beneficiary	Connection to the waterway	Values & uses	How have these benefits been considered?
Local businesses	• Increased tourism benefits the local tourism industry. • Pumped water has previously been delivered by local suppliers.	• Local employment opportunities • Retaining money in local communities • Support for local businesses	• Environmental water delivery in the Mallee is highly dependent on pumped delivery. Delivery contracts have generally been awarded locally, with local suppliers encouraged to tender; the program would not be possible without their support. • Water attracts tourism and encourages locals to enjoy recreation pursuits, increasing patronage at nearby hospitality and accommodation businesses and increasing ecotourism opportunities.
Apiarists	• Watering supports native vegetation to flower, benefitting bees. • Environmental water deliveries ensure bees don't have to travel long distances for drinking water.	• Commercial enterprises	• Water delivery benefits vegetation outcomes, which support flower production, providing abundant resources for bees.
Birdwatchers	• Water provides essential habitat for birds, which draws birds and birdwatchers to the region.	• Recreation opportunities	• Water is regularly delivered to sites to meet waterbird and bird objectives.

Beneficiary	Connection to the waterway	Values & uses	How have these benefits been considered?
Anglers	• Water increases opportunities for yabbying in wetlands.	• Recreation • Food for personal consumption	• Delivering water to floodplains and large, shallow wetlands regularly results in the yabby population booming, benefitting anglers who catch them to eat.
Campers	• Water increases a site's water quality and beauty, drawing people to it.	• Recreation • Fishing • Birdwatching • Photography	• Campers generally prefer setting up close to water and, given the option, will usually prefer a site with water over a site without it. This gives them easy access to water for recreational pursuits.
Tourists	• Water draws people to sites. • Increasing the quality and beauty of a region draws tourists. • The local tourism industry benefits as a result of increased tourism.	• Recreation opportunities • Tour operators	• There is extensive community consultation and engagement as part of the environmental water delivery program.
Researchers	• Studying the wetland, floodplain and rivers during different stages (wet, dry and during drawdown) increases understanding of the natural environment and the requirements of plants, animals and habitat processes.	• Condition monitoring • Intervention monitoring around watering • Large-scale system investigations	• Providing water to sites enables condition and intervention monitoring projects that target particular plants, animals or hydrological outcomes to inform future management planning and decisions.
Schools and education centres	• Local schools and other educators (e.g. TAFE, universities) cover aspects of the natural environment in their curriculum. Several nearby wetlands provide examples of channel and wetland ecology.	• Natural resources education (e.g. food webs, effects of flooding, water uses) • Recreation/outdoor education (e.g. school camps) • Connection with Country and Indigenous/cultural education	• Environmental water deliveries have enabled schools and TAFEs to use sites close to Mildura (e.g. Koorlong Lake, Lake Hawthorn, Kings Billabong/Butlers Creek, Merbein Common) to deliver their curriculums.

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 5.2.15** by an icon, as pictured below and also explained in **Figure 1.2.3**.

	Watering planned to support waterbird-related recreational activities
	Watering planned to support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.2.15 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.2.15 Lower Murray wetlands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Bottle Bend Wetland (fill in spring)	• Provide soil moisture to maintain and improve the health of the adjacent black box (to a target water level of 36.5 m AHD) • Provide conditions to support the growth of aquatic and emergent vegetation • Provide feeding and breeding opportunities for frogs, including the growling grass frog • Maintain feeding and nesting opportunities for non-colonial waterbirds	A1 B1 V1, V2
Brickworks Billabong (fill in spring/summer, then top-ups as required)	• Maintain water levels (the target water level is between 30.8 m AHD and 31.6 m AHD) to inundate ruppia beds, provide nursery habitat for Murray hardyhead and provide high levels of aquatic productivity • Maintain water quality suitable for Murray hardyhead • Provide shallow-water habitat and exposed mudflats to support foraging and resting waterbirds, including migratory waterbirds	B1 F1 V1
Brown Swamp (Pound Bend) (fill in spring)	• Inundate and wet the outer fringing lignum and vegetation communities (to target water level 47.0 m AHD) to improve their condition • Inundate adjacent river red gum communities to stimulate their growth and flowering to improve their condition and extent • Provide a range of habitat for birds and frogs	A1 B1 V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Burra Creek North (fill in spring) **Burra Creek South (fill in spring)** **Burra Creek South Proper (fill in spring)**	• Provide soil moisture to maintain and improve the condition of streamside and floodplain vegetation, specifically river red gum, black box and lignum • Provide habitat by improving vegetation communities and water resources for birds and frogs • Mobilise leaf litter to promote carbon and nutrient cycling	A1 B1 CN1 V2
Catfish Billabong (fill in spring)	• Fill to 33.5 m AHD to inundate fringing woodland vegetation to improve its condition and recruitment • Provide habitat for fish species • Allow the water level to draw down over summer and autumn to: – promote the growth of a range of aquatic plants that favour different water depths and inundation patterns – provide suitable foraging conditions for wading shorebirds	B1 F2 V1, V2
J1 Creek (fill in spring)	• Fill to 46.5 m AHD to provide soil moisture to maintain and improve the condition of streamside and floodplain vegetation, specifically river red gum and black box • Provide shallow-water habitat to provide refuge and feeding habitat for waterbirds • Stimulate the growth of aquatic vegetation during inundation • Provide conditions for semi-aquatic lake-bed herbland to establish during drawdown	B1 V1, V2
Koorlong Lake (top-ups in spring, then as required)	• Increase and maintain the water level (to a target level between 36.7 m AHD and 38.0 m AHD) to support the growth of saline aquatic vegetation, including ruppia, to provide nursery habitat for Murray hardyhead and high levels of aquatic productivity • Maintain the water level within a 1.3 m range to provide feeding resources for waterbirds and maintain the Murray hardyhead population	B1 F1 V1
Lake Hawthorn (top-ups in spring, then as required)	• Maintain the water level between 33 m AHD and 33.3 m AHD to encourage the germination and growth of saline aquatic vegetation, including ruppia, and provide mudflat and shallow-water feeding habitat for shorebirds	B1 V1

Potential environmental watering action	Expected watering effects	Environmental objectives
Musk Duck Wetland (top-ups in winter/ spring, if triggered by fish)	• Provide habitat for fish and sustain or cue the movement of stocked golden and silver perch to assist with their planned recapture and translocation	F3
Outlet Creek (Karadoc Swamp) (fill in spring)	• Provide soil moisture to maintain and improve the condition of streamside and floodplain vegetation, specifically river red gum, black box and lignum • Provide suitable habitat for native frog species • Provide open-water habitat as feeding and breeding habitat for waterbirds • Maintain significant Moira grass	A1 B1 V2

Scenario planning

Table 5.2.16 outlines potential environmental watering and expected water use in a range of planning scenarios.

Three permanent wetlands in the lower Murray wetlands system rely on environmental watering or natural inundation every year to maintain their environmental values and are high priorities for watering in all planning scenarios in 2025-26. Brickworks Billabong and Koorlong Lake are important sites for endangered Murray hardyhead. Lake Koorlong currently supports a healthy population of Murray hardyhead and requires top-ups each year to maintain salinity levels within the target range for ruppia and successful fish breeding. Brickworks Billabong underwent a restoration in 2023-24 and 2024-25 after the 2022 floods flushed the fish from the wetland and allowed pest species to become established. Wetland and saline habitat has been restored, which will enable the reintroduction of Murray hardyhead in autumn 2025. Lake Hawthorn has similar characteristics to Brickworks Billabong and Koorlong Lake, but efforts to establish a Murray hardyhead population in the lake have been unsuccessful. The lake's semi-saline conditions continue to support ruppia and provide foraging habitat for shorebirds. It draws down in summer and autumn and benefits from a spring top-up in all planning scenarios.

Other high priorities in all planning scenarios are Bottle Bend and Musk Duck wetlands. Bottle Bend Wetland was naturally inundated by flooding in 2022 and 2023, but has since dried out and needs watering in 2025 to improve the local frog population, including the threatened growling grass frog and vegetation communities of black box and lignum. In 2024-25, Musk Duck Wetland was part of a project led by the Victorian Fisheries Authority and Traditional Owners and funded by the Murray-Darling Basin Authority to investigate the growth and survival benefits of raising hatchery-bred native fish in floodplain wetlands. In 2025-26, to complete the trial, FPMMAC may gather the fish using a cultural harvest strategy, which will allow the wetland to draw down and complete important dry-phase ecosystem processes. If capturing fish is not possible without a small flow, it may be delivered to a targeted area of the wetland in spring to attract fish to a place where they can be more efficiently caught, tagged and relocated to the river. If significant drawdown occurs in winter, a top-up may be delivered to ensure water quality and the survival of the fish until spring.

J1 Creek, Outlet Creek (Karadoc Swamp) and Catfish Billabong are medium priorities in 2025-26 in the dry, average and wet planning scenarios. J1 Creek and Catfish Billabong have exceeded their recommended drying phases, and delivery of environmental water is recommended to improve the condition of fringing vegetation, including black box and lignum, which will also provide habitat for waterbirds. Outlet Creek (Karadoc Swamp) received water for the environment in 2024-25 after flooding naturally inundated the creek in 2022 and 2023. Moira grass emerged following the 2024 watering, which also improved the condition of streamside species: swamp sheoak, black box and lignum. The Mallee CMA is keen to provide a follow-up watering to maintain the new Moira grass and build resilience for any drier periods ahead.

The Burra Creek and Brown Swamp at Pound Bend sites have all been inundated multiple times since 2021 and are the lowest-priority sites for 2025-26. Their environmental condition is currently high, and they don't need more watering in the drought and dry planning scenarios but are prioritised in the average and wet planning scenarios to improve their ecological condition. Any additional watering will encourage the further growth of streamside and floodplain vegetation communities to support waterbirds, frogs and other animals.

All other wetlands in the lower Murray wetlands system will be allowed to draw down to support dry-phase ecosystem processes, as recommended in their management plans.

Table 5.2.16 Lower Murray wetlands environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• The Murray River's natural flow is too low to connect to the wetlands • Very low rainfall year-round and extremely hot and dry conditions in summer/autumn cause substantial wetland drying • Wetlands rely on environmental water	• Short periods of high flow in the Murray River are possible, but overbank flow to the wetlands is unlikely • There may be low rainfall and a very warm summer/autumn • Wetlands rely on environmental water	• Sustained periods of high flow in the Murray River in late winter and early spring may wet some low-lying wetlands, but most will rely on environmental water • Local rainfall may be high and provide run-off to some wetlands	• Lengthy periods of high flow and floods with major spills from storages are likely, resulting in widespread wetting of the floodplain and most wetlands • There may be some reliance on environmental water to achieve target water levels • Local rainfall may be high and will provide run-off to most wetlands

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 1 (high priorities)	• Brickworks Billabong (fill in spring/summer, then as required) • Bottle Bend Wetland (fill in spring) • Koorlong Lake (top-ups in spring, then as required) • Lake Hawthorn (top-ups in spring, then as required) • Musk Duck Wetland (top-ups in winter/spring, if triggered)	• Brickworks Billabong (fill in spring/summer, then as required) • Bottle Bend Wetland (fill in spring) • Catfish Billabong (fill in spring) • J1 Creek (fill in spring) • Koorlong Lake (top-ups in spring, then as required) • Lake Hawthorn (top-ups in spring, then as required) • Musk Duck Wetland (top-ups in winter/spring, if triggered) • Outlet Creek (Karadoc Swamp) (fill in spring)	• Brickworks Billabong (fill in spring/summer, then as required) • Bottle Bend Wetland (fill in spring) • Brown Swamp (Pound Bend) (fill in spring) • Burra Creek North (fill in spring) • Burra Creek South (fill in spring) • Burra Creek South Proper (fill in spring) • Catfish Billabong (fill in spring) • J1 Creek (fill in spring) • Koorlong Lake (top-ups in spring, then as required) • Lake Hawthorn (top-ups in spring, then as required) • Musk Duck Wetland (top-ups in winter/spring, if triggered) • Outlet Creek (Karadoc Swamp) (fill in spring)	• Brickworks Billabong (fill in spring/summer, then as required) • Bottle Bend Wetland (fill in spring) • Brown Swamp (Pound Bend) (fill in spring) • Burra Creek North (fill in spring) • Burra Creek South (fill in spring) • Burra Creek South Proper (fill in spring) • Catfish Billabong (fill in spring) • J1 Creek (fill in spring) • Koorlong Lake (top-ups in spring, then as required) • Lake Hawthorn (top-ups in spring, then as required) • Musk Duck Wetland (top-ups in winter/spring, if triggered) • Outlet Creek (Karadoc Swamp) (fill in spring)
Potential environmental watering – tier 2 (additional priorities)	• N/A			
Possible volume of water for the environment required to achieve objectives	• 2,450 ML (tier 1	• 4,650 ML (tier 1)	• 6,895 ML (tier 1)	• 4,300 ML (tier 1)

5.2.7 Lindsay, Mulcra and Wallpolla islands

System overview

Lindsay, Mulcra and Wallpolla islands cover over 26,100 ha of Victorian floodplain in the Murray-Sunset National Park (Figure 5.2.9). These islands form part of the Chowilla Floodplain and Lindsay-Wallpolla islands icon site that straddles the Victoria-South Australia-New South Wales border in the mid-Murray River system.

The Lindsay-Mulcra-Wallpolla islands floodplain is characterised by a network of permanent waterways, small creeks and wetlands. Lindsay River, Potterwalkagee Creek and Wallpolla Creek form the southern boundaries of the site and create large floodplain islands, with the Murray River to the north.

In their natural state, these waterways and wetlands would regularly flow and fill in response to high water levels in the Murray River. Large floods still occur, but major storages in the upper reaches of the Murray River system and extraction for consumptive use have reduced the frequency of small- to moderate-sized floods.

Flows in the mid-Murray River system are regulated through a series of weir pools. The weir pools are named after the locks that form part of the infrastructure at the weirs that allow vessels to navigate from one weir pool to the next. The weir pools are primarily managed as small water storages to ensure adequate water levels for off-stream diversion via pumps and regulated channels.

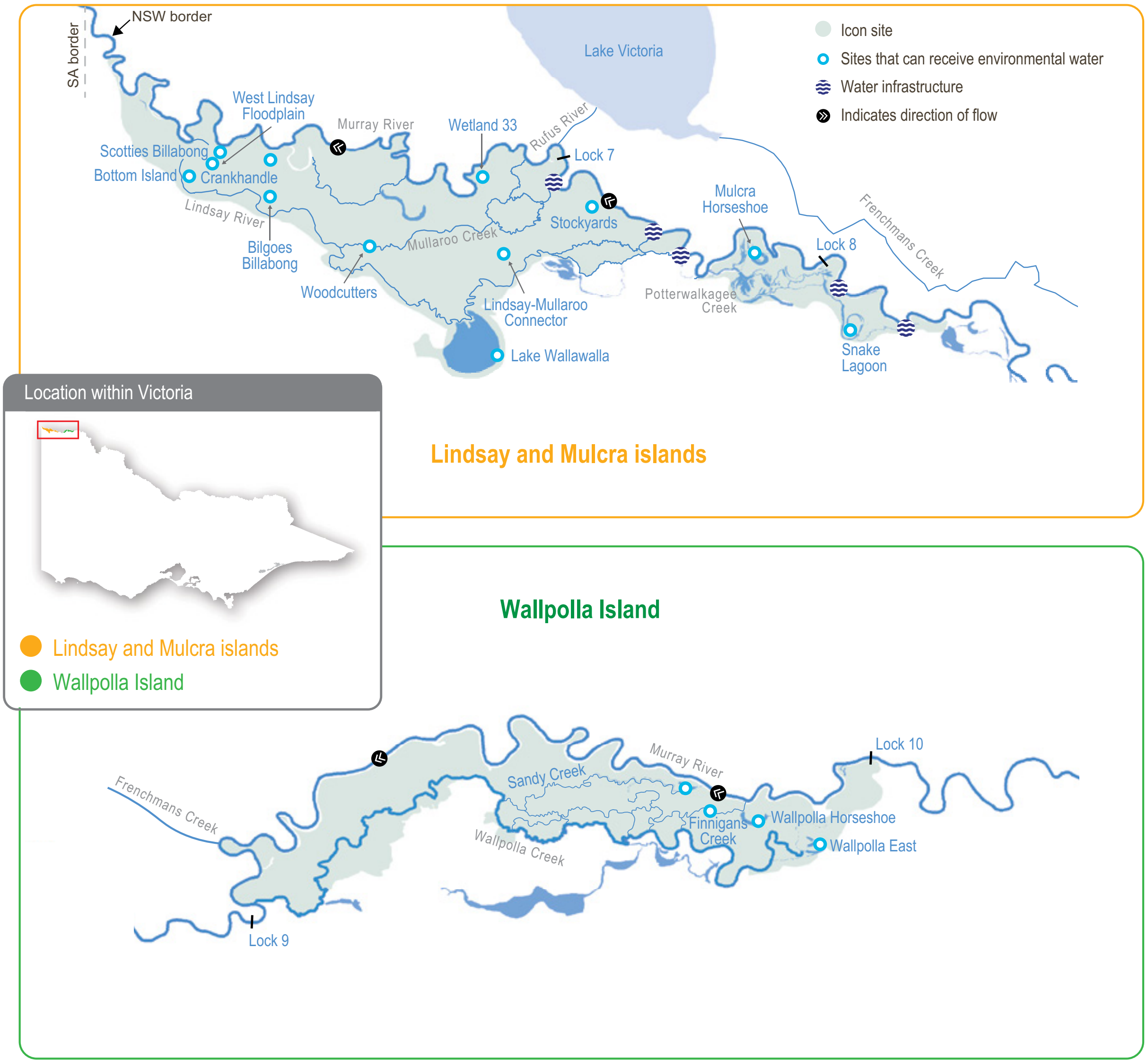
Water is diverted from the Lock 9 weir pool in the Murray River to Lake Victoria, where it is stored for later use to meet South Australian water demands. The diversion causes water to bypass Murray River weir pools 7 and 8, and at times it can significantly affect flow in those reaches.

In recent years, water levels in weir pools 7 and 8 have been managed to achieve ecological benefits in the Murray River channel. For example, weir pool levels have been raised during winter and spring and then lowered during summer and autumn to mimic the seasonal river flow. The raising and lowering provide greater environmental benefits than a stable weir pool because they wet and dry off-channel habitats and create more variable flow patterns in the Murray River and connected floodplain streams. Changes in water levels during appropriate seasons help establish fringing vegetation in shallow margins of the river channel and promote the cycling of nutrients and carbon as conditions fluctuate between wet and dry.

Static weir pool levels and reduced flow in the Murray River significantly affect flows in the Lindsay River and Potterwalkagee Creek. When the natural flow increases and/or when water levels in weir pools 7 and 8 are raised above the full supply level, the upper Lindsay River starts flowing (Lock 7) and flow to Potterwalkagee Creek increases (Lock 8). When weir pools are lowered, flow to both the upper Lindsay River and Potterwalkagee Creek ceases. Mullaroo Creek on Lindsay Island is less affected by weir pool levels, and flow is controlled independently through the Mullaroo Creek regulator, which connects the creek and the Murray River. A moderate lowering of the Lock 7 weir pool level has little effect on Mullaroo Creek, but lowering more than 0.5 m below the full supply level makes it difficult to deliver the recommended minimum flow of 600 ML per day that is required to maintain fast-flowing habitat for native fish, especially Murray cod.

Fluctuation of weir pool levels is a major consideration for jurisdictions managing flow in the Murray River and the anabranch waterways of Lindsay, Mulcra and Wallpolla islands. Environmental objectives and associated water regimes for the Murray River sometimes conflict with those for the Lindsay, Mulcra and Wallpolla anabranch systems. Responsible agencies in Victoria and NSW and the Murray-Darling Basin Authority collaboratively plan how to effectively manage weir pools and flows to floodplain habitats.

Figure 5.2.9 Lindsay, Mulcra and Wallpolla islands



Environmental values

The Lindsay, Mulcra and Wallpolla islands represent three separate anabranch systems that contain various streams, billabongs, large wetlands and swamps. When flooded, waterways and wetlands within these systems provide habitat for native fish, frogs, turtles, waterbirds and water-dependent plants. Terrestrial animals (such as woodland birds) also benefit from improved productivity and food resources when anabranch systems are inundated. Large floodplain wetlands (such as Lake Wallawalla) can retain water for several years after receiving inflows; they provide important refuges for wetland-dependent species and support terrestrial animals (such as small mammals and reptiles).

Mullaroo Creek supports one of the most significant populations of Murray cod in the mid-Murray River system. Mullaroo Creek provides fast-flowing habitat that Murray cod favour, which contrasts with the artificially slow-flowing and still habitats in the nearby Murray River weir pools. Fish in Mullaroo Creek breed and produce juveniles that contribute to populations in adjacent parts of the Murray system (such as in the Darling River in NSW and the lower Murray River in South Australia). Waterways and wetlands throughout the icon site support several other fish species, including freshwater catfish, golden perch, silver perch, Murray-Darling rainbowfish and unspecked hardyhead.

The reduced frequency and duration of floods in the Murray River have degraded the water-dependent vegetation communities throughout the Lindsay, Mulcra and Wallpolla island system. This has, in turn, reduced the diversity and abundance of animals that rely on healthy vegetation for habitat.

Environmental objectives in the Lindsay, Mulcra and Wallpolla islands

A1 – Maintain populations of frogs

B1 – Maintain communities and species diversity of colonial nesting waterbirds, waterfowl and waders that feed on fish

B2 – By 2030, increase populations of colonial nesting waterbirds at Lake Wallawalla and non-colonial waterbirds at Mulcra Horseshoe and Wallpolla Horseshoe

CN1 – By 2030, improve the function of water-dependent ecosystems by improving productivity linkages between river and floodplain habitats

F1 – By 2030, increase the abundance of small-bodied native fish and the spread of age classes for long-lived native fish, compared to 2006 baseline levels

V1 – Improve populations of threatened flow-dependent plants

V2 – By 2030, maintain the extent and improve the condition of river red gum, black box and lignum, compared to 2006 baseline levels

V3 – By 2030, improve the species richness and abundance of native wetland and floodplain aquatic vegetation functional groups

Traditional Owner cultural values and uses

Aboriginal ancestral occupation across the Lindsay, Mulcra and Wallpolla islands floodplain dates back tens of thousands of years and is sustained by the rich productivity of the floodplain woodland and wetland systems. Historically, the islands would have been an abundant source of food and water for these communities. The floodplain remains a vital part of community health and wellbeing for Aboriginal communities.

The First People of the Millewa-Mallee Aboriginal Corporation (FPMMAC) is recognised as the Traditional Owner of Country in north-west Victoria that runs south of the Murray River to the Mallee Highway and west from the Calder Highway to the South Australian border, including the Murray-Sunset National Park. FPMMAC is a Registered Aboriginal Party (RAP).

There are many sites of cultural significance across the floodplain, including ceremonial grounds, earth oven remains, culturally modified trees, shell middens, song lines, ancestral resting places and story places.

FPMMAC has maintained associations with the Murray River for thousands of generations. The river and its surrounds are among the richest sources of Aboriginal archaeological and cultural heritage material in Australia. The floodplain provides vital resources, including food, water, shelter, medicine and tools. The Traditional Owners retain a strong connection to this Country.

The Mallee CMA has a strong working relationship with FPMMAC, which involves regular two-way communication, including planning, sharing of knowledge and ongoing discussions. Water in the landscape is critical to the spirituality of the people of FPMMAC, strengthening their connection to Country. The Mallee CMA and FPMMAC have frequent discussions about water, including the planning and delivery of environmental water.

In the last two years, the Mallee CMA has made a concerted effort to ensure it was engaging with Traditional Owners much earlier in the planning process than in previous years. This was in response to feedback from a number of groups asking to be involved earlier in the process.

An environmental water planning event was held with FPMMAC in October 2024. Initial discussions covered previous engagements and how they had affected current activities, followed by how FPMMAC would like to see environmental watering in 2025-26. It was a great day, due to the level of participation and input by Traditional Owners, particularly about how water benefits Country. For example, Traditional Owners want to see more native fish and shellfish at various locations, with the discussion moving to how environmental water can support this. Bird and plant life at different locations were then discussed, providing the environmental water team with a great source of information for their planning.

Meetings were also held about Lake Walla Walla, which is a particularly important site for FPMMAC. Planning has commenced for how FPMMAC would like to manage the site in the future.

There is a heavy focus on Cultural Heritage protection works along the lake edge and on the dune system and covering tracks that have Cultural Heritage values.

Many other meetings and discussions occur throughout the year with FPMMAC representatives about environmental water planning and cultural input into seasonal water proposals.

Increasing the involvement of Traditional Owners in managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 5.2.18** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.2.18**, the Mallee CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, kayaking, fishing and yabbying)
- riverside recreation and amenity (such as bushwalking, camping, bird and wildlife watching, four-wheel driving and photography)
- community events and tourism (such as increased and longstanding repeat visitation, ecotourism and educational programs for school, TAFE and university students)
- socioeconomic benefits (such as for commercial beekeepers who rest bees around the floodplain, local businesses providing accommodation and hospitality to tourists, researchers and local water delivery contractors).

The Lindsay-Mulcra-Wallpolla islands floodplain is a vast, isolated landscape. Its remoteness is a major drawcard, with people 'getting away from it all' during trips to this area. Tourism is one of the largest industries in the Mildura-Mallee region, and Murray-Sunset National Park is one of the major attractions. The area draws tens of thousands of visitors from the three adjacent states and around Australia annually. The permanent flows in the Murray River and anabranches provide a multitude of recreational opportunities, including camping, canoeing, bird and wildlife watching, photography, fishing and four-wheel driving. When environmental water is delivered, the region's attractiveness further increases, with short-term responses to watering offering more yabbying and birdwatching opportunities. Many people have long-standing connections with the Lindsay-Mulcra-Wallpolla region and make regular trips to enjoy the diverse landscape.

While social, recreational and economic drivers are not the deciding factors when selecting and prioritising sites to receive water, community support can be important for determining the success of a watering event. Community feedback highlights the importance of these landscapes to the community and the additional benefits of delivering environmental water.

The local community greatly values the Lindsay, Mulcra and Wallpolla islands as a place to connect with nature, which benefits their health and wellbeing. Conversations with Mallee CMA staff and survey results show the community enjoys activities including kayaking, walking, birdwatching, fishing and social gatherings. **Figure 5.2.10** shows what people value (top) and favourite sites (bottom) as 'word clouds': the largest words are those most often used in recorded feedback. Social media posts by local clubs, including Mildura Birdlife, Sunraysia Bushwalkers and Sunraysia Inspired Photographers, also show how much people enjoy the area.

The Lindsay, Mulcra and Wallpolla islands are important for apiarists, who use the area for their beehives and to collect honey. The bees benefit from being rested away from commercial crops (such as nuts and fruit) and the insecticides applied to them. Environmental flows improve the health of local vegetation, which can result in flower production and subsequently greater honey production.

Many Lindsay, Mulcra and Wallpolla islands sites need water to be delivered via temporary pumping infrastructure, and contractors are engaged to install and operate the infrastructure. Many are Mallee region local businesses that employ locals and use local goods and services.

Research is important for learning about plant and animal responses and hydrological and geomorphological outcomes from the inundation of wetlands, creeks, channels, rivers and the floodplain. It helps improve the timing, magnitude and duration of environmental watering, which improves recreational outcomes (such as better breeding responses by fish) and cultural outcomes (such as more medicinal plants on the floodplain). If researchers are not local, their attendance supports retail and hospitality providers.

Figure 5.2.10 Word clouds of community values and favourite sites, Lindsay, Mulcra and Wallpolla islands

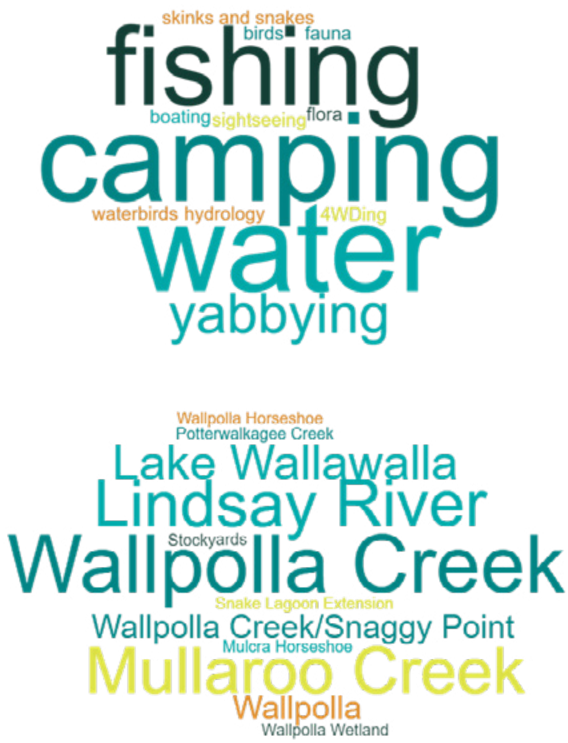


Table 5.2.17 shows the social, recreational and economic benefits of Lindsay, Mulcra and Wallpolla islands environmental watering.

Table 5.2.17 Social, recreational and economic benefits of environmental watering, Lindsay, Mulcra and Wallpolla islands

Beneficiary	Connection to the waterway	Values & uses	How have these benefits been considered?
Local businesses	• Increased tourism benefits the local tourism industry. • Pumped water has previously been delivered by local suppliers.	• Local employment opportunities • Retaining money in local communities • Support for local businesses	• Environmental water delivery in the Mallee is highly dependent on pumped delivery. Delivery contracts have generally been awarded locally, with local suppliers encouraged to tender; the program would not be possible without their support. • Water attracts tourism and encourages locals to enjoy recreation pursuits, increasing patronage at nearby hospitality and accommodation businesses and increasing ecotourism opportunities.
Apiarists	• Watering supports native vegetation to flower, benefitting bees. • Environmental water deliveries ensure bees don't have to travel long distances for drinking water.	• Commercial enterprises	• Water delivery benefits vegetation outcomes, which support flower production, providing abundant resources for bees.
Birdwatchers	• Water provides essential habitat for birds, which draws birds and birdwatchers to the region.	• Recreation opportunities	• Water is regularly delivered to sites to meet waterbird and bird objectives.
Anglers	• Water increases opportunities for yabbying in wetlands.	• Recreation • Food for personal consumption	• Delivering water to floodplains and large, shallow wetlands regularly results in the yabby population booming, benefitting anglers who catch them to eat.

Beneficiary	Connection to the waterway	Values & uses	How have these benefits been considered?
Campers	• Water increases a site's water quality and beauty, drawing people to it.	• Recreation • Fishing • Birdwatching • Photography	• Campers generally prefer setting up close to water and, given the option, will usually prefer a site with water over a site without it. This gives them easy access to water for recreational pursuits.
Tourists	• Water draws people to sites. • Increasing the quality and beauty of a region draws tourists. • The local tourism industry benefits as a result of increased tourism.	• Recreation opportunities • Tour operators	• There is extensive community consultation and engagement as part of the environmental water delivery program.
Researchers	• Studying the wetland, floodplain and rivers during different stages (wet, dry and during drawdown) increases understanding of the natural environment and the requirements of plants, animals and habitat processes.	• Condition monitoring • Intervention monitoring around watering • Large-scale system investigations	• Providing water to sites enables condition and intervention monitoring projects that target particular plants, animals or hydrological outcomes to inform future management planning and decisions.
Schools and education centres	• Local schools and other educators (e.g. TAFE, universities) cover aspects of the natural environment in their curriculum. Several nearby wetlands provide examples of channel and wetland ecology.	• Natural resources education (e.g. food webs, effects of flooding, water uses) • Recreation/outdoor education (e.g. school camps) • Connection with Country and Indigenous/cultural education	• Environmental water deliveries have enabled schools and TAFEs to use sites close to Mildura (e.g. Koorlong Lake, Lake Hawthorn, Kings Billabong/Butlers Creek, Merbein Common) to deliver their curriculums.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.2.18 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.2.18 Lindsay, Mulcra and Wallpolla islands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Lindsay Island – Mullaroo Creek		
Year-round low flow (minimum of 600 ML/day)	• Maintain fast-flowing habitat for large-bodied native fish (such as Murray cod, silver perch and golden perch) • Maintain habitat for aquatic vegetation and soil moisture to maintain the condition of streamside vegetation	F1, V2, V3
Elevated spring flow (1,200 ML/day for three months during September to November)	• Increase the extent and velocity of fast-flowing habitat to cue the movement and spawning and improve recruitment opportunities for large-bodied native fish • Increase fish passage between Mullaroo Creek and the Murray River via the Mullaroo Creek regulator fishway	F1
Lindsay Island wetlands		
Wetland 33 (fill in spring)	• Provide shallow and open-water habitat to create foraging and breeding opportunities for waterbirds and frogs • Increase soil moisture to maintain and improve the condition of river red gums • Stimulate the growth of emergent, aquatic and streamside vegetation • Provide conditions for lake-bed herbaceous plants to grow as the wetland draws down	B1, A1, V2, V3
Lindsay Mullaroo connector (fill in autumn)		
Stockyards (fill in spring)		

Potential environmental watering action	Expected watering effects	Environmental objectives
Mulcra Island – Potterwalkagee Creek		
Spring low flow via the Stoney Crossing regulator (35 ML/day for three months during September to November)	• Provide temporary flowing water to connect pools and support the dispersal and recruitment of small- and large-bodied native fish, and the spawning of small-bodied native fish • Stimulate the release of carbon and nutrients from the sediment to increase the productivity of the floodplain food web • Maintain soil moisture to maintain the condition of streamside vegetation	F1, CN1, V2
Mulcra Island wetlands		
Mulcra Horseshoe (fill in spring)	• Provide shallow and open-water habitat to create foraging and breeding opportunities for waterbirds and frogs • Stimulate the growth of emergent, aquatic and streamside vegetation	B1, B2, A1, V2, V3
Wallpolla Island		
Sandy Creek and Lilyponds (fill in spring)	• Provide shallow and open-water habitat to create foraging and breeding opportunities for waterbirds and frogs • Provide conditions for lake-bed herbaceous plants to grow as the wetland draws down • Stimulate the growth of emergent, aquatic and streamside vegetation • Stimulate the release of carbon and nutrients from the sediment to increase the productivity of the floodplain food web	B1, A1, CN1, V2, V3
Finnigans Creek (fill in spring)	• Provide conditions for lake-bed herbaceous plants to grow as the wetland draws down • Stimulate the growth of emergent, aquatic and streamside vegetation • Stimulate the release of carbon and nutrients from the sediment to increase the productivity of the floodplain food web	B1, A1, CN1, V2, V3
Wallpolla Horseshoe (fill in spring)	• Provide shallow and open-water habitat to create foraging and breeding opportunities for waterbirds and frogs • Stimulate the growth of emergent, aquatic and streamside vegetation	B1, A1, V2, V3

Scenario planning

Table 5.2.19 outlines potential environmental watering and expected water use in a range of planning scenarios.

The two categories of opportunities to deliver water for the environment at Lindsay and Mulcra islands in 2025-26 are:

- deliveries of water for the environment to anabranch waterways (Mullaroo Creek, Lindsay River and Potterwalkagee Creek) in coordination with weir pool operation
- deliveries via temporary pumps to individual wetlands at Lindsay and Mulcra islands.

Anabranch watering

Permanent flowing water with a modest increase in spring is essential for Mullaroo Creek in all planning scenarios because there is strong evidence that this promotes fish movement and breeding, particularly for Murray cod. Flow in the Mullaroo Creek is controlled through the Mullaroo Creek regulator, and it can be managed independently of weir pool operations and moderate fluctuations in flow in the Murray River. It is practical and desirable to deliver this flow regime in all planning scenarios.

Lindsay River and Potterwalkagee Creek require flow in eight or nine of every 10 years to maintain soil moisture for streamside vegetation and replenish and connect deep pools for dispersal and recruitment of native fish. In most years, this is achieved by delivering a low flow in spring, but every second or third year a higher-magnitude flow during winter, spring and early summer enhances connectivity through the waterways and with the Murray River. The occasional delivery of higher-magnitude flows in Potterwalkagee Creek also enables the delivery of water to the floodplain on Mulcra Island. From mid-late summer through to the end of autumn, the flow is typically prevented from entering both anabranches. Dry-phase ecological processes should be supported once or twice every 10 years by not delivering environmental water, which helps increase species richness and the abundance of native wetland and floodplain aquatic vegetation. To achieve these outcomes, in 2025-26, the following flow regimes are planned to be implemented in Lindsay River and Potterwalkagee Creek.

Lindsay River

In 2025-26, no environmental watering of the Lindsay River is planned, allowing the upper reaches of the river to completely dry to enable dry-phase ecological processes to occur. The lower reaches of Lindsay River downstream of the confluence with Mullaroo Creek will incidentally receive flows of operational and environmental water.

Potterwalkagee Creek

In the drought, dry and average planning scenarios, the Lock 8 weir pool will be held at or slightly above full supply level during spring, and the Stoney Crossing regulator will be managed to provide a minor flow into Potterwalkagee Creek during this time. There will be no flow in the creek from summer to winter in these scenarios.

In the wet planning scenario, a high flow in the Murray River is likely to deliver a natural flow through all sections of Potterwalkagee Creek and inundate parts of the adjacent floodplain for extended periods in winter, spring and early summer.

Deliveries via temporary pumps

Many wetlands and creeklines across Lindsay, Mulcra and Wallpolla islands had substantial flooding or periods of sustained high flow from winter-spring 2022 through to early autumn 2024. As a result, relatively little active watering was required during that period. On a return to drier conditions in 2024-25, most environmental watering sites benefitted from partial or complete drawdowns. In 2025-26, a program of active watering is planned to refill many sites that have naturally drawn down in the previous 12-18 months.

Watering Lindsay Mullaroo connector and Stockyards on Lindsay Island and Wallpolla Horseshoe on Wallpolla Island are high priorities in all planning scenarios. In the wet planning scenario, Stockyards is expected to fill from natural flooding, but active watering might be needed at Lindsay Mullaroo connector and Wallpolla Horseshoe because they have high commence-to-flow rates and may not fill naturally in wet conditions. At all three sites, the frequency of fills achieved over the last 10 years has been much less than the optimal watering regimes, and active watering is proposed in 2025-26 to move them closer to achieving environmental watering targets. At Stockyards and Wallpolla Horseshoe, fills will be managed in spring, which is the optimal time of year to stimulate the growth and reproduction of emergent and aquatic vegetation. Water will be delivered to Lindsay Mullaroo connector in autumn, so aquatic vegetation growth at that site will be less discernible and environmental watering will primarily provide longer-term aquatic habitat for birds and frogs through autumn, winter and spring.

Three additional sites are planned for active watering in spring in the dry and average planning scenarios: Wetland 33 on Lindsay Island, Mulcra Horseshoe on Mulcra Island and Finnigans Creek, Sandy Creek and Lilypond on Wallpolla Island. These sites are in good condition after the recent natural flow and environmental water deliveries in recent years, and it is not essential to water them in a drought planning scenario. The aim in 2025-26 is to continue the gains in environmental condition achieved in recent wet years.

In wet conditions, Sandy Creek and Lilyponds and Mulcra Horseshoe are unlikely to fill naturally due to high commence-to-flow rates, and active watering is still planned for them in case the natural flow is insufficient to achieve enough natural inundation. Wetland 33 may also miss out on natural fills in wet conditions, but due to its location, it would likely be inaccessible, and it would not be feasible to actively water the site.

Currently, there are no priority carryover requirements for Lindsay, Mulcra and Wallpolla islands in 2026-27. It is expected that an adaptive watering program of similar scope to 2025-26 will be planned, and carryover requirements will be established as information becomes available.

Table 5.2.19 Lindsay, Mulcra and Wallpolla islands environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Year-round low flow in the Murray River and no natural floodplain wetting • Weir pools will be maintained at full supply level in spring and drawn down below full supply level during summer, autumn and winter • Substantial wetland drying will occur	• Rare high-flow events in the Murray River and no natural floodplain wetting • Weir pools will be raised in spring and drawn down below full supply level in summer, autumn and winter • Substantial wetland drying will occur	• Short periods of high flow, most likely in spring/summer, providing minor wetting of the floodplain • Weir pool levels will be maintained at full supply level or raised in winter/spring and summer and drawn down in summer, autumn and winter	• Long periods of high flow, with major spills from storages resulting in widespread wetting of the floodplain and wetting of most wetlands • Weirs would be removed to allow the passage of natural flow

Planning scenario	Drought	Dry	Average	Wet
Lindsay Island				
Potential environmental watering – tier 1 (high priorities)	• Year-round low flow (Mullaroo Creek) • Elevated spring flow (Mullaroo Creek) • Lindsay Mullaroo connector (fill in autumn) • Stockyards (fill in spring)	• Year-round low flow (Mullaroo Creek) • Elevated spring flow (Mullaroo Creek) • Lindsay Mullaroo connector (fill in autumn) • Stockyards (fill in spring) • Wetland 33 (fill in spring)	• Year-round low flow (Mullaroo Creek) • Elevated spring flow (Mullaroo Creek) • Lindsay Mullaroo connector (fill in autumn) • Stockyards (fill in spring) • Wetland 33 (fill in spring)	• Year-round low flow (Mullaroo Creek) • Elevated spring flow (Mullaroo Creek) • Lindsay Mullaroo connector (fill in autumn) • Stockyards (fill in spring)
Mulcra Island				
Potential environmental watering – tier 1 (high priorities)	• Spring low flow (Potterwalkagee Creek via the Stony Crossing regulator)	• Spring low flow (Potterwalkagee Creek via the Stony Crossing regulator) • Mulcra Horseshoe (fill in spring)	• Spring low flow (Potterwalkagee Creek via the Stony Crossing regulator) • Mulcra Horseshoe (fill in spring)	• Spring low flow (Potterwalkagee Creek via the Stony Crossing regulator) • Mulcra Horseshoe (fill in spring)
Wallpolla Island				
Potential environmental watering – tier 1 (high priorities)	• Wallpolla Horseshoe (fill in spring)	• Finnigans Creek (fill in spring) • Sandy Creek and Lilyponds (fill in spring) • Wallpolla Horseshoe (fill in spring)	• Finnigans Creek (fill in spring) • Sandy Creek and Lilyponds (fill in spring) • Wallpolla Horseshoe (fill in spring)	• Finnigans Creek (fill in spring) • Sandy Creek and Lilyponds (fill in spring) • Wallpolla Horseshoe (fill in spring)
Possible volume of water for the environment required to achieve objectives[1]	• 1,900 ML (tier 1) • N/A (tier 2)	• 6,250 ML (tier 1) • N/A (tier 2)		• 4,300 ML (tier 1) • N/A (tier 2)
Priority carryover requirements for 2026-27	• 0 ML			

1 These estimates include the use of water for the environment for deliveries via temporary pumps to Lindsay Mullaroo connector, Stockyards, Wetland 33, Mulcra Horseshoe, Finnigans Creek, Sandy Creek and Lilyponds and Wallpolla Horseshoe. Water for the environment used at Mullaroo Creek and Potterwalkagee Creek is calculated alongside the use attributable to raising and lowering of the locks 7, 8, 9 and 15 weir pools and is accounted for in Victoria or New South Wales. Water delivered by the VEWH under these arrangements is expected to be between zero and 4,000 ML.

5.3 Ovens system

Waterway manager – North East Catchment Management Authority

Storage manager – Goulburn-Murray Water

Environmental water holder – Commonwealth Environmental Water Holder

System overview

The Ovens River rises in the steep, forested mountains of the Great Dividing Range near Mount Hotham and flows about 150 km to join the Murray River in the backwaters of Lake Mulwala (Figure 5.3.1). The system has two small water storages: Lake Buffalo on the Buffalo River and Lake William Hovell on the King River. The regulated reaches of the Ovens system include the Buffalo and King rivers below these storages and the Ovens River from its confluence with the Buffalo River to the Murray River.

As its storages are small and spill regularly, the Ovens system maintains a large proportion of its natural flow regime, particularly in winter/spring. However, the storages and licensed water extractions throughout the system can restrict the flow in drier years, and parts of the system can become flow-stressed during summer and autumn.

The Ovens River flows into Lake Mulwala on the Murray River; the lake is the largest weir pool on the Murray regulated system. The Ovens River's flow contributes to the reliability and variability of the flow in the Murray River and supports many downstream uses, including irrigation, urban supply and watering of iconic floodplain sites (such as Barmah Forest).

Water for the environment is held in Lake Buffalo and Lake William Hovell and can be released when the storages are not spilling. Five reaches in the Ovens system can benefit from releases of water for the environment. While all are important, a relatively small volume (123 ML) of water is available, and it is insufficient to meet most environmental flow objectives. In recent years, private landowners have donated some of their annual water allocations to the VEWH to use in the King River. The Taungurung Land and Waters Council has also transferred their annual allocation to the VEWH to be delivered to the King River to heal Country.

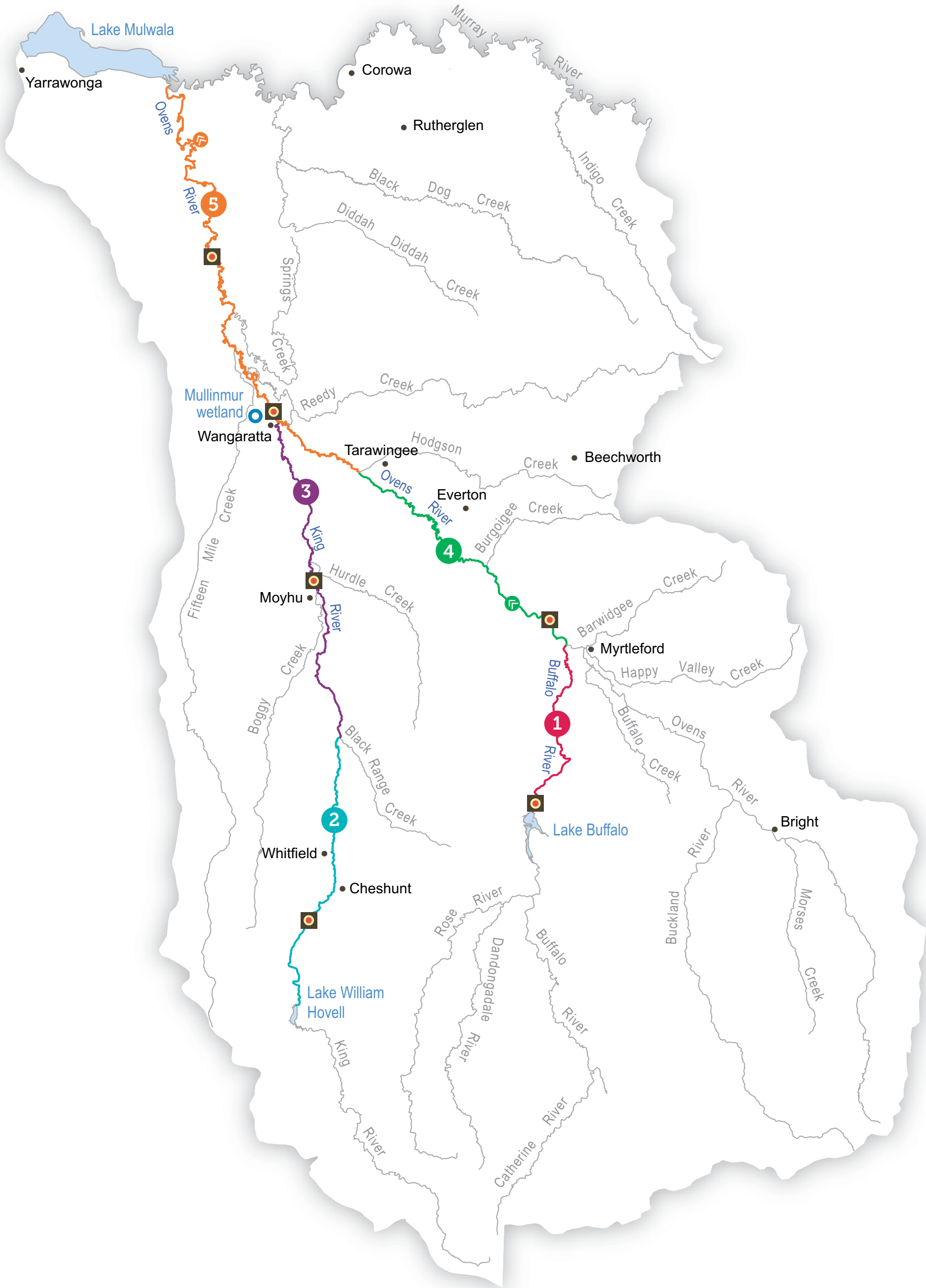
The water transfers are used selectively to deliver the greatest possible environmental benefit. Water for the environment is most commonly used in the Ovens system to deliver critical flow events in reaches immediately below the two main storages, or it is used in conjunction with operational water releases to influence the flows of the Buffalo River and the lower Ovens River. It may also be used to top up Mullinmur Wetland in Wangaratta.

Figure 5.3.1 Ovens system

Reach 1 Buffalo River: Lake Buffalo to the Ovens River
Reach 2 King River: Lake William Hovell to Moyhu
Reach 3 King River: Moyhu to the Ovens River
Reach 4 Ovens River: Buffalo River to Everton/Tarrawingee
Reach 5 Ovens River: Everton/Tarrawingee to the Murray River at Lake Mulwala

Wetlands that can receive environmental water
Measurement point
Town
Indicates direction of flow

Grey river reaches have been included for context. The numbered reaches indicate where relevant environmental flow studies have been undertaken. Coloured reaches can receive environmental water.



Environmental values

The diverse aquatic habitat and abundant food resources associated with the Ovens system support many native fish species, including Murray cod, trout cod, golden perch, Macquarie perch, two-spined blackfish and unspecked hardyhead. The Buffalo River provides valuable habitat for large-bodied fish species during part of their breeding cycle, while trout cod have an extensive range within the system and are found as far up the King River as Whitfield. A distinctive feature of the Ovens system compared with more heavily regulated rivers is the lack of a high summer flow. The absence of a high summer flow is particularly important to native fish populations: slackwater habitat facilitates successful native fish recruitment, reducing the likelihood of larvae being swept downstream, while also being rich in food resources.

Projects to recover trout cod and Macquarie cod populations in the lower Ovens system have been successful. No stocking of trout cod has occurred in the Ovens system since 2006, but successive annual surveys along the lower Ovens indicate that the system is supporting the recruitment and survival of this species throughout its lifecycle. Macquarie perch were first stocked in the Ovens River in 2011, with the most recent event occurring in 2024. Annual surveys conducted by the Arthur Rylah Institute on the Ovens River since 2017 have recorded Macquarie perch recruitment in all years except 2021, and a large increase in adult fish was detected in 2023 and 2024, indicating fish are surviving to maturity. In January 2024, the Victorian Fisheries Authority banned the take of Macquarie perch across Victoria to protect their population.

The lower Ovens wetland complex contains over 1,800 wetlands. It is listed as nationally significant and is home to various waterbirds, including egrets, herons, cormorants and bitterns. The streamside zones of river channels throughout the Ovens system support some of Victoria's healthiest river red gum forests and woodlands, while the wetlands support various aquatic and semi-aquatic vegetation communities.

Water for the environment was delivered to Mullinmur Wetland at Wangaratta for the first time in 2019-20. This site has been the focus of several environmental improvement projects recently, including carp removal, a revegetation program and the stocking of native fish, including the endangered freshwater catfish, in December 2019 and November 2024.

Environmental objectives in the Ovens system

F1 – Maintain the abundance and diversity of large- and small-bodied native fish species associated with main channel habitats

F2 – Maintain the abundance and diversity of large- and small-bodied native fish species associated with floodplain habitats

M1 – Maintain the abundance and diversity of waterbug assemblages in pool, riffle and edge habitats

PR1 – Maintain platypus and rakali (water rat) populations and structures

V1 – Maintain the extent, condition and floristic diversity of submerged vascular vegetation (e.g. water ribbons, milfoil)

V2 – Maintain the extent, condition and floristic diversity of fringing emergent non-woody plants (e.g. rushes, reeds, sedges)

WQ1 – Maintain water quality

Traditional Owner cultural values and uses

The Ovens system is within the recognised Registered Aboriginal Party (RAP) and Recognition and Settlement Agreement boundary of the Taungurung Land and Waters Council (TLaWC) and the Yorta Yorta Nation Aboriginal Corporation (YYNAC). The Ovens system is also an area of significance to the Bangarang, Dhuduroa and Waywurru people.

The TLaWC water knowledge group Baan Ganalina (Guardians of Water) supports increasing Taungurung influence in water management, building internal capacity and advancing Taungurung water rights.

The ***Taungurung Country Plan***'s objectives include increasing and strengthening Taungurung voices, increasing water literacy and capacity and returning water to disconnected wetlands. The future environmental water delivery by TLaWC on Taungurung Country would help achieve some of these objectives.

The YYNAC's ***Yorta Yorta Whole-Of-Country Plan 2021-2030*** outlines objectives for Yorta Yorta Country, including for the Ovens River. It identifies the lower Ovens River as a high priority for management actions. The plan aims to support more culturally informed planning for water in the lower Ovens River in the future.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

TLaWC may consider using its 39 ML entitlement in the King River system to support environmental objectives as part of its goal of healing and caring for Country in 2025-26. The council's allocation has been released from Lake William Hovell six times as an environmental flow (2020-2025) in partnership with the North East CMA, Goulburn-Murray Water and the VEWH to provide additional water to the King River and assist in healing Country.

Environmental flows may be planned to align with cultural benefits, so long as environmental outcomes are not compromised. Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental water for a particular site, their contribution is acknowledged in **Table 5.3.1** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.3.1**, the North East CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as kayaking, boating and fishing)
- riverside recreation and amenity (such as camping and visitation for mental and physical health and wellbeing)
- community events and tourism (such as providing a setting for community gatherings, outdoor school learning, sporting events and citizen science projects)
- socioeconomic benefits (such as businesses providing for anglers, and stock and domestic uses that rely on water quality, supported by deliveries of water for the environment when the natural flow is at its lowest from November to March).

Environmental flows may be delivered to Mullinmur Wetland in late spring, summer or early autumn to re-establish submerged aquatic vegetation and support native fish at the site. The water is expected to sustain other benefits to the local community (such as recreation and amenity). The Mullinmur Wetland site is owned by the Roman Catholic Trust and managed by Wangaratta Landcare and Sustainability Incorporated. An education hub provides a space for environmental education for students from Galen Catholic College and the Borinya Wangaratta Community Partnership School, and others from the local community, including a team of Waterwatch citizen scientists. These volunteers have been involved in monitoring changes in conditions for plant and fish species to inform deliveries of water for the environment.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.3.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.3.1 Ovens system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Buffalo River (targeting reach 1)		
Summer/autumn low-flow variability (greater than 70 ML/ day for two days during February to April)	• Provide a diversity of micro-habitats within the river channel • Cover riffle zones and provide shallow habitat for native fish and waterbugs and foraging areas for aquatic mammals • Provide a sufficient depth across the channel to facilitate native fish movement to source food and habitat requirements	F1, MI1, PR1
Autumn low flow fresh (430 ML/ day for three days during March to April)	• Provide a diversity of micro-habitats within the river channel • Maintain acceptable oxygen levels in pools to support aquatic life • Provide a flow cue to trigger native fish movement to source new food and habitat requirements • Provide flow variability to maintain floristic diversity and elevational zonation of streamside vegetation • Provide downstream dispersal of plant propagules (e.g. seed and plant fragments) and scour attached epiphytes • Scour fine sediments from the substrate to promote the renewal of food resources for waterbugs (such as benthic biofilms) • Support the dispersal of juvenile platypus in autumn	F1, MI1, PR1, V1, V2, WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
King River (targeting reaches 2 and 3)		
Summer/autumn low-flow variability (greater than 60 ML/day for two to four days during February to April)	• Provide a diversity of micro-habitats within the river channel • Cover riffle zones and provide shallow habitat for native fish and waterbugs and foraging areas for aquatic mammals • Provide a sufficient depth across the channel to facilitate native fish movement to source food and habitat requirements	F1 MI1 PR1
Mullinmur Wetland		
Mullinmur Wetland (top-up during November to April)	• Maintain the water level within the wetland to support the growth and recruitment of aquatic vegetation • Maintain habitat and water quality for native fish	F2 V1, V2

Scenario planning

Table 5.3.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The weather and inflows into storages greatly affect how water for the environment will likely be used in the Ovens system. In the drought and dry planning scenarios, the highest priority will be to use available water for the environment to introduce some variability to the summer/autumn low flow to limit the duration of extremely low-flow or cease-to-flow events that can stress native fish and waterbugs. In the average and wet planning scenarios, the objective is to provide a greater flow to support fish movement and breeding and increase the abundance and diversity of waterbugs. There is not enough water for the environment to deliver the recommended autumn fresh in full, so releases would need to coincide with and add to operational water releases. All the potential environmental watering actions for the Ovens River system are expected to be met naturally in the wet planning scenario.

Due to the small volume of water for the environment available, there is little opportunity to vary the potential environmental watering actions each year for each planning scenario. However, if additional water is made available (such as by TLaWC or a private donor in the King River), it will help to increase the effectiveness of some potential watering actions.

Water for the environment was delivered to Mullinmur Wetland in November 2024 to improve the water quality and increase the water depth to support translocated endangered freshwater catfish. Mullinmur Wetland also filled naturally in each of the previous four years. The proposed action to top up Mullinmur Wetland is not a priority to deliver in 2025-26 to help establish aquatic vegetation in the wetland, but it may be considered if it is needed to prevent the wetland from completely drying in drought and dry conditions.

All available water for the environment is expected to be used in 2025-26. No carryover targets have been set for 2026-27.

Table 5.3.2 Ovens system environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Very low flow through summer and autumn • No bulk water release	• Possible winter/ early spring natural fresh • Low flow through summer and autumn • Bulk water release is unlikely in reach 1	• High winter/ spring natural freshes • Moderate flow in summer and autumn with occasional natural freshes • Bulk water release is likely in reach 1	• High natural freshes and low flow throughout most of the year • Bulk water release is likely in reach 1
Expected availability of water for the environment	• 123 ML (73 ML held in Lake Buffalo and 50 ML held in Lake William Hovell)			
Buffalo River (targeting reach 1)				
Potential environmental watering – tier 1 (high priorities)	• Summer/autumn low-flow variability		• Summer/autumn low-flow variability • Autumn low-flow fresh (one fresh)	
Potential environmental watering – tier 2 (additional priorities)	• N/A			
King River (targeting reaches 2 and 3)				
Potential environmental watering – tier 1 (high priorities)	• Summer/autumn low-flow variability			
Potential environmental watering – tier 2 (additional priorities)	• N/A			
Mullinmur Wetland				
Potential environmental watering – tier 1 (high priorities)	• N/A			
Potential environmental watering – tier 2 (additional priorities)	• Mullinmur Wetland top-up		• N/A	
Possible volume of water for the environment required to achieve objectives	• 123 ML (tier 1) • 20 ML (tier 2)		• 123 ML (tier 1) • 0 ML (tier 2)	

5.4 Goulburn system

Waterway manager – Goulburn Broken Catchment Management Authority

Storage manager – Goulburn-Murray Water

Environmental water holders – Victorian Environmental Water Holder (including the Living Murray program) and the Commonwealth Environmental Water Holder

The Goulburn system includes the Goulburn River and Goulburn wetlands.

5.4.1 Goulburn River

System overview

The Goulburn is Victoria's largest river basin, covering over 1.6 million ha or 7.1 per cent of the state (Figure 5.4.1). The Goulburn River flows for 570 km from the Great Dividing Range upstream of Woods Point to the Murray River east of Echuca. It is an ancient, iconic river rich with environmental, cultural and recreational values.

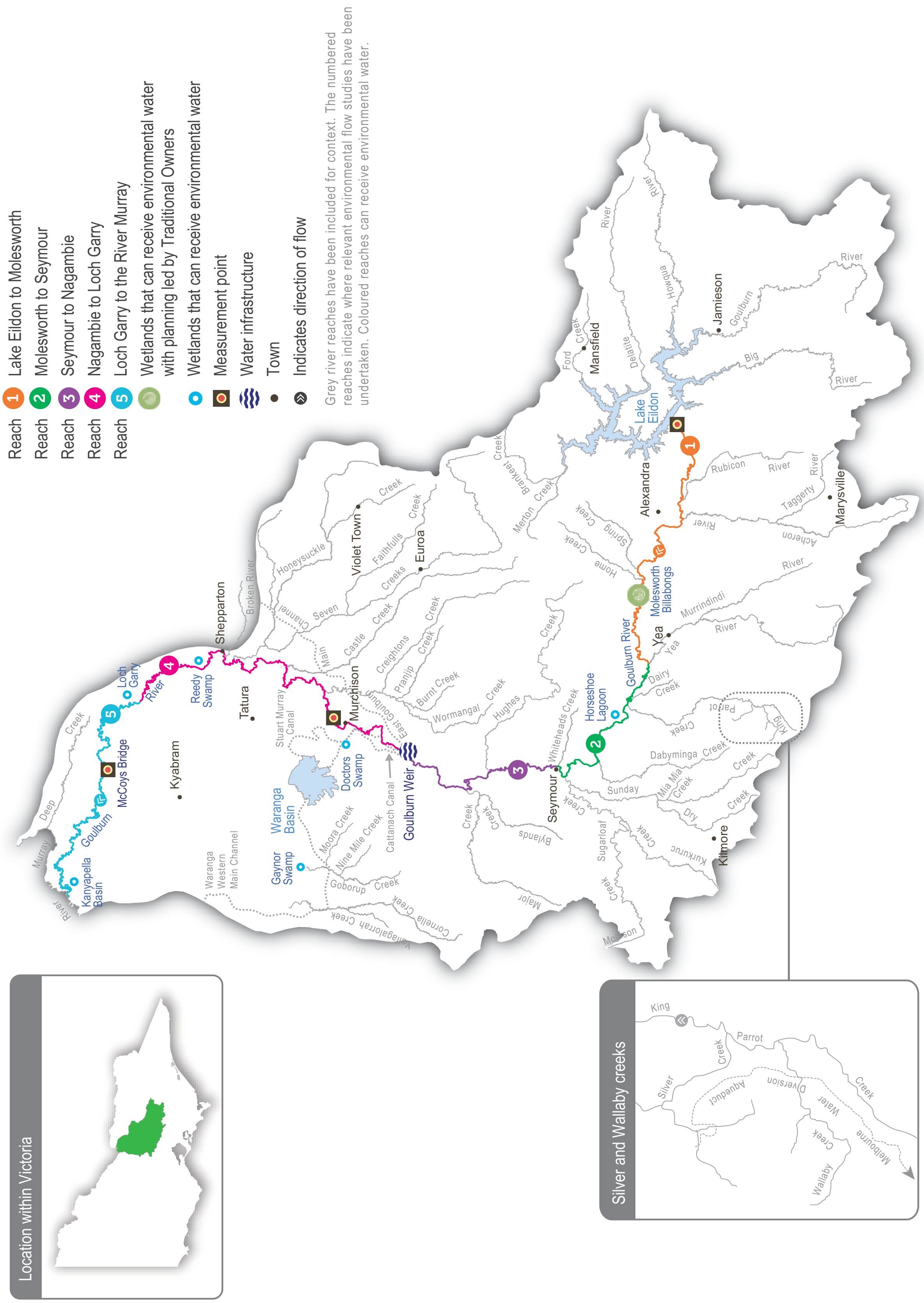
There are several environmental water holders in the Goulburn system. The Commonwealth Environmental Water Holder (CEWH) holds the largest volume, and the use of Commonwealth Water Holdings is critical to achieving outcomes in the Goulburn River, as well as priority environmental sites further downstream. Water for the environment held on behalf of the Living Murray program may assist in meeting objectives in the Goulburn system en route to icon sites in the Murray system. Water held by the VEWH in the Goulburn system is primarily used to meet environmental objectives in the Goulburn River and the Goulburn wetlands, but it can also be used to support environmental objectives at downstream sites along the Murray River and in South Australia.

The construction and operation of Lake Eildon and Goulburn Weir have significantly altered the natural flow regime of the Goulburn River. Water harvesting during wet periods and releases to meet irrigation and other consumptive demands during dry periods means the flow below these structures is typically low in winter/spring and high in summer/autumn. This is the reverse of the natural seasonal flow pattern. Land use changes and the construction of small dams and drainage schemes have further modified the Goulburn River's flow regime. Levees and other structures prevent water from inundating the floodplain and filling many of the natural wetlands and billabongs. Several tributaries, including the Acheron, Yea and Broken rivers, join the Goulburn River downstream of Lake Eildon and can add some flow variation to the river's regulated flows. Large floods that cause the Goulburn River's storages to fill and spill are also important for the overall flow regime and its associated environmental values.

The priority environmental flow reaches in the Goulburn River are downstream of Goulburn Weir (reaches 4 and 5), collectively called the lower Goulburn River. The mid-Goulburn River extends from Lake Eildon to Goulburn Weir (reaches 1 to 3). From early spring to late autumn, large volumes of water are delivered from Lake Eildon to Goulburn Weir to supply the irrigation system. During that period, the flow in the mid-Goulburn River is usually well above the recommended environmental flow targets. Deliveries of water for the environment have the most benefit in the mid-Goulburn River (especially in reach 1, immediately downstream of Lake Eildon) outside the irrigation season, when releases from Lake Eildon are often much lower than natural.

Environmental flow targets in the lower Goulburn River can sometimes be met by the coordinated delivery of operational water being transferred from Lake Eildon to the Murray River. These inter-valley transfers (IVTs) mainly occur during the irrigation season between spring and autumn and may meet environmental flow objectives without the need to release water for the environment. A Goulburn to Murray trade rule and operating plan was introduced in 2022-23 to prevent further damage to the lower Goulburn River from a prolonged high flow over summer and autumn. Previously, IVTs in the Goulburn River significantly exceeded environmental flows recommendations for summer and early autumn, damaging bank vegetation and eroding riverbanks. Wet conditions between 2021-22 and 2023-24 meant only small volumes of IVTs were delivered from the Goulburn system during this period, so the effect of the new trade rule and operating plan on environmental assets could not be fully assessed. Drier conditions and high demand for IVTs in 2024-25 meant a summer IVT pulse was delivered. Environmental monitoring was carried out following the IVT pulse, which will help inform future management.

Figure 5.4.1 Goulburn River



Environmental values

The Goulburn River and its tributaries support a range of native fish (including golden perch, silver perch, Murray cod, trout cod, Macquarie perch and freshwater catfish), turtles, platypus and rakali (water rats). Aquatic vegetation, scour holes and woody debris within the channel provide high-quality habitat for adult and juvenile fish. River red gums are a dominant feature of the streamside zone along the length of the Goulburn River. These trees shade the river and provide habitat for many species, including the squirrel glider. Leaves that fall from the river red gums provide carbon that supports riverine food webs, and dead trees that fall into the river provide a surface for biofilms and waterbugs and habitat for fish. Birds (such as egrets, herons and cormorants) use trees along the river to roost and feed, while frogs benefit from shallow vegetated habitats at the edge of the river channel and in adjacent wetlands.

The Goulburn River system is an important conservation area for threatened species. Several wetlands in the Goulburn catchment are formally recognised for their conservation significance. Tributaries of the mid-Goulburn River between Lake Eildon and Goulburn Weir host some of the last remaining Macquarie perch populations in the Murray-Darling Basin, while freshwater catfish occur in lagoons connected to reach 3 of the Goulburn River. eDNA monitoring indicates the Goulburn River supports a strong population of platypus, which are now classified as vulnerable under Victoria's *Flora and Fauna Guarantee Act 1988*. Monitoring in recent years shows that environmental flows in the lower Goulburn River trigger golden perch and silver perch to spawn. However, the extent to which these spawning events contribute to populations locally and in the wider southern basin is unknown. Self-sustaining populations of Murray cod have been confirmed, and trout cod are extending their range in the lower Goulburn River.

Environmental objectives in the Goulburn River

CN1 – Provide sufficient rates of carbon and nutrient production and processing to support native fish and waterbug communities

F1 – Increase the abundance, spatial distribution and size class diversity of key native fish species

G1 – Maintain substrate surfaces to support ecological processes

G2 – Maintain the diversity of the channel form (e.g. shallow and deep water habitats)

MI1 – Maintain abundant and diverse waterbug communities to support riverine food webs

PR1 – Increase the self-sustaining platypus population

T1 – Maintain the self-sustaining turtle population

V1 – Increase the abundance of aquatic and flood-tolerant plants in the river channel and on the lower banks to provide shelter and food for animals and stabilise the riverbank

V2 – Increase the abundance of aquatic and flood-tolerant plants in low-lying and connected wetlands

WQ1 – Minimise the risk of low-oxygen blackwater

Traditional Owner cultural values and uses

The Goulburn River system flows through Taungurung Country and Yorta Yorta Country.

Each year, the Goulburn Broken CMA consults with the Taungurung Land and Waters Council (TLaWC) and the Yorta Yorta Nation Aboriginal Corporation (YYNAC) about plans for environmental watering in the Goulburn River. Consultation takes the form of formal and informal discussions.

TLaWC and YYNAC are members of the Goulburn Environmental Water Advisory Group and the Goulburn and Broken Operational Advisory Group. Both groups meet frequently throughout the year and share technical, operational and other information (such as recreational and cultural values) to support environmental water management and decision-making in the Goulburn River.

In 2023, the Goulburn Broken CMA met with the Taungurung water knowledge group Baan Ganalina (Guardians of Water) to discuss environmental flows recommendations for *Waring* (reaches 1 to 3 of the Goulburn River).

Baan Ganalina supports flows that would help to reinstate a more natural water regime that better reflects the size, timing and variability of natural inflows to this part of the river, including off-channel areas.

> "These flow recommendations will help support *Waring* (Goulburn River), which is such an important part of Taungurung identity. It's good to see how the Goulburn Broken CMA has used peer-reviewed articles to show the effects on important animals like platypus and shared this knowledge. The river is a work in progress, but together with the Goulburn Broken CMA, we will continue to seek ways to heal Country despite the harm it has suffered. Baan Ganalina hopes to see the proposed higher winter flows and looks forward to taking an ongoing role in monitoring their effects."
>
> *– Baan Ganalina, 2023*

TLaWC-communicated outcomes for *Waring* that align with Taungurung objectives and responsibilities to heal and care for Country include connecting wetlands that support valued species at appropriate times. This helps to protect intangible and tangible cultural heritage and values, including traditional food and medicine plants. Planned flows will also support ongoing efforts by Taungurung and program partners to care for the river and its floodplain, including investigations into rehabilitating degraded significant sites.

A YYNAC representative contributed to the 2020 **Kaiela (Lower Goulburn River) Environmental Flows Study**, which has influenced environmental flows in the lower Goulburn River since 2021-22.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Both YYNAC and TLaWC attend the Goulburn and Broken Operational Advisory Group and participate in multiple Goulburn River monitoring programs with scientists, which share technical and operational information to support environmental water management and decision-making in the Goulburn River and lower Broken Creek.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental flows for a particular site, their contribution is acknowledged in **Table 5.4.1** with an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Social, recreational and economic values and uses

In planning the potential watering actions in **Table 5.4.1**, the Goulburn Broken CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as boating, canoeing, fishing, gaming, hunting and kayaking)
- riverside recreation and amenity (for landholders and visitors)
- community events and tourism (such as paddling and boating businesses)
- socioeconomic benefits (such as improving water quality for stock and domestic uses, irrigation diverters and water supply for settlements on the Goulburn River).

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 5.4.1** by an icon, as pictured below and also explained in **Figure 1.2.3**.

	Watering will also support angling activities
	Watering will also support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

The Goulburn River provides numerous recreational and economic benefits. Environmental flows support native fish populations by providing fish passage and habitat and encouraging fish migration and spawning, which in turn benefits recreational anglers. Following community feedback, the timing of targeted environmental flow events in September (mid-Goulburn) and November/December (lower Goulburn) is planned to reduce impacts on river access around the opening of different fishing seasons, benefitting anglers and local businesses. Other high-recreation periods are also taken into consideration when planning environmental flows.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.4.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.4.1 Goulburn River potential environmental watering actions expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Goulburn River reach 1		
Year-round low flow (400-2,000 ML/day)	• Maintain habitat for small-bodied native fish • Maintain adequate foraging habitat for platypus and reduce the risk of predation • Provide habitat and food for turtles • Wet and maintain riffles to provide habitat for biofilms and waterbugs Additional benefits when the flow is above 800 ML/day: • scour fine sediment from the gravel bed and riffle substrate • maintain existing beds of in-channel vegetation • provide connection to low-lying, off-stream wetland habitats, which increases food resources (waterbugs) available for fish and native animals	F1, G1, MI1, PR1, T1, V1
Winter fresh (one fresh of more than 8,000 ML/ day for five to 10 days during July to August)	• Encourage female platypus to select a nesting burrow higher up the bank to reduce the risk of greater flow later in the year flooding the burrow when juveniles are present • Scour bed sediments to maintain pools and change in-channel complexity for improved habitat • Inundate aquatic vegetation in connected wetlands to avoid exposure to frost • Connect larger off-stream wetlands to the river channel to provide habitat for small-bodied native fish • Increase foraging conditions for platypus and turtles • Increase the availability of habitat to support waterbug lifecycles	F1, G1, G2, MI1, PR1, T1, V1, V2
Autumn/winter/ spring fresh(es) (one to three freshes of more than 5,000 ML/ day for five to 10 days during May to November)	• Scour fine sediment from the gravel bed and riffle substrates • Maintain existing beds of in-channel vegetation • Maximise the time off-stream wetland habitats are available for small-bodied native fish and platypus • Increase foraging conditions for platypus and turtles • Increase the availability of habitat to support waterbug lifecycles	F1, G1, MI1, PR1, T1, V1, V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Spring fresh (one fresh of more than 8,000 ML/day for five to 10 days during September to November)	• Maintain mid-Goulburn off-stream habitat for small-bodied native fish and platypus • Scour bed sediments to maintain pools and change in-channel complexity for improved habitat • Maintain existing beds of aquatic vegetation both in-channel and in connected wetlands • Connect larger off-stream wetlands to the river channel to provide habitat for small-bodied native fish • Increase foraging conditions for platypus and turtles • Increase the availability of habitat to support waterbug lifecycles • Increase soil moisture in banks and connected wetlands to improve the condition of existing native vegetation	F1 G1, G2 MI1 PR1 T1 V1, V2
Goulburn River reach 4 and 5		
Year-round low flow (500-1,000 ML/day)	• Provide a slow, shallow habitat required for the recruitment of larvae/juvenile fish and habitat for adult small-bodied fish • Provide deep water habitat for large-bodied fish • Submerge snags and littoral vegetation to provide habitat for fish and waterbugs and a substrate for biofilms to grow • Provide habitat and food for turtles • Maintain habitat for aquatic vegetation and water the root zone of low-bank vegetation • Vary flow within a specified range to encourage plankton production for food, disrupt biofilms and maintain water quality • Provide a low, variable flow to enable vegetation to establish to protect against notching and bank erosion	CN1 F1 MI1 PR1 T1 V1 WQ1
Winter/autumn fresh (one fresh of up to 10,000 ML/day with more than four days above 7,300 ML/day during July to August and May to June)	• Wash organic matter and carbon (e.g. leaf litter) into the channel • Provide connectivity to off-channel habitats and through the river for fish dispersal and greater food resources • Scour bed sediments to maintain pools and change in-channel complexity for improved habitat • Provide cues for platypus to nest higher up the bank • Provide sediment and plant propagules from tributary inflows after large rain events to encourage the establishment of new plants • Drown terrestrial vegetation on low banks and trigger the recruitment of native, flood-tolerant streamside vegetation • Improve waterbug habitat and food availability by scouring fine sediments	CN1 F1 G1, G2 MI1 PR1 V1, V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Early spring fresh (one fresh of up to 10,000 ML/day with more than seven days above 7,300 ML/day during September to October)	• Wash organic matter and carbon (e.g. leaf litter) into the channel • Provide connectivity to off-channel habitats and through the river for fish dispersal and greater food resources • Scour bed sediments to maintain pools and change in-channel complexity for improved habitat • Increase soil moisture in banks to improve the condition of existing native vegetation • Provide sediment and plant propagules from tributary inflows after large rain events to encourage the establishment of new plants • Drown terrestrial vegetation on low banks and trigger the recruitment of native flood-tolerant streamside vegetation • Improve waterbug habitat and food availability by scouring fine sediments and biofilms from hard substrates	CN1, F1, G1, G2, MI1, V1, V2
Late spring fresh (one fresh of more than 6,600 ML/day for two days during October to December)	• Stimulate spawning of golden and silver perch • Scour bed sediments to maintain pools and change in-channel complexity for improved habitat • Improve waterbug habitat and food availability by scouring fine sediments and biofilms from hard substrates	F1, G1, G2, MI1
Autumn fresh (one fresh of more than 5,700 ML/day for one to seven days during March to May)	• Cue fish to move into and through the system to increase their abundance and dispersal • Scour bed sediments to maintain pools and change in-channel complexity for improved habitat • Increase soil moisture in banks to maintain and increase the abundance of existing vegetation • Scour old biofilm from hard substrates to allow new biofilm growth to improve food and habitat for waterbugs	F1, G1, G2, MI1, V1
Environmental risk mitigation flow; slow recession of unregulated flow or releases from Goulburn Weir (6,000 ML/day)	• Provide organic matter and carbon (e.g. leaf litter) to the channel • Minimise the risk of bank erosion associated with a rapid reduction in the water level • Transport and deposit seed, plant propagules and sediment on the riverbank • Minimise the risk of low-oxygen blackwater after natural events	CN1, G1, V1, WQ1

Scenario planning

Table 5.4.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The environmental flows study for the Goulburn River recommends a range of watering actions needed in most years to achieve the target environmental outcomes. Following multiple wet years and high allocations of water for the environment, water availability in the Goulburn system at the end of 2024-25 is expected to be high, despite a drier-than-average spring and summer. Resource allocations in 2025-26 are expected to be lower in dry and drought conditions, but even in these conditions, all recommended watering actions can potentially be met with carryover and expected allocation.

The highest-priority potential watering actions in the lower Goulburn River in 2025-26 aim to increase the extent and improve the composition and condition of streamside vegetation within the channel. Unnaturally high IVT flows have severely damaged native vegetation on the banks of the lower Goulburn River during the irrigation seasons from 2017 to 2021. Large spring and summer floods in 2022-23 and 2023-24 also limited the recovery of bank vegetation. Scientific advice and monitoring results indicate that it will take multiple years for the lower-bank vegetation to fully recover from these severe disturbances.

The most important flows for bank vegetation in the Goulburn River are a year-round low flow and freshes during winter and spring. The variable target range for the low flow aims to minimise erosion and inundate enough of the channel to support in-stream vegetation and expose the lower parts of the bank for sustained periods during the warmer growing season to avoid drowning streamside vegetation. Freshes delivered between late autumn and spring are needed to periodically wet higher parts of the bank to improve the growth and recruitment of native plants at the water's edge and deter the growth of terrestrial species. Where possible, these freshes will be delivered by passing tributary inflows from the mid-Goulburn River to the lower Goulburn reaches so that seeds, sediments and nutrients that are carried from natural tributary flows are transported and deposited along the banks of rivers throughout the whole system.

A year-round low flow and freshes may be fully or partially achieved with the natural flow in the wetter planning scenarios, and operational releases (such as IVTs) may help meet environmental flow targets in the drier planning scenarios. Goulburn-Murray Water generally diverts a proportion of the natural high flow from Goulburn Weir into the Waranga Basin. These operational transfers can cause the flow rate in the lower Goulburn River to drop rapidly after a natural high-flow event, and environmental risk mitigation flows will be used as required to slow the recession of natural spills at Goulburn Weir to reduce the risk of bank slumping.

A continuing priority for environmental watering in 2025-26 will be to support native fish objectives. Significant declines in small-bodied native fish populations in the Goulburn River and other connected systems were observed following the 2022 and 2023 floods. These declines are likely due to a range of factors, including low-oxygen blackwater, the temporary loss of slow-flowing littoral habitat within the channel and an increase in the proliferation of carp in the Murray River and its tributaries. Recent fish monitoring also suggests there has been little recruitment of larger native species (such as golden and silver perch) in recent years. While these species do not need to spawn every year, actions to increase their populations will be taken where possible.

Late spring freshes are known to trigger golden and silver perch spawning in the lower Goulburn River, and water for the environment may be used to deliver a fresh in spring 2025 in wet conditions as long as its timing does not compromise outcomes for re-establishing bank vegetation. In the drought, dry and average planning scenarios, delivering a late spring fresh is a lower priority (tier 2) as its timing and interaction with possible IVT pulses will likely compromise outcomes for the lower-bank vegetation. Autumn freshes provide a flow cue for native fish to move into the Goulburn system from the Murray system and rejuvenate native bank vegetation following dry conditions. Delivering an autumn fresh in 2026 is a high priority in the drought, dry and average planning scenarios to support bank vegetation. It is a lower priority (tier 2) in the wet planning scenario, when more frequent unregulated flow events are likely to keep vegetation in good condition. However, an autumn fresh may still be delivered in wet conditions to support native fish outcomes, based on scientific advice at the time.

The final focus for environmental watering in the Goulburn River in 2025-26 will be to maintain minimum flows in reach 1 (immediately downstream of Lake Eildon) during winter when there are no irrigation releases and deliver multiple freshes in winter and spring in average and wet conditions to reinstate some natural flow variation and connect floodplain wetlands between reach 1and reach 3. Collectively, these flows will maintain in-channel habitat through the mid-Goulburn system and provide opportunities for fish and platypus to access off-channel habitats for feeding and breeding. The freshes may be met with the natural flow in average and wet conditions. They are a lower priority in the drought and dry planning scenarios, but may be fully or partially met with operational flows. Delivering a winter fresh in reach 1 is also important in all planning scenarios to optimise breeding of platypus by providing them with a cue to nest higher in the bank.

Carrying over water to meet minimum low-flow objectives from July to September 2026 is an important consideration in the drought and dry planning scenarios, but it is less important in the average and wet planning scenarios due to likely high early-season allocations.

Table 5.4.2 Goulburn River environmental watering planning scenarios

<table>
<tr><th>Planning scenario</th><th>Drought</th><th>Dry</th><th>Average</th><th>Wet</th></tr>
<tr><td>Expected conditions</td><td>• Very few or no large natural-flow events
• Blackwater could be an issue if there is a large rain event in the warmer months</td><td>• One to two short-duration, large natural flow events are likely to provide small winter/spring freshes
• Blackwater could be an issue if there is a large rain event in the warmer months</td><td>• Large natural-flow events will provide low flow for most of the year and will likely provide winter/spring freshes
• Blackwater could be an issue if there is a large rain event in the warmer months</td><td>• Large natural-flow events will provide low flow and multiple freshes and/or overbank flow events in winter/spring
• Blackwater could be an issue if there is a large rain event in the warmer months</td></tr>
<tr><td>Expected availability of water for the environment</td><td>• 409 GL</td><td>• 547 GL</td><td>• 638 GL</td><td>• 638 GL</td></tr>
<tr><td colspan="5">Goulburn River (targeting reach 1)</td></tr>
<tr><td>Potential environmental watering – tier 1 (high priorities)</td><td colspan="4">• Year-round low flow
• Winter fresh
• Autumn/winter/spring freshes
• Spring fresh</td></tr>
<tr><td colspan="5">Goulburn River (targeting reaches 4 and 5)</td></tr>
<tr><td>Potential environmental watering – tier 1 (high priorities)</td><td colspan="3">• Year-round low flow
• Winter/autumn fresh
• Early spring fresh
• Autumn fresh
• Environmental risk mitigation flow</td><td>• Year-round low flow
• Winter/autumn fresh
• Early spring fresh
• Late spring fresh
• Environmental risk mitigation flow</td></tr>
</table>

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• Late spring fresh			• Autumn fresh
Possible volume of water for the environment required to achieve objectives	• 322 GL (tier 1) • 20 GL (tier 2)	• 375 GL (tier 1) • 20 GL (tier 2)	• 446 GL (tier 1) • 50 GL (tier 2)	• 528 GL (tier 1) • 60 GL (tier 2)
Priority carryover requirements for 2026-27	• 60 GL	• 100 GL	• N/A	

5.4.2 Goulburn wetlands

System overview

Within the Goulburn Broken catchment, there are about 2,000 natural wetlands identified, but only six — Doctors Swamp, Gaynor Swamp, Horseshoe Lagoon, Kanyapella Basin, Loch Garry and Reedy Swamp — have received water for the environment through the VEWH's or CEWH's entitlements (Figure 5.4.1). Several other small wetlands in the Goulburn catchment have been watered under a separate arrangement through the Murray-Darling Wetlands Working Group.

Doctors Swamp, Gaynor Swamp, Kanyapella Basin, Loch Garry and Reedy Swamp can receive water for the environment through irrigation supply infrastructure. The volume of water that can be delivered to each wetland depends on the physical capacity of the infrastructure and the seasonal allocation. Water for the environment can be delivered from the Goulburn River to Horseshoe Lagoon via a temporary pump.

This year, for the first time, seasonal watering proposals were sent directly to the VEWH by some Traditional Owners. For the Goulburn wetlands, a seasonal watering proposal by the Taungurung Land and Waters Council (TLaWC) for Molesworth billabongs is incorporated into this seasonal watering plan. This site can receive water via a temporary pump from the Goulburn River.

Environmental values

Many natural wetlands across the Goulburn catchment, including Doctors Swamp, Gaynor Swamp, Kanyapella Basin, Loch Garry and Reedy Swamp, are formally recognised for their conservation significance. The Goulburn wetlands support various plant communities ranging from river red gum swamps to cane grass wetlands.

Doctors Swamp is one of Victoria's most intact red gum swamps, supporting over 80 wetland plant species.

Gaynor Swamp is a cane grass wetland situated on paleosaline soils: soils formed from historic oceans. When wet, the wetland supports thousands of waterbirds, including brolga and intermediate egrets. Gaynor Swamp is more saline than other wetlands in the region when water levels are low, and it attracts a different group of feeding waterbirds as it draws down. The red-necked avocet is one of the most significant species that feed on exposed mudflats at Gaynor Swamp.

Horseshoe Lagoon is a paleochannel of the Goulburn River with tall marsh, floodway pond herbland and floodplain streamside woodland vegetation communities. The lagoon supports numerous waterbird species and is home to three turtle species, including the broad-shelled turtle.

Kanyapella Basin is a shallow freshwater marsh that provides habitat for numerous plant and animal species, including the threatened intermediate egret. Historically, it has been a popular breeding site for ibis, herons and cormorants.

Loch Garry is a paleochannel of the Goulburn River that provides deep open-water habitat. Shallow, vegetated wetland depressions, red gum forest and sand ridges surround the channel. It is an important site for waterbird feeding and roosting, and it is a drought refuge for eastern great egrets, musk ducks, nankeen night herons and royal spoonbills.

Molesworth billabongs is an off-channel billabong complex on the *Waring* (mid-Goulburn River) floodplain containing various culturally significant vegetation species, including threatened vegetation communities. Recent monitoring confirmed the billabongs support flathead galaxias, which are listed as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and as vulnerable under the Victorian *Flora and Fauna Guarantee Act 1988*.

Reedy Swamp contains a mosaic of vegetation types, including tall marsh, floodway pond herbland and rushy riverine swamp. It is a vital drought refuge, a nesting site for colonial waterbirds and a stopover feeding site for migratory birds (such as sharp-tailed sandpiper and marsh sandpiper).

Environmental objectives in the Goulburn wetlands

A1 – Maintain frog populations and provide suitable habitat for them

B1 – Provide breeding habitat for waterbirds

B2 – Provide feeding and roosting habitat for waterbirds

CN1 – Restore carbon and nutrient cycling within the wetlands to increase ecosystem productivity

F1 – Maintain fish populations and provide suitable habitat for them

T1 – Maintain the abundance of freshwater turtle populations

V1 – Increase the diversity and cover of native wetland plant species consistent with their ecological vegetation class benchmarks

V2 – Reduce the cover and diversity of invasive plants

Traditional Owner cultural values and uses

The Goulburn wetlands span the lands of two Traditional Owner groups, represented by the Taungurung Land and Waters Council (TLaWC) and the Yorta Yorta Nation Aboriginal Corporation (YYNAC). Gaynor Swamp, Molesworth billabongs and Horseshoe Lagoon are on Taungurung Country. TLaWC has been involved in environmental water planning for Gaynor Swamp and Horseshoe Lagoon for several years and in delivering water for the environment at Horseshoe Lagoon since 2021. This year, TLaWC prepared a Traditional Owner-led seasonal watering proposal for Molesworth billabongs.

Doctors Swamp, Kanyapella Basin, Loch Garry and Reedy Swamp are on Yorta Yorta Country. YYNAC has been involved in planning for environmental flows at these wetlands for several years, including participating in developing environmental water management plans.

In February 2025, the Goulburn Broken CMA discussed 2025-26 priorities for water for the environment for the Goulburn wetlands with the Goulburn Broken Technical Reference Group, including wetland specialists Rhonda Butcher and Damien Cook. Representatives of TLaWC, YYNAC, the VEWH and the Department of Energy, Environment and Climate Action also attended this meeting.

TLaWC has identified that water for the environment supports cultural values by protecting intangible cultural heritage and valued species, including traditional food and medicine plants. Participation in environmental water planning by TLaWC and the TLaWC water knowledge group Baan Ganalina (Guardians of Water) is furthering Taungurung Traditional Owners' capacity to fulfil their obligations to care for Country. This includes working to restore a more natural watering regime to significant sites and rehabilitating habitat for native species. This work contributes to reconnecting the Taungurung community to Country by supporting and securing access for Taungurung contemporary cultural practices and uses, teaching places, camping sites and other places of cultural importance.

The Taungurung people have an interest in rehabilitating floodplain wetlands associated with *Waring* (Goulburn River reaches 1 to 3). TLaWC monitors biocultural values and habitat conditions at several disconnected wetlands as part of its ongoing Reading Water Country program. The monitoring findings inform seasonal watering proposals and planning for water for the environment. TLaWC is working with partners to improve habitat conditions for native species in the area, and healthy Country assessments provide important information about cultural objectives and indicators.

In 2017, TLaWC undertook an Aboriginal Waterways Assessment at Horseshoe Lagoon and Molesworth billabongs. In 2019, it helped develop the environmental water management plan before the first environmental water delivery to Horseshoe Lagoon in winter 2019. In 2021 and 2022, TLaWC staff and Baan Ganalina coordinated the delivery of environmental water to Horseshoe Lagoon via a portable pump. This year's planned environmental water delivery to one of the four Molesworth billabongs would see the first water at the site since the 2022 floods, which revitalised the billabong complex and provided refuge for flathead galaxias.

TLaWC is continuing to develop and refine efforts to heal the wetlands in line with Taungurung biocultural objectives and in collaboration with partners including Parks Victoria and the Goulburn Broken CMA. This has included the reintroduction of aquatic plant species that are either missing or in low numbers at Horseshoe Lagoon to boost their diversity and abundance, the installation of a 'floating island' to support turtle breeding at the site, as well as weed management and native plantings at Molesworth billabongs.

For Yorta Yorta people, water for the environment supports many cultural values. At Doctors Swamp, it supports nardoo (a food source), native grasses, old man weed (which has medicinal uses), sedges and rushes (for basket weaving), as well as a wide range of bird and animal species. At Loch Garry, water for the environment supports culturally important food, fibre and medicinal plants. A flow delivered to Loch Garry in April 2020 initiated a resurgence of these plants and giant rush, which provided nesting opportunities for important bird species. Loch Garry is rich in cultural values: stone scatters, scar trees and significant sand hills in the higher elevations.

Kanyapella Basin is important for the Yorta Yorta people's cultural and spiritual connections. It supports the health of cultural values in the landscape (such as the Creation Story and traditional food and medicine plants). Before the delivery of environmental flows in winter 2020, Yorta Yorta people conducted a cultural burn at the site, helping to enable direct delivery of the water and help the growth of old man weed.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Planned environmental flows may be modified to align with a community benefit so long as environmental outcomes are not compromised. This is indicated in **Table 5.4.4** by an icon, as pictured below and also explained in **Figure 1.2.3**. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is used in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners will support Aboriginal cultural values and uses

Traditional Owner-led seasonal watering proposals for healthy Country

Taungurung Land and Waters Council

The Goulburn wetlands system has included proposed watering actions for the Molesworth billabongs for 2025-26 presented by the Taungurung Land and Waters Council (TLaWC).

The actions aim to support the ongoing connection of the Taungurung people to Country and ancestors and meet cultural obligations to care for Country by restoring the Molesworth billabongs, including by delivering water for the environment to support water-dependent species and help suppress invasive weeds while the complex is restored.

> "Baan Ganalina will gather and discuss what is happening at the billabongs regularly during the first few years of watering, and we (will) make decisions together about whether water should be delivered or not. As time goes on, we will learn more and more about what the billabongs need from us to heal."
>
> *– TLaWC Molesworth billabongs seasonal watering proposal*

The billabongs support several important biocultural and ecological values that will be strengthened through the provision of environmental water.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.4.4**, Goulburn Broken CMA considered how environmental water deliveries could support values and uses, including:

- water-based recreation (such as canoeing)
- recreation and amenity adjacent to waterways (such as birdwatching, camping, cycling, hiking, photography and walking)
- community events and tourism (such as birdwatching events, the Nature Scripts Initiative and outdoor classroom learning).

Environmental watering of wetlands increases the number of visitors and opportunities for them, including for birdwatching, photography, walking, camping, and hunting (state game reserves have been reclassified as wildlife reserves).

Table 5.4.3 shows the social, recreational and economic benefits of Goulburn wetlands environmental watering.

Table 5.4.3 Social, recreational and economic benefits of environmental watering, Goulburn wetlands

Wetland	Beneficiary	Value	How have these benefits been considered?
Doctors Swamp	• Birdwatchers • Photographers • Walkers • Local landholders	• Environmental water provides opportunities for walking, birdwatching and photography.	• Watering could result in an increased number of plants and animals, providing opportunities for naturalists/ photographers.
Gaynor Swamp	• Birdwatchers • Photographers • Walkers • Local landholders • Duck hunters	• Environmental water provides opportunities for walking, birdwatching and photography.	• Watering of the site promotes the growth of wetland plants, beneficial for waterbirds roosting and foraging.
Horseshoe Lagoon	• Birdwatchers • Photographers • Walkers • Campers • Local landholders	• Environmental watering provides opportunities for walking, birdwatching and photography.	• Watering of the site promotes the growth of wetland plants, beneficial for waterbirds roosting and foraging.
Kanyapella Basin	• Birdwatchers • Photographers • Walkers • Local landholders	• Environmental water provides opportunities for walking, birdwatching and photography.	• Watering could increase the number of plants and animals, providing opportunities for naturalists/ photographers.
Loch Garry	• Birdwatchers • Photographers • Walkers • Duck Hunters	• Environmental water provides opportunities for walking, birdwatching and photography.	• Watering of the site promotes the growth of wetland plants beneficial for waterbirds roosting and foraging.
Molesworth billabongs	• Walkers • Caravan park visitors • Birdwatchers • Photographers	• Environmental watering provides opportunities for walking, birdwatching and photography.	• Watering could increase the number of plants and animals, providing opportunities for naturalists/ photographers and improving people's wellbeing by spending time in nature.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.4.4 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.4.4 Goulburn wetlands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Doctors Swamp (fill in late winter/spring 2025)	• Promote frog breeding opportunities (notably for the Environment Protection and Biodiversity Conservation Act-listed Sloane's froglet) • Promote waterbird breeding opportunities (target species include Australasian bittern, musk duck and blue-billed duck) • Maintain the Red Gum Swamp Ecological Vegetation Class	A1 B1, B2 V1, V2
Gaynor Swamp (in natural conditions, inundate swamp, top-up[s] if required)	• Increase foraging and roosting habitat for breeding waterbirds, especially brolga • Maintain water levels for waterbird chicks to successfully grow and become independent	B1, B2
Horseshoe Lagoon (top-up to deeper pools only in late winter/spring 2025 [if required])	• Provide habitat for turtle populations	T1
Kanyapella Basin (partial fill in late winter/spring 2025)	• Promote waterbird breeding opportunities; target species include royal spoonbill and ibis • Maintain floristic diversity	B1, B2 V1, V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Loch Garry (fill in autumn 2026)	• Protect targeted vegetation while minimising overflow to continue promoting the drawdown of deeper channels	V1
Molesworth billabongs (fill in winter/spring 2025 [Billabong A only])	• Provide refuge and habitat for flathead galaxias • Maintain and improve native vegetation • Control exotic weeds	F1 V1, V2

Scenario planning

Table 5.4.5 outlines potential environmental watering and expected water use in a range of planning scenarios.

Three Goulburn wetlands are planned to receive water for the environment in 2025-26 in all planning scenarios, with Doctors Swamp and Kanyapella Basin to receive a fill and Molesworth billabongs to receive a partial fill in winter/spring 2025. Gaynor Swamp and Horseshoe Lagoon may also receive water in late winter/spring 2025 to support their environmental values if required, and Loch Garry may receive water in autumn 2026.

Doctors Swamp has remained dry since February 2024 and needs filling to maintain the growth of river red gum and associated vegetation communities and to support native frog communities. Watering Kanyapella Basin from both the northeast and northwest will support waterbird breeding opportunities and vegetation diversity. The watering at Molesworth billabongs will be the first inundation since the 2022 floods.

Flathead galaxias were recently discovered in TLaWC-led monitoring. They were translocated to a surrogate site and a hatchery to protect the species as Molesworth billabongs began to draw down. Watering at Molesworth billabongs will be primarily targeted towards one of the four billabongs as part of an initial trial to better understand the hydrology and ecology of the complex.

The Goulburn wetlands have filled multiple times in recent years due to natural floods and periods of high rainfall, most recently from the floods in October 2023 and January 2024, but Gaynor Swamp, Loch Garry and Reedy Swamp are now dry or drying. The priority for these sites in 2025-26 is to allow them to remain dry to support dry-phase ecosystem processes, including nutrient cycling. Drying the wetlands will also help control pest species, including European carp at Horseshoe Lagoon and Reedy Swamp and cumbungi at Gaynor Swamp. Gaynor Swamp should remain dry for four years to combat the expansion of cumbungi.

In the average or wet planning scenarios, natural conditions may provide for inundation of Gaynor Swamp. If this occurs and waterbird breeding eventuates, a top-up may be provided to ensure the successful fledging of any chicks. The environmental water management plan for Horseshoe Lagoon recommends annual filling, whereas other wetlands require less-frequent wetting. However, a partial drying while retaining and topping up water in the deeper pools will help promote nutrient cycling while continuing to provide habitat for turtles.

Loch Garry may receive a fill in autumn to protect targeted vegetation communities as informed by a monitoring program while the remaining deeper channels dry out. Watering Gaynor Swamp, Horseshoe Lagoon and Loch Garry are lower priorities in all planning scenarios, and they will likely fill naturally in wet conditions.

No end-of-year carryover target has been set for the Goulburn wetlands because seasonal allocations are expected to meet environmental watering requirements in 2026-27.

Table 5.4.5 Goulburn wetlands environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Catchment run-off and natural flow into the wetlands are highly unlikely	• Catchment run-off and natural flow into the wetlands are highly unlikely	• Some catchment run-off and natural flow into some of the wetlands are likely, particularly in winter/spring	• Catchment run-off and natural flow into the wetlands are likely to fill or partially fill the wetlands, particularly in winter/spring
Potential environmental watering – tier 1 (high priorities)	• Doctors Swamp • Kanyapella Basin • Molesworth billabongs	• Doctors Swamp • Kanyapella Basin • Molesworth billabongs	• Doctors Swamp • Kanyapella Basin • Molesworth billabongs	• Doctors Swamp • Kanyapella Basin • Molesworth billabongs
Potential environmental watering – tier 2 (additional priorities)	• Horseshoe Lagoon • Loch Garry	• Horseshoe Lagoon • Loch Garry	• Gaynor Swamp • Horseshoe Lagoon • Loch Garry	• Gaynor Swamp • Horseshoe Lagoon • Loch Garry
Possible volume of water for the environment required to achieve objectives	• 3,170 ML (tier 1) • 600 ML (tier 2)	• 3,160 ML (tier 1) • 600 ML (tier 2)	• 3,160 ML (tier 1) • 1,600 ML (tier 2)	• 2,560 ML (tier 1) • 500 ML (tier 2)
Priority carryover requirements for 2026-27	• N/A			

5.5 Broken system

Waterway manager – Goulburn Broken Catchment Management Authority

Storage manager – Goulburn-Murray Water

Environmental water holders – Victorian Environmental Water Holder and Commonwealth Environmental Water Holder

The Broken system includes the Broken River, upper Broken Creek, lower Broken Creek and the Broken wetlands.

5.5.1 Broken River and upper Broken Creek

System overview

The Broken River is a tributary of the Goulburn River, rising in the Wellington-Tolmie highlands and flowing northwest to Benalla and then west for a total distance of 190 km before it joins the Goulburn River near Shepparton (Figure 5.5.1). Lake Nillahcootie is the main storage on the Broken River. It is about 36 km upstream of Benalla and harvests water from the river to support stock and domestic supply and irrigated agriculture. The main tributaries of the Broken River are Hollands Creek, Ryans Creek and Lima East Creek.

Lake Nillahcootie has a storage capacity that is about half the mean annual flow of its upstream catchment, so it fills in most years. The operation of Lake Nillahcootie has modified the river's natural flow pattern: winter/spring flow is less than natural because a large proportion of inflow is harvested, while summer/autumn flow is greater than natural because water is released to meet downstream irrigation demands. These impacts are most pronounced in the reach between Lake Nillahcootie and Hollands Creek. Below Hollands Creek, the river retains a more natural flow pattern due to flows from unregulated tributaries, although the total annual flow is considerably less than natural. The catchment has been extensively cleared for agriculture, including dryland farming (such as livestock grazing and cereal cropping) and irrigated agriculture (such as dairy, fruit and livestock).

Water is released from Lake Nillahcootie to meet downstream demand and minimum-flow requirements specified under the bulk entitlement for the Broken River system. Releases from storage may be less than 30 ML per day, as tributary inflows immediately below the storage (such as from Back Creek) can supply much of the minimum-flow requirements specified in the bulk entitlement.

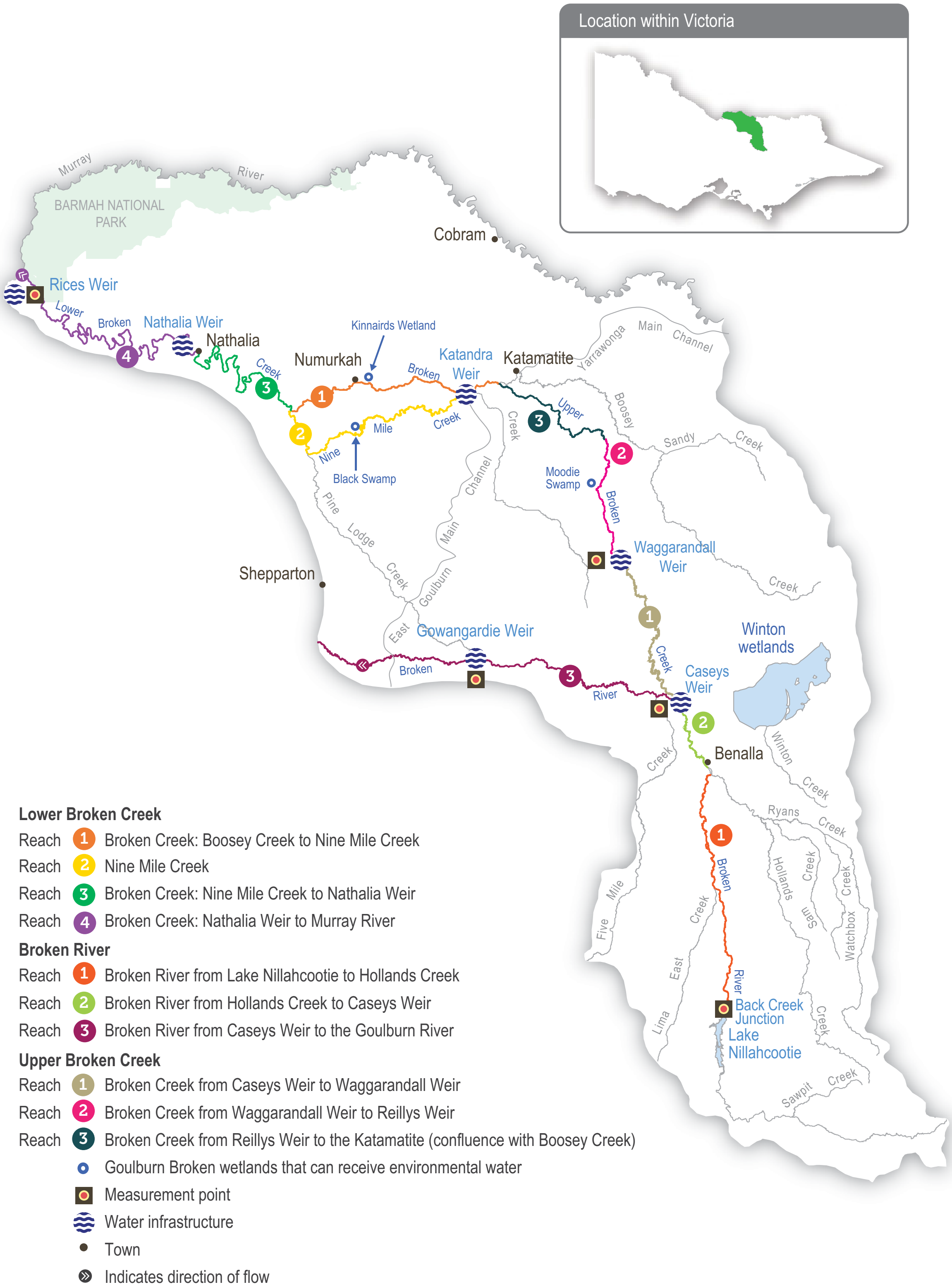
Upper Broken Creek is defined as the 89-km stretch of creek from the Broken River (at Caseys Weir) to the confluence with Boosey Creek near Katamatite. Upper Broken Creek flows across a flat riverine plain and has naturally low run-off from its local catchment. It receives flood flows from the Broken River, although the frequency of these floods has been reduced by river regulation, earthworks and road construction.

Upper Broken Creek has been regulated for more than a century. Before 2007, water was diverted into upper Broken Creek at Caseys Weir to meet local demand, but recent water savings projects have reduced the demand on the creek. There is now a low flow throughout the year between Casey's Weir and Waggarandall Weir. The flow below Waggarandall Weir is more variable and experiences regular cease-to-flow periods. These changes have reduced the amount of permanent aquatic habitat.

Environmental water delivery to the Broken River is primarily constrained by the small volume of water holdings in the Broken system. Environmental water holders can trade water into the Broken system from other trading zones, subject to relevant limits and conditions to meet environmental needs.

The bulk entitlement for the Broken system held by Goulburn-Murray Water stipulates that a minimum environmental flow, also known as passing flow, is to be maintained in the Broken River when there are natural flows into the system. The bulk entitlement also allows Goulburn-Murray Water and the Goulburn Broken CMA to agree to reduce the minimum passing flow and accumulate unused volumes for later releases that will provide a greater environmental benefit. Accumulated passing flow is the first volume lost when the storage spills. Environmental flows in upper Broken Creek are restricted by the volume of available supply, channel capacity and the need to avoid flooding low-lying, adjacent land.

Figure 5.5.1 Broken system



Grey river reaches have been included for context. The numbered reaches indicate where relevant environmental flow studies have been undertaken. Coloured reaches can receive environmental water.

Environmental values

The Broken River retains one of the best examples of healthy in-stream vegetation in a lowland river in the region. Various native submerged and emergent plant species, including eelgrass, common reed and water ribbons, populate the bed and margins of the river. These plants provide habitat for various animals, including small- and large-bodied native fish. Murray cod, Macquarie perch, golden perch, silver perch, river blackfish, mountain galaxias, southern pygmy perch and Murray-Darling rainbowfish all occur in the Broken River. The river also supports a platypus population.

Upper Broken Creek is dominated by unique box eucalypt vegetation and remnant plains grassy woodland. The creek and its streamside zone support numerous threatened species, including brolga, Australasian bittern, buloke and ridged water-milfoil. Much of the high-quality native vegetation in the region is set aside as a natural features reserve. Upper Broken Creek supports a variety of native fish species, including carp gudgeon, Murray cod, river blackfish and Murray-Darling rainbowfish, as well as platypus, rakali (water rat) and common long-necked turtle.

The Broken River and upper Broken Creek are listed in the Commonwealth Government's ***Directory of Important Wetlands in Australia***.

Environmental objectives in the Broken River and upper Broken Creek

	F1 – Maintain native fish populations
	G1 – Turn over bed sediments and scour around large wood to maintain in-channel habitat diversity
	MI1 – Maintain waterbug diversity and abundance
	PR1 – Maintain platypus populations
	V1 – Maintain in-stream vegetation
	WQ1 – Maintain water quality

Traditional Owner cultural values and uses

The Broken River system flows through the lands of the Taungurung and the Yorta Yorta peoples. Broken Creek is on Yorta Yorta Country. Water for the environment in the Broken system supports the health of cultural values and landscapes, including intangible cultural heritage, valued species and traditional food and medicine plants.

The Taungurung Land and Waters Council (TLaWC) and the Yorta Yorta Nation Aboriginal Corporation (YYNAC) are Broken Environmental Water Advisory Group members. Each year, the Goulburn Broken CMA discuss plans for environmental watering in the Broken River and upper Broken Creek with TLaWC and YYNAC. Both groups support the proposed watering actions.

TLaWC plans to assess cultural values and objectives for the Broken River through healthy Country assessments like Aboriginal Waterway Assessments. These will help the Council develop more specific cultural objectives for the Broken River system and culturally informed recommendations for water for the environment.

In 2021, YYNAC provided the following statement about the cultural values of the Broken River system, including Broken Creek.

> "The Broken River (and Broken Creek) hold many cultural values. Common reed contained within the slack water provides important material for tools, while also providing refuge for culturally important fish species (large- and small-bodied). The river also has significant stands of old-growth river red gum containing important habitat and exhibiting scars made from carving out canoes and coolamons."

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

The proposed 2025-26 watering actions aim to support native fish, in-stream vegetation and fringing vegetation, which YYNAC has identified as important cultural values. The Goulburn Broken CMA will continue to collaborate with YYNAC and TLaWC to identify opportunities for watering actions to support cultural values and objectives.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.5.1**, the Goulburn Broken CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, fishing, kayaking and swimming)
- riverside recreation (such as birdwatching, bushwalking, camping, duck hunting and picnicking)
- green and blue spaces important to the community for wellbeing and mental health in an otherwise dry environment
- community events and tourism (such as markets around Benalla Lake)
- socioeconomic benefits (such as maintaining the volume of water in the lower sections to optimise the efficiency of deliveries of consumptive water, maintain water quality for irrigation, stock and domestic use and support terrestrial birds and waterbirds that help control agricultural pests).

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.5.1 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.5.1 Broken River and upper Broken Creek potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Upper Broken Creek[1] – reach 1 (compliance points – Waggarandall Weir, Caseys Weir)		
Year-round low flow (5-10 ML/day)	• Maintain aquatic habitat and connections between weir pools for native fish and platypus • Inundate benthic surfaces and large wood located at the bottom of the channel, which are waterbug habitat • Maintain water quality (specifically low oxygen levels) for native fish, platypus and waterbugs • Maintain habitat for in-stream and fringing vegetation	F 1, MI1, PR1, V1, WQ1
Year-round fresh (trigger-based, of 20-50 ML/day for 10 days)[2] *Triggers:* • *low oxygen* • *low or cease-to-flow river conditions* • *high water temperatures*	• Increase the flow and flush pools to improve water quality and low oxygen levels	WQ1
Broken River[3] – reaches 1, 2 and 3 (compliance points – Back Creek Junction, Caseys Weir, Gowangardie Weir)		
Year-round low flow (15-100 ML/day)	At 15 ML/day: • provide minimum longitudinal connection along the length of the river and habitat for native fish, aquatic plants, platypus and waterbugs • maintain water quality and oxygen levels for native fish, platypus and waterbugs At 30-100 ML/day: • increase habitat for in-stream and fringing vegetation, and prevent terrestrial vegetation from colonising the stream bed • enhance riffles, pools and slackwater to increase the diversity of hydraulic habitat for native fish, aquatic plants, platypus and waterbugs • improve water quality and oxygen levels for native fish, platypus and waterbugs	F 1, MI1, PR1, V1, WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn fresh (one fresh of 400-500 ML/day for two to five days during December to May)	• Scour sediments around large wood, turn over bed sediments, replenish biofilms and maintain aquatic plant habitat • Provide flow cues to stimulate native fish to breed and migrate • Increase food resources for native fish, platypus and waterbugs	F1 G1 MI1 PR1 V1

1 Potential watering actions in upper Broken Creek will be delivered at a lower magnitude if insufficient water is available to achieve the target magnitude.

2 The compliance point is Caseys Weir. The maximum volume that can be diverted from Caseys Weir to Broken Creek is about 20 ML per day. Higher flows may be possible during very dry periods.

3 30-100 ML per day is the recommended flow required to ensure optimal habitat and water quality is achieved in the Broken River. When water availability is low, a flow may need to be delivered at 15 ML per day to provide the minimum habitat and water quality requirements to sustain populations of fish, platypus and vegetation while conserving enough water to deliver throughout the year.

Scenario planning

Table 5.5.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The small environmental water entitlement restricts the scope of watering actions that can be delivered in the Broken River system. The proposed actions for 2025-26 are similar to those that have been delivered in previous years.

There are two sets of watering actions: one for the Broken River and another for upper Broken Creek. Delivering flow to upper Broken Creek is a higher priority because upper Broken Creek has no inflows from tributaries and relies more on operational water deliveries and water for the environment. The potential watering actions for upper Broken Creek require less water than those for the Broken River. Any environmental flows delivered to upper Broken Creek will pass through reaches 1 and 2 of the Broken River, where they will provide some environmental benefit.

All potential watering actions in the Broken River and upper Broken Creek are required across all planning scenarios, but there is unlikely to be enough supply to meet those demands. The expected supply is only sufficient to partially deliver a summer low flow through upper Broken Creek in drought and dry planning scenarios and fully deliver the summer low flow in upper Broken Creek in average and wet planning scenarios. Year-round low-flow requirements for the Broken River are typically met by passing and operational flows under the expected conditions in the average and wet planning scenarios. Due to the relatively small volume of environmental water held in the Broken system, achievement of the remaining required watering actions requires additional supply (for example, via trade) if not met by natural flow events.

The main environmental watering objective in upper Broken Creek is to maintain a low flow throughout the year to maintain connectivity, water quality and habitat for native fish, platypus and waterbugs. Maintaining an adequate flow is particularly important during spring and summer when native fish, platypus and waterbugs are most active and plants are actively growing. Though longitudinal flow connectivity may be lost in drier conditions, baseline ecological values may be protected in weir pools. The year-round, trigger-based fresh will be used to help prevent low-oxygen events, which can result in fish deaths. The Goulburn Broken CMA will monitor water quality conditions in upper Broken Creek and seasonal forecasts and may limit the use of water for a low flow during low-risk periods to conserve water for additional trigger-based freshes if necessary.

A year-round low flow (in all planning scenarios) and a summer/autumn fresh (in the average and wet planning scenarios) are needed to support

Broken River environmental objectives. However, there is little capacity to influence these with environmental water, especially in the drought and dry planning scenarios. Any environmental water allocations in drought or dry conditions will be prioritised to deliver a flow to upper Broken Creek, and additional supply would be required to supplement operational deliveries and any natural tributary inflows in the Broken River in these conditions. In average and wet conditions, increased operational deliveries and tributary inflows will help meet the recommended year-round low flow in the Broken River, but the recommended minimum low flow may not be met in dry or drought conditions.

Carryover requirements have not been identified for the Broken River and upper Broken Creek. The preferred course is to use available water in 2025-26 and reassess conditions and water availability closer to 2026-27.

Table 5.5.2 Broken River and upper Broken Creek environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Limited or no unregulated flow in the Broken River or upper Broken Creek • Low releases of operational water in the Broken River • Likely low and cease-to-flow events throughout the year in all reaches	• Low, unregulated flow in the Broken River • Low or no unregulated flow in upper Broken Creek • Low releases of operational water in the Broken River and upper Broken Creek • Possible low and cease-to-flow events throughout the year in all reaches	• High winter/spring flow in the Broken River • Increased releases of operational water in the Broken River • Periods of unregulated flow in upper Broken Creek	• High winter/spring flow in the Broken River • Increased releases of operational water in the Broken River • Periods of unregulated flow in upper Broken Creek with some winter/spring freshes
Expected availability of water for the environment	• 0 ML	• 37 ML	• 647 ML	• 647 ML
Upper Broken Creek – reach 1				
Potential environmental watering – tier 1 (high priorities)	• N/A	• Year-round low flow (partially delivered)		
Potential environmental watering – tier 2 (additional priorities)	• Year-round low flow • Year-round fresh (as required)	• Year-round low flow (remaining volume) • Year-round fresh (as required)		

Planning scenario	Drought	Dry	Average	Wet
Broken River – all reaches				
Potential environmental watering – tier 1 (high priorities)	• N/A		• Year-round low flow	
Potential environmental watering – tier 2 (additional priorities)	• Year-round low flow		• Broken River summer or autumn fresh	
Possible volume of water for the environment required to achieve objectives	• 4,076-6,176 ML (tier 2)	• 37 ML (tier 1) • 4,039-6,139 ML (tier 2)	• 647 ML (tier 1) • 3,401-6,755 ML (tier 2)	• 647 ML (tier 1) • 3,401-6,755 ML (tier 2)
Priority carryover requirements for 2026-27	• N/A			

5.5.2 Lower Broken Creek

System overview

The lower Broken Creek system is within Yorta Yorta Country, and their cultural connection is evident throughout the landscape. The lower Broken Creek system includes the section of Broken Creek that flows from the confluence of Boosey Creek near Katamatite to the Murray River and Nine Mile Creek, which is an anabranch of lower Broken Creek that flows from the East Goulburn Main Channel to below Numurkah (Figure 5.5.1).

Lower Broken and Nine Mile creeks have been regulated for over a century. Before regulation, the creeks would have had most of their flow in winter/spring, then contracted to isolated pools or dried out during summer/autumn. The adjacent floodplain would have also flooded regularly. The creeks now have numerous weirs that maintain a relatively constant water level from mid-August until mid-May to support irrigated agriculture and little flow during the non-irrigation season. These modifications have changed how native species use the creek and favour invasive species (such as arrowhead). Previously, native fish would have moved into the creek when it flowed and returned to the Murray River as it dried.

Both creeks now provide year-round habitat for native fish, and fish passage structures allow fish to move between weir pools. Water for the environment supports these permanent fish habitats by providing flows to trigger fish movement and support fish passage, encourage the growth of native plants, promote in-stream productivity, control water quality and flush the water fern azolla as necessary.

The irrigation channel network delivers regulated water from the Goulburn and Murray systems to lower Broken Creek. Lower Broken Creek is operated separately from upper Broken Creek and Broken River, and both are supplied from Lake Nillahcootie on the upper Broken River.

Environmental water can be provided to lower Broken Creek from the Goulburn system through the East Goulburn Main Channel and the Murray system through the Yarrawonga Main Channel. Water is released into lower Broken Creek from several irrigation regulators along its length. The main priority for environmental flows in the lower Broken Creek system is a minimum flow throughout the year to maintain suitable habitat for native fish. Particular attention is paid to reaches 1 and 2 during the non-irrigation season when the flow can stop. The next priority is to deliver freshes in winter/spring to trigger fish movement and spawning, maintain water quality and manage azolla accumulations in reaches 3 and 4. Rices Weir is the measurement point for environmental flows in lower Broken Creek.

Operational water releases — inter-valley transfers (IVTs) from the Goulburn to the Murray or Barmah Choke bypass flows delivered to meet downstream demands — partly or wholly meet some environmental flow targets for lower Broken Creek. These operational deliveries mainly occur during peak irrigation demand between spring and autumn. Water for the environment may be used to supplement these operational releases and deliver recommended flow components not met by operational releases.

Environmental values

Lower Broken Creek and Nine Mile Creek support a diverse native fish community, including the threatened Murray cod, golden perch, silver perch, unspecked hardyhead, freshwater catfish and Murray-Darling rainbowfish.

Sections of lower Broken and Nine Mile creeks have been reserved as state parks and natural feature reserves. The associated floodplain and wetland habitats support box-dominated grassy woodland communities and numerous species of state and national conservation significance, including river swamp wallaby grass.

Environmental objectives in lower Broken Creek

F1 – Protect and increase native fish populations, including threatened Murray cod, golden perch, silver perch and small-bodied species
MI1 – Increase the diversity and abundance of the waterbug population
PR1 – Protect the platypus and rakali (water rat) populations, particularly outside the irrigation season
T1 – Protect turtle populations, particularly outside the irrigation season
V1 – Avoid the excessive build-up of azolla **V2** – Increase the cover and condition of native in-stream and littoral vegetation communities
WQ1 – Maintain oxygen levels suitable for aquatic animals

Traditional Owner cultural values and uses

The lower Broken Creek system is within Yorta Yorta Country, and their cultural connection is evident throughout the landscape.

Each year, the Goulburn Broken CMA meets with Yorta Yorta Nation Aboriginal Corporation (YYNAC) representatives to discuss water for the environment in lower Broken Creek. YYNAC continues to support the proposed watering actions. In February 2025, a meeting with all key stakeholders was held to discuss 2025-26 environmental watering priorities.

In 2021, YYNAC provided the following statement about the cultural values of the Broken River system, including lower Broken Creek.

> "The Broken River (and Broken Creek) hold many cultural values. Common reed contained within the slack water provides important material for tools, while also providing refuge for culturally important fish species (large and small-bodied). The creek also has significant stands of old-growth river red gum containing important habitat and exhibiting scars made from carving out canoes and coolamons."

YYNAC has raised concerns about the regulation of flows in all their waterways, which affects their Country and cultural knowledge. YYNAC continues to pursue the Yorta Yorta people's inherent rights to water for Country, with the aim of improving their spiritual, cultural, environmental, social and economic needs, in line with the ***Yorta Yorta Whole-Of-Country Plan 2021-2030***.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

The Goulburn Broken CMA will continue to work with the Yorta Yorta people to identify how the management of water for the environment can better support cultural values.

Social, recreational and economic values and uses

In planning the potential watering actions in **Table 5.5.3**, the Goulburn Broken CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, fishing, game hunting and kayaking)
- riverside recreation and amenity (such as aesthetic and amenity values that are particularly important for the community's mental health and wellbeing during dry periods and for passive recreation)
- community events and tourism
- socioeconomic benefits (such as consumptive water users, Goulburn-Murray Water irrigators and diverters and Goulburn Valley Water potable water customers).

The lower Broken Creek system generally has a narrow streamside zone with residential and farming properties adjoining or overlooking it. The creek system runs through the Katamatite, Wunghnu, Numurkah and Nathalia townships. Consequently, these communities have a direct connection with their creek, which provides important aesthetic and amenity values. The creeks are also important recreational areas, including for fishing, canoeing, kayaking and passive recreation.

> "The Broken and Nine Mile creeks are important in regards to being one of the most accessible waterways in Victoria for fishing, family picnics and camping."
>
> – *Nathalia community member*

The expected benefits of delivering water for the environment in lower Broken Creek and Nine Mile Creek in 2025-26 include winter flows, which support amenity and maintain adequate depths for canoeing and fishing. Environmental flows support native fish populations by providing fish passage and habitat and encouraging fish migration and spawning, which in turn benefits recreational anglers.

The lower Broken Creek system is the source of consumptive water for irrigation, stock and domestic uses for more than 70 diverters and urban water for Nathalia. The creek can be prone to poor water quality due to high turbidity, elevated colour and/or low-oxygen events. Delivery of baseflows during the warmer months can help improve water quality for consumptive users.

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. Benefits from environmental flows can exist well beyond the delivery event. Goulburn Broken CMA engagement with the community evidences the recreational and social values of lower Broken Creek, including for water sports and angling.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.5.3 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.5.3 Lower Broken Creek potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Winter low flow (20-40 ML/day during May to August)	• Provide native fish with passage through fish ladders • Provide suitable foraging habitat for platypus and rakali (water rats), and support the conditioning of females in preparation for the breeding season • Provide habitat for turtles, including protection from exposure during their winter dormancy • Provide flowing-water habitat and avoid winter drying of weir pools for fish, vegetation, waterbugs, platypus and turtles • Maintain water over submerged aquatic plants so they are protected from drying and frost • Reduce the stagnation of weir pools to maintain water quality	F1 MI1 PR1 T1 V2 WQ1
Spring/summer/ autumn low flow (70-250 ML/day in reaches 1 and 2 and 200-450 ML/day in reaches 3 and 4 during August to May)	• Provide habitat for aquatic animals, including native fish, platypus, rakali (water rats), turtles and waterbugs • Support the movement and recruitment of fish • Maintain native in-stream and littoral vegetation communities through variations in the water level • Maintain oxygen levels in summer Also, when delivered from December to February (at 250-450 ML/day): • mobilise azolla and increase oxygen levels during high-risk periods	F1 MI1 PR1 T1 V1, V2 WQ1
Winter/spring fresh(es) (one to three freshes of 300-450 ML/day for one to two weeks during July to November)	• Flush and mobilise azolla if it has accumulated to maintain water quality • Trigger the movement and spawning of fish • Encourage the germination and growth of littoral and in-stream vegetation • Reduce the stagnation of weir pools to maintain water quality	F1 V1, V2 WQ1

Scenario planning

Table 5.5.4 outlines potential environmental watering and expected water use in a range of planning scenarios.

The high degree of regulation in the lower Broken Creek system means flow patterns in the lower Broken and Nine Mile creeks are the same in all planning scenarios. Water for the environment will primarily be used in the lower Broken Creek system to guard against a reduced flow during the non-irrigation season.

Potential watering actions in all planning scenarios include maintaining a flow above 40 ML per day outside the irrigation season, ameliorating sudden fluctuations in irrigation demand during the irrigation season and delivering spring freshes to trigger fish movement, improve water quality or flush excessive accumulations of azolla. Delivering spring freshes in 2025-26 in all planning scenarios will be of particular importance to trigger the movement and spawning of native fish in the system and help the fish community recover from extensive flooding and associated low-oxygen blackwater events that caused widespread fish deaths in the lower Broken Creek and many parts of the southern connected basin. A low flow and freshes throughout the year will also support native fish, which are being restocked as part of a recovery project.

The Goulburn Broken CMA will monitor water quality throughout the year, and it may ask to increase the flow to the upper end of the recommended range in **Table 5.5.3** if oxygen levels drop below 4.0 mg/L. The total volume of water for the environment that will be needed to achieve planned watering actions in 2025-26 will vary depending on operational deliveries (including IVTs) and the size and duration of any unregulated flow events. A carryover target of 5,000 ML applies in all planning scenarios to ensure a minimum low flow and a small fresh can be delivered early in 2026-27.

Table 5.5.4 Lower Broken Creek environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• No unregulated flow	• Some unregulated flow in winter • No unregulated flow throughout the irrigation season (mid-August to May) • No diversion of unregulated Murray River flow is available	• Unregulated flow in winter/spring • Unregulated flow is unlikely from October to May • Diversion of unregulated Murray River flow is available from mid-August to October	• Unregulated flow is likely in winter/spring • Unregulated flow is possible from November to May • Diversion of unregulated Murray River flow available from mid-August to November
Lower Broken Creek (targeting reach 4)				
Potential environmental watering – tier 1 (high priorities)	• Winter low flow • Spring/summer/autumn low flow • Winter/spring freshes			
Possible volume of water for the environment required to achieve objectives	• 80,000 ML			
Priority carryover requirements for 2026-27	• 5,000 ML			

5.5.3 Broken wetlands

System overview

Of some 3,600 natural wetlands in the Goulburn Broken region, only three in the Broken catchment have infrastructure that allows them to receive environmental water: Black Swamp, Kinnairds Wetland and Moodie Swamp (Figure 5.5.1).

All three wetlands are on the Country of the Yorta Yorta people. Their knowledge and practice are evident throughout the landscape; for example, Black and Moodie Swamps have evidence of old cooking mounds around their perimeter. Kinnairds Wetland and Black Swamp are red gum swamps near Numurkah. Moodie Swamp is a cane grass wetland adjacent to upper Broken Creek at Waggarandall that provides excellent breeding habitat for brolga.

The water regimes of these wetlands are influenced by their position in the landscape. The development and operation of the Broken, Shepparton and Murray Valley irrigation districts have changed the natural flow paths and the timing, frequency, volume and duration of natural flooding to these and other wetlands in the region. The existing irrigation system infrastructure enables water for the environment to be delivered to the three wetlands, but under existing agreements, irrigation deliveries have priority within the channel system. This limits the volume of water that can be delivered to the wetlands. The VEWH, waterway managers and storage managers adjust the timing and rate of environmental deliveries where possible to optimise environmental outcomes within the current system constraints.

Environmental values

Moodie Swamp, Kinnairds Wetland and Black Swamp support diverse vegetation communities ranging from river red gum to cane grass. The wetlands contain state and nationally threatened vegetation communities and species, including ridged water-milfoil and river swamp wallaby grass. The wetlands also provide food resources and breeding habitat for bird species of high conservation significance, including eastern great egret, Latham's snipe, white-bellied sea eagle, Australasian bittern, brolga, royal spoonbill, yellow-billed spoonbill, Australasian shoveler and glossy ibis. Many of these species are listed in international agreements and conventions. Moodie Swamp also supports Sloane's froglet, listed in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Environmental objectives in the Broken wetlands

A1 – Provide breeding habitat for frogs

B1 – Provide breeding habitat for waterbirds

B2 – Provide feeding and roosting habitat for waterbirds

CN1 – Restore carbon and nutrient cycling within the wetlands to increase ecosystem productivity

V1 – Improve the cover, diversity, recruitment/regeneration and growth of native wetland plant species, consistent with ecological vegetation class benchmarks

V2 – Reduce the cover and diversity of exotic plant species

V3 – Maintain populations of ridged water-milfoil

V4 – Maintain populations of river swamp wallaby grass

Traditional Owner cultural values and uses

Moodie Swamp, Kinnairds Wetland and Black Swamp support native plants and animals that provide many cultural values and uses for the Yorta Yorta people. Black Swamp and Kinnairds Wetland support multiple varieties of nardoo (a food source), native grasses, herbs (such as old man weed, which has medicinal uses) and sedges and rushes (used for basket weaving). Basket-weaving sedges also grow at Moodie Swamp. There is also evidence of oven mounds and clay balls at Black and Moodie swamps.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Table 5.5.5 summarises Traditional Owner cultural values and uses considered when proposing watering actions.

Table 5.5.5 Traditional Owner cultural values and uses, Broken wetlands

Wetland	Connection to the wetland	Value	How have these benefits been considered?
Black Swamp	• Evidence of middens, clay balls and oven mounds at the site • Food and medicinal sources.	• Environmental water provides a connection to Country and food, medicine and fibre for Traditional Owners.	• Cultural values at the site include knowledge-sharing and increased resources (such as food and medicine plants).
Moodie Swamp	• Evidence of oven mounds and scar trees at the site • Food and basket-weaving sedges grow at the site.	• Environmental water provides a connection to Country and food, medicine and fibre for Traditional Owners.	• Cultural values at the site include knowledge-sharing and increased resources (such as food and medicine plants).
Kinnairds Wetland	• Connection to Country • Food, medicine resources and fibre grow at the site.	• Environmental water provides a connection to Country and food, medicine and fibre for Traditional Owners.	

Social, recreational and economic values and uses

When planning potential environmental watering actions, the Goulburn Broken CMA considers how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing)
- riverside recreation and amenity (such as birdwatching, camping, picnicking, photography, walking and hunting)
- community events and tourism (such as community gatherings at Kinnairds Wetland)
- socioeconomic benefits (such as tourism, which greatly contributes to the local economy).

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 5.5.7** by an icon, as pictured below and also explained in **Figure 1.2.3**.

Watering will also support waterbird-related recreational activities

Environmental water is delivered to sites to meet waterbird objectives, which in turn support birdwatching and other recreational activities.

Table 5.5.6 shows the social, recreational and economic benefits of Broken wetlands environmental watering.

Table 5.5.6 Social, recreational and economic benefits of environmental watering, Broken wetlands

Wetland	Beneficiary	Connection to the wetland	Value	How have these benefits been considered?
Black Swamp	• Birdwatchers • Photographers • Walkers • Hunters • Naturalists	• Connection with nature • Hunting can provide food.	• Environmental watering provides opportunities for walking, birdwatching and photography. • Hunting within the area benefits the local economy and recreation at Black Swamp.	• Environmental watering enables recreational activities such as birdwatching and photography. • The Goulburn Broken CMA uses social media, radio and local newspaper notices to expand its networks and find new audiences. • Black Swamp is a wildlife reserve, meaning hunting can occur in season, but the planned spring watering does not overlap with the 2025 hunting season.

Wetland	Beneficiary	Connection to the wetland	Value	How have these benefits been considered?
Kinnairds Wetland	• Local council • Birdwatchers • Photographers	• Local council-run activities at the wetland benefit locals and tourists.	• Environmental watering provides opportunities for walking, birdwatching and photography.	• Watering could result in more plants and animals, providing opportunities for naturalists and photographers.
Moodie Swamp	• Birdwatchers • Photographers • Walkers • Local landholders	• Connection with nature	• Environmental water provides a connection to Country for Traditional Owners and opportunities for walking, birdwatching and photography.	• Moodie Swamp is a wildlife reserve, meaning hunting can occur in season. • Local landholders are advocates for Moodie Swamp; the resident brolga and waterbirds (such as ibis) will at times move onto neighbouring properties to feed on pests and aerate the soil, with environmental benefits for landholders. • Environmental water delivery to Moodie Swamp is via the upper Broken Creek, which benefits the creek during delivery.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.5.7 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.5.7 Broken wetlands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Black Swamp (fill in spring)	• Promote the growth and improve the condition of Red Gum Swamp Ecological Vegetation Class (EVC) vegetation, including river swamp wallaby grass	**V1, V2, V4**
Kinnairds Wetland (fill in spring)	• Promote the growth and improve the condition of Red Gum Swamp EVC and Plains Grassy Wetland EVC vegetation, including ridged water-milfoil	**V1, V2, V3**
Moodie Swamp (partial fill in spring)	• Reduce weed growth and promote native vegetation establishment in the burnt area of the swamp	**V1, V2, V3**
Moodie Swamp (partial fill in autumn)	• Provide habitat for waterbirds to feed, roost and breed, particularly brolga • Provide habitat for Sloanes froglet to maintain its population at the site • Promote the growth and improve the condition of EVCs at the site, including ridged water-milfoil	**A1** **B1, B2** **V1, V2, V3**

Scenario planning

Table 5.5.8 outlines potential environmental watering and expected water use in a range of planning scenarios.

Black Swamp, Kinnairds Wetland and Moodie Swamp rely on a mix of wetting and drying cycles to support their environmental values. After several wet years that pushed the wetlands beyond their optimal wet-phase duration, all wetlands are currently dry. Provided they remain dry for a suitable period (6-12 months), they are planned to receive environmental water in 2025-26 in all planning scenarios.

Moodie Swamp has remained a favoured habitat for birds and other wildlife, including brolga and Sloanes froglet, which were observed in large numbers in 2024. In February 2025, a small fire burnt 15 ha of the swamp, so the Wetland Technical Reference Group recommended that the swamp be watered in spring to suppress weeds, promote the recovery of native vegetation and facilitate research contrasting the response of burnt and unburnt areas. However, an autumn fill to support waterbirds and frogs is a higher priority and is included in the dry, average and wet planning scenarios, with an additional spring fill in the average and wet scenarios. Both watering actions are contingent on sourcing water to complement the limited Broken entitlement, which is also used to meet demands in the Broken River and upper Broken Creek.

In contrast, Kinnairds Wetland and Black Swamp have a more secure supply from the Murray and Goulburn systems, respectively, allowing spring fills in all planning scenarios. Environmental water will help control weeds and promote native vegetation across the wetlands. Maintaining the current good cover of river swamp wallaby grass is a focus at Black Swamp, and ridged water-milfoil will be targeted at Kinnairds Wetland.

Table 5.5.8 Broken wetlands environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Catchment run-off and natural flow into the wetlands are highly unlikely	• Catchment run-off and natural flow into the wetlands are highly unlikely	• Some catchment run-off and natural flow into some of the wetlands are likely, particularly in winter/spring	• Catchment run-off and natural flow into the wetlands are likely to fill or partially fill the wetlands, particularly in winter/spring
Potential environmental watering – tier 1 (high priorities)[1]	• Black Swamp • Kinnairds Wetland			
Potential environmental watering – tier 2 (additional priorities)[2]	• N/A	• Moodie Swamp (partial fill in autumn)	• Moodie Swamp (partial fill in autumn) • Moodie Swamp (partial fill in spring)	
Possible volume of water for the environment required to achieve objectives	• 680 ML (tier 1) • N/A (tier 2)	• 680 ML (tier 1) • 500 ML (tier 2)	• 650 ML (tier 1) • 1,000 ML (tier 2)	• 440 ML (tier 1) • 500 ML (tier 2)
Priority carryover requirements for 2026-27	• N/A			

1 Tier 1 actions have assured supply as Black Swamp and Kinnairds Wetland draw on the Goulburn and Murray systems, respectively.

2 Moodie Swamp actions are tier 2 as they share limited allocations with the Broken River and upper Broken Creek and rely on sourcing additional water.

5.6 Campaspe system

Waterway manager – North Central Catchment Management Authority

Storage manager – Goulburn-Murray Water

Environmental water holders – Victorian Environmental Water Holder (including the Living Murray program) and the Commonwealth Environmental Water Holder

The Campaspe system includes the Campaspe and Coliban rivers.

5.6.1 Campaspe River

System overview

Natural inflows in the upper Campaspe River catchment are harvested into Lake Eppalock, located near the townships of Axedale and Heathcote. The main tributaries of the Campaspe River are the Coliban River, McIvor and Wild Duck creeks above Lake Eppalock and Mount Pleasant, Forest and Axe creeks below Lake Eppalock (Figure 5.6.1).

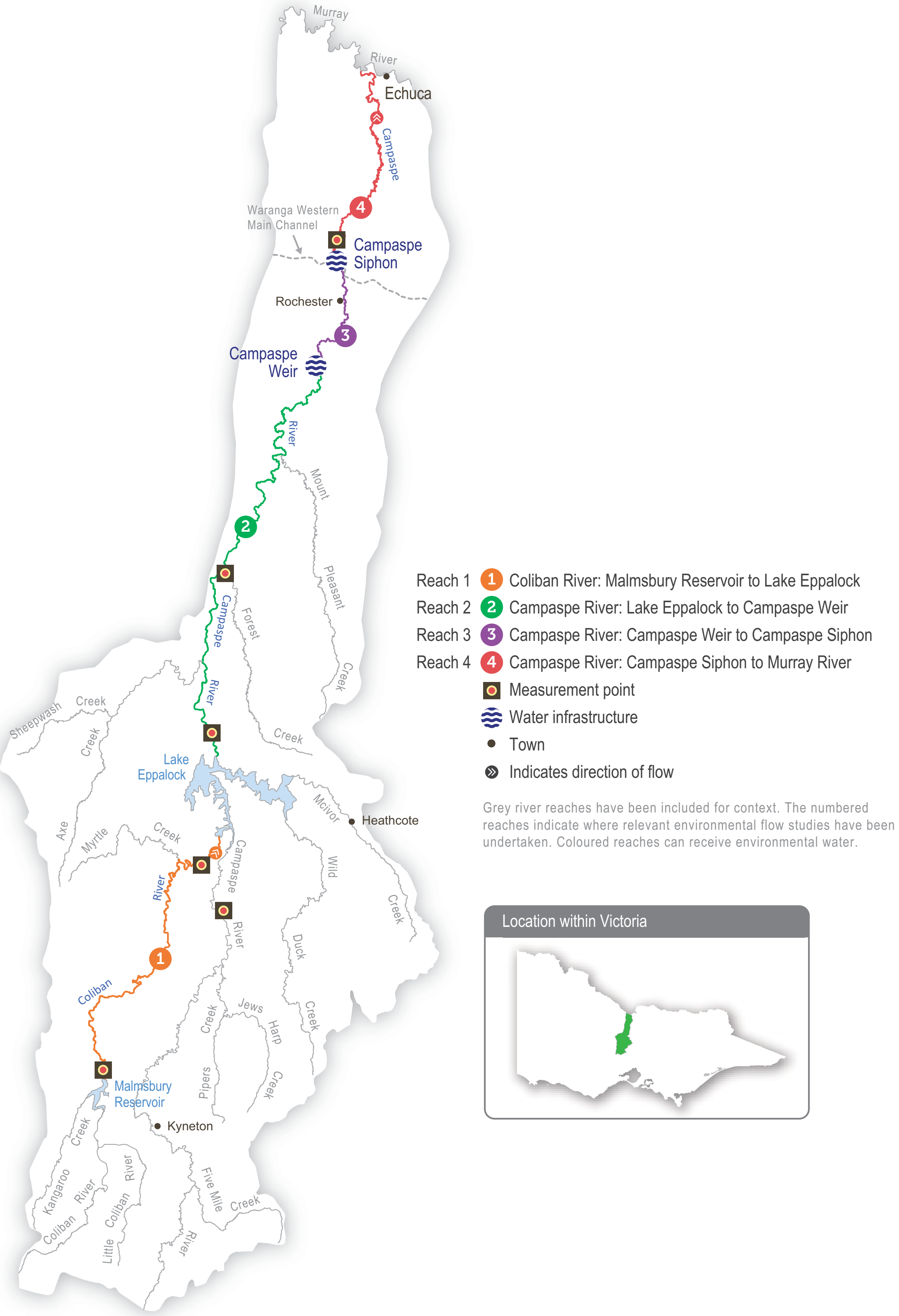
Below Lake Eppalock, the major in-stream structure is the Campaspe Weir, built to divert water to the Campaspe Irrigation District. It is no longer used for water diversion but is a barrier to fish migration. Gates on the weir provide some degree of control over the flow, but large flows spill over the weir. The Campaspe Siphon, just below Rochester, is part of the Waranga Western Channel, which carries water from the Goulburn system to western Victoria. Water can be released from the Waranga Western Channel into the lower reaches of the Campaspe River, or water can potentially be pumped from the river into the Waranga Western Channel. The siphon is another barrier to fish migration when there is low-to-moderate flow.

The flow below Lake Eppalock is influenced mainly by releases from storage and the operation of the Campaspe Weir and the Campaspe Siphon. The Campaspe's major tributary (the Coliban River) flows through the three Coliban Water storages (the Upper Coliban, Lauriston and Malmsbury reservoirs) before reaching Lake Eppalock. Water for the environment is held and released from Lake Eppalock, with some limited ability to regulate the flow further downstream at the Campaspe Weir.

Water for the environment is released from Lake Eppalock to support aquatic plants and animals in and along the Campaspe River. It can be supplemented by water for the environment delivered via the Waranga Western Channel at the Campaspe Siphon, which provides flexibility to meet environmental demands in reach 4. Water for the environment is primarily used in the Campaspe River to improve the magnitude and variability of flow during winter and spring, but it is also used to deliver a critical flow in summer and autumn that is not met or exceeded by operational deliveries. Primary flow measurement points are at Barnadown (reach 2) and below the Campaspe Siphon (reach 4).

Goulburn-Murray Water transfers operational water from Lake Eppalock or through the Waranga Western Channel to Murray River customers and downstream storages (such as Lake Victoria). These inter-valley transfers (IVTs) usually occur in summer and autumn and, depending on the rate of delivery, can either support or compromise environmental flow objectives. High IVT flows delivered when the Campaspe River would naturally have a low flow may reduce suitable habitat for juvenile fish, which rely on protected, shallow areas of water near the edge of the river channel. Sustained high IVT flows in summer can also drown recruiting streamside vegetation. Storage managers and the North Central CMA have worked cooperatively to increase the positive effects and reduce the harmful effects of IVTs on native plants and animals in the Campaspe River. For example, IVTs are sometimes delivered in a pattern that meets summer low-flow and fresh requirements, reducing demand on the environmental entitlement. IVTs have also been released in a pattern to support native fish migration from the Murray River into reach 4 of the Campaspe River without affecting delivery to downstream users.

Figure 5.6.1 The Campaspe system



Environmental values

The Campaspe River below Lake Eppalock provides important habitat for native fish species, including Murray cod, silver perch, golden perch, Murray-Darling rainbowfish and flathead gudgeon. Murray-Darling rainbowfish were presumed lost from the system during the Millennium Drought, but since 2011, they have been recorded at many sites on the Campaspe River and are now abundant below Elmore. In recent years, there have been trial reintroductions of river blackfish, catfish, trout cod and southern pygmy perch. Environmental flows help native fish migrate and disperse throughout the Campaspe system.

Platypus, rakali (water rats), turtles and frogs are also present along the length of the Campaspe River. The streamside vegetation zone is narrow and dominated by large, mature river red gum trees that support wildlife (such as the swift parrot and squirrel glider).

Environmental objectives in the Campaspe River

F1 – Protect and increase native fish populations

F2 – Facilitate the recolonisation of reintroduced native fish species (including trout, cod, blackfish and catfish)

G1 – Maintain substrate surfaces to support ecological processes

MI1 – Increase the diversity and biomass of waterbugs

PR1 – Protect the platypus population

V1 – Maintain adult river red gums and increase the recruitment of immature trees

V2 – Maintain the extent and increase the diversity of streamside vegetation

V3 – Increase the extent of in-stream aquatic plants

WQ1 – Maintain water quality in deep pools and prevent stratification

WQ2 – Reduce the risk of low-oxygen blackwater events in summer

Traditional Owner cultural values and uses

Djaara, Taungurung and Yorta Yorta Nation are the First Peoples of the Campaspe River and we acknowledge their rights to practice their culture and identity as Traditional Owners, to maintain their relationship with the river and natural resources on, or depending on, their land and to protect places and areas of importance on their land. Traditional Owners have rights as the primary guardians, keepers and knowledge-holders of Aboriginal cultural heritage and knowledge.

The North Central CMA has engaged with DJAARA, Taungurung and Yorta Yorta as part of the ongoing management of water for the environment in the Campaspe River and other north-central waterways. Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Table 5.6.1 shows Djaara and Taungurung Nations' values and uses in the Campaspe River and how these have been considered in developing the *2025-26 Campaspe Seasonal Watering Proposals*. More information for each Nation follows.

Dja Dja Wurrung Clans Aboriginal Corporation

The Campaspe system partly sits on the Country of the Djaara People, represented by the Dja Dja Wurrung Clans Aboriginal Corporation (DJAARA). DJAARA provided the following statement for the 2025-26 seasonal watering proposal and plan.

> "DJAARA have a unique opportunity, as the first owners of the land and water that includes Campaspe River, to apply ancient Djaara Cultural principles and management practices to the current water management context.
>
> "Empowering DJAARA to manage water in the catchment enables DJAARA to provide overarching guidance to holistically manage water to meet environmental, social and economic values.
>
> "Cultural values do not sit as another competing value and use of the water. Rather, Cultural values provide the lens for all values to be viewed through and met. If we are enhancing Cultural values, uses and practices in the Campaspe River, we are enabling environmental, social and economic values to be supported.
>
> "In November 2023, DJAARA launched its water strategy ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy***, setting a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.
>
> "Through implementation of the Dhelkunyangu Gatjin Strategy, facilitated by the Wanggal Partners Group, which has representation by the North Central CMA and water management agencies operating on Djaara *Djandak* (Country), the agencies continue to work to support DJAARA's increased engagement in planning and delivering of environmental water, including identifying opportunities for DJAARA to play a greater role in its management and administration and the transfer of environmental water entitlements to DJAARA."

DJAARA have expressed that the resources allocated to managing environmental water on *Djandak* do not include sufficient allowance to appropriately engage with Djaara members, for them to meaningfully articulate Cultural values and the Djaara Cultural lens, to establish watering objectives to guide environmental water management, nor for the review of the six seasonal watering proposals on *Djandak*. For the development of the 2025-26 seasonal watering proposals, DJAARA and the North Central CMA agreed to allocate DJAARA's limited resource allowance to developing a joint management approach that would embed DJAARA in the development process, trialling the approach for Birchs Creek and Coliban River.

The Djaara Nation Statement in the Victorian Government's 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and the ***Dhelkunya Dja Dja Dja Wurrung Country Plan 2014-2034*** also describe Djaara's objectives for managing *gatjin* (water) on *Djandak* (Country) and articulate Djaara's support for reinstating environmental flows as an overall management objective.

Table 5.6.1 summarises the aspirations and values of Kapa Gatjin, the Djaara water knowledge group, for the Campaspe River from previous years' engagement. Djaara emphasises that it is not possible to include all their cultural water aspirations, uses, values and places of cultural importance into one document. Djaara's values are diverse and complex and can widely differ between family and clan groups. Djaara's interests and beliefs are multifaceted and cannot be defined through a single standpoint or response.

Taungurung

Taungurung Land and Waters Council (TLaWC) staff have advised North Central CMA that they discussed the proposed watering actions with the TLaWC water knowledge group Baan Ganalina (Guardians of Water) in early 2025, in the context of earlier discussions between the North Central CMA and Baan Ganalina and ongoing biocultural monitoring and assessment activities at seven sites on the Campaspe River by TLaWC as part of its Reading Water Country program.

On 4 and 5 September 2019, the North Central CMA met with the Taungurung water knowledge group, Baan Ganalina, for a two-day field tour of the Campaspe River and a workshop to identify biocultural values and express Taungurung objectives for healing and caring for the Campaspe River in line with cultural obligations and priorities. In line with values and objectives identified by knowledge-holders during this process and building on the ecological and cultural assessment undertaken on the Campaspe in 2019 in collaboration with Dja Dja Wurrung, commencing in 2022, Biik crew members have monitored seven sites on the river monthly to maintain connection to Country and support the collection of biocultural knowledge. This information has been synthesised through ongoing collaborative discussions with Baan Ganalina to develop the cultural objectives presented in this section.

Baan Ganalina have highlighted the importance of native animals, including fish, frogs, platypus, waterbirds, mussels and crustaceans, and identified the importance of overstorey, mid-layer and aquatic vegetation in creating healthy habitat. The group has emphasised the principle of 'right way water' (right time, right place, right amount), to ensure flow is at varying and seasonally appropriate levels, and to emphasise the importance of reconnecting backwaters, maintaining water quality and preventing flows that might erode or damage cultural sites. Also, the group emphasised the need for ongoing involvement in water management decisions to allow for cultural values and objectives to be incorporated appropriately.

TLaWC has identified that this method of ongoing engagement is needed so that initial objectives in the cultural waterway assessment process can be built on over subsequent years through an iterative process of refinement in response to cultural directions and priorities. This requires regular assessments of the river and the necessary funding.

Table 5.6.1 responds to current priorities identified by Taungurung knowledge-holders in response to an assessment of the health of Country over the previous year and does not reflect a complete picture of Taungurung knowledge, values and objectives regarding the Campaspe River. Funding sources will need to be identified to enable Baan Ganalina and Biik crew members to monitor the ongoing health of Country. The North Central CMA continues to work with TLaWC and Baan Ganalina to support the assessment and monitoring of biocultural values on the Campaspe River.

Yorta Yorta First Nations People

The Yorta Yorta First Nations People's participation in environmental water planning and delivery is facilitated by the Yorta Yorta Nation Aboriginal Corporation (YYNAC). YYNAC has not provided specific cultural watering objectives or aspirations for the Campaspe River.

The North Central CMA remains committed to working with Yorta Yorta Nation to support the involvement and input of Yorta Yorta People to make sure environmental watering actions are culturally informed and able to support their aspirations for looking after Country.

Table 5.6.1 summarises Traditional Owner cultural values and uses considered when proposing watering actions.

Table 5.6.1 Traditional Owner cultural values and uses, Campaspe River

Traditional Owner group	Values & uses	What environmental watering aims to do
Kapa Gatjin and Baan Ganalina	• Protection of culturally significant sites (such as scar trees)	• Environmental water deliveries will include ramp-up and ramp-down rates at the lower end of the environmental flows recommendations to minimise the risk of erosion and bank slumping. • More work is required to locate and document cultural assets that may be affected by river flows.
Kapa Gatjin	Objectives • A Djaara-led environmental watering program and management plan that provides guidance for water for the environment, among other water entitlements and flows. • Overarching holistic monitoring and management of waterways and flows to optimise outcomes for the environment and other values, maximising the value delivered through the program.	• DJAARA is supported in performing monitoring and planning activities. • Activation of a DJAARA/ North Central CMA joint management approach to environmental water planning and delivery.
Baan Ganalina	• The flow regime reflects the principle of 'right way' water. • Environmental water deliveries should mimic natural flow regimes and respond to/top up the natural flow. • Backwaters are connected to maintain the health of the river.	• Water for the environment deliveries, where feasible, should be delivered consistent with antecedent conditions and seasonality, respecting natural cycles and the needs of Country. • Winter and spring flows should reflect the climatic conditions experienced at the time of delivery: lower in dry years and higher in average to above-average rainfall years. • Summer freshes and winter high-flow events should be delivered to coincide with forecast rainfall events, if possible.
Kapa Gatjin	• Promote the growth of traditional food, fibre, and medicine plants (such as water ribbons, water pepper and juncus).	• Water for the environment deliveries will include summer/ autumn freshes and a winter/spring high flow to wet riverbank margins to promote in-stream and fringing vegetation.

Traditional Owner group	Values & uses	What environmental watering aims to do
Baan Ganalina	• Maintain or improve the diversity and abundance of native vegetation species, assessed by their health and abundance, utilising indicator species such as water ribbon (food) and juncus (fibre) to assess the overall health of Country.	• Water for the environment deliveries will include summer/autumn freshes and a winter/spring high flow to wet riverbank margins to promote bank, in-stream and fringing vegetation.
Kapa Gatjin	• Improve vegetation and prevent the encroachment of terrestrial weeds.	• A winter/spring high flow to prevent terrestrial vegetation from establishing on the lower banks.
Kapa Gatjin and Baan Ganalina	• Healthy water, improved water quality.	• Delivery of the recommended flow regime will help improve water quality. • Delivery of a winter/spring high flow will reduce the risk of blackwater events in summer.
Kapa Gatjin and Baan Ganalina	• Improve native fish populations.	• Water for the environment deliveries will protect and improve native fish populations (such as summer/autumn freshes for large-bodied fish movement and steady spring flows to prevent Murray cod abandoning their nests).
Baan Ganalina and Kapa Gatjin	• Maintain and improve platypus populations.	• Connect low flow for platypus movement. • A fresh in April reduces predation during juvenile dispersal. • A winter/spring low flow allows long-distance male platypus movement during the breeding season, and the timing of a spring high flow prevents burrows from being inundation during the breeding season.

Social, recreational and economic values and uses

The Campaspe River provides a diverse range of social, recreational and economic values, which **Table 5.6.2** shows. Recreation and tourism activities include camping, fishing, water sports, birdwatching and duck hunting. These activities directly benefit the local economy as well as economies in the wider region. A shared benefit identified during the 2016-2024 Victoria Environmental Flow Monitoring and Assessment program is the increased abundance of native fish in the Campaspe River, including fish breeding events. This is an ecological benefit that also satisfies social, recreational, economic and cultural objectives.

Although not explicitly measured, the river is also likely to provide indirect economic benefits through ecosystem services (such as groundwater recharge and carbon storage). The delivery of environmental water aims to support these shared economic, social and cultural benefits as long as they do not compromise the environmental objectives of watering or impose extra demands on the Environmental Water Reserve: that is, require additional environmental water.

In planning the potential environmental watering actions in **Table 5.6.3**, the North Central CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, kayaking, fishing and water sports)
- riverside recreation and amenity (such as birdwatching, bushwalking, camping, cycling, duck hunting and picnicking)
- community events and tourism (such as visitors travelling to canoe and kayak on the river)
- socioeconomic benefits (such as diversions for irrigation, domestic and stock uses; local and regional economic benefits from increased visitation; ecosystem services [such as carbon storage, groundwater recharge and water quality regulation]; lower salinity management costs, lower blackwater and blue-green algae risks for landholders; and contributions to community enjoyment, health and recuperation).

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 5.6.3** by an icon, as pictured below and also explained in **Figure 1.2.3**. For example, there are many places along the Campaspe River where visitors like to camp. Aysons Reserve is a popular camping site near Elmore, and it draws hundreds of campers during school holiday periods. Where possible, freshes are delivered outside of peak visitation periods (such as the March and April long weekends) to ensure the flow is not too high for campers and water-related activities.

Watering planned to support peaks in visitation (e.g. camping or other public activities on long weekends or school holidays)

Table 5.6.2 shows the social, recreational and economic benefits of the Campaspe system environmental watering.

Table 5.6.2 Social, recreational and economic benefits of environmental watering, Campaspe system

Waterway	Beneficiary	Connection to the river	Values & uses	How have these benefits been considered
Campaspe River	• VRFish • Recreational fishers	• Anglers have a close connection to the river and an interest in maintaining its health.	• Flows associated with the movement or dispersal of fish benefit recreational fishers by encouraging fish to move through the system to promote healthy fish populations, providing recreational opportunities for anglers.	• Summer/autumn low flow and freshes • Winter/spring low flow and high flow

Waterway	Beneficiary	Connection to the river	Values & uses	How have these benefits been considered
(continued) **Campaspe River**	• Domestic, stock and agricultural diverters • Recreational users • Traditional Owners	• Diverters along the river rely on environmental water deliveries to ensure they have usable water for household and agricultural business uses and that the river can support recreational activities.	• Many potential watering actions target water quality. • Low flow and freshes improve water quality for diverters to benefit their households.	• Summer/autumn low flow and freshes in reach 4 help provide diverters with lower-salinity water. • Winter/spring high flows reduce the risk of toxic blackwater in summer, which unregulated and operational flows can trigger.
Campaspe River reaches 3 & 4	• Powered and unpowered boat users	• Rochester Weir (reach 3) and the Campaspe Weir Pool (reach 2) are popular locations for water-based recreational uses, including fishing and boating. • Environmental flows help maintain water quality and water levels within the weirs and promote a healthy riverine environment.	• Water for the environment improves water quality for canoeing, a popular recreational activity along the river.	• Summer/autumn low flow and freshes • Winter/spring low and high flow
Campaspe River reach 2	• Unpowered boating	• Canoers have a close connection to the river and an interest in maintaining its health and the provision of water for recreation.	• Canoeing and kayaking are popular recreational activities along the river, particularly at Rocky Crossing (reach 2). • Kayakers are notified of high river flows and schedule kayaking trips on the high flows.	• Winter/spring low flow and freshes

Waterway	Beneficiary	Connection to the river	Values & uses	How have these benefits been considered
Campaspe River reaches 2-4	• Campers	• Campers have a close connection to the river and an interest in maintaining its health and aesthetic values.	• People can camp at many places along the Campaspe. • Aysons Reserve is a popular camping site near Elmore that draws hundreds of campers over the Christmas school holiday period. • Other recreational activity sites include Doaks Reserve, Runnymede Nature Reserve, Bryant's Lane and Spencer Road Reserve. • Campers are drawn to healthy, flowing waterways with good water quality.	• All potential watering actions
	• Passive and active recreation	• Bushwalkers and cyclists have a close connection to the river and an interest in maintaining its health and aesthetic values.	• Many local councils provide picnic facilities and walking and cycling tracks that provide recreation opportunities. The river is integral to these opportunities and contributes to the wellbeing of the community and visitors and to the local economy.	• All potential watering actions

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.6.3 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.6.3 Campaspe River potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Campaspe River (targeting reach 4)		
Winter/spring low flow (50-200 ML/ day during June to November)	• Maintain longitudinal connectivity to allow native fish to disperse within reaches • Provide foraging opportunities across a wide range of habitats for female platypus to develop fat reserves before breeding • Maintain water quality by preventing pools from stratifying • Discourage terrestrial plants from colonising the lower sections of the riverbank and low benches in the channel • Maintain in-stream aquatic vegetation • Maintain soil moisture in the riverbank to water established river red gums and woody shrubs • Provide a variety and large abundance of habitats for high waterbug productivity, supporting food webs A greater-volume flow will: • help establish littoral vegetation • facilitate long-distance movement by male platypus, especially in the August to October breeding season • facilitate greater movement of large-bodied native fish	F1 MI1 PR1 V1, V2 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Winter/spring fresh(es) (one to two freshes of 1,000-1,600 ML/day for two to seven days during July to November)	• Enable plants growing on the water's edge to become established low on the bank and limit colonisation by terrestrial plant species • Provide sufficient velocity to scour accumulated sediment from pools and scour biofilms • Promote the local movement of adult fish to access alternative habitats and trigger migration from the Murray River • Flush accumulated leaf litter from the banks and low benches to reduce the risk of blackwater events during high river flow in summer • Maintain soil moisture for established river red gum and woody shrubs (such as bottlebrush and tea tree) • Maintain connectivity to allow native fish to move and access new habitat • Encourage female platypus to select nesting burrows higher up the bank to reduce the risk of a high flow later in the year flooding burrows when juveniles are present • Redistribute fine sand on benches and bars in the river channel • Scoured aged biofilms from hard surfaces, including submerged wood	F1, F2 G1 MI1 PR1 V1, V2 WQ2
Summer/autumn low flow (50-60 ML/ day[1] at the Campaspe Siphon during December to May)	• Maintain slackwater habitats for zooplankton and nursery habitats for native fish • Maintain the water depth and prevent stratification in deep pools in summer to maintain habitat for native fish and platypus • Help establish in-stream and littoral vegetation • Inundate a variety of habitats to facilitate the growth of biofilms and support waterbug productivity • Allow platypus to move between pools safely while foraging, and ensure there is adequate food for lactating females Reducing flow to 20 ML/day in reaches 2 and 3 in autumn will expose mudflats and encourage the recruitment of some fringing vegetation	F1 MI1 PR1 V2, V3 WQ2

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn freshes (three freshes of 100-200 ML/day for two to four days during December to May)	• Promote the germination, growth and survival of fringing emergent aquatic plants, including phragmites, reeds and sedges, by inundating the lower banks and low benches to wet the soil • Promote the local movement of adult fish to access alternative habitats and trigger migration from the Murray River • Increase longitudinal connectivity to allow native fish to access new habitats • Wet submerged wood and flush fine silt and old biofilms to promote new biofilm growth and increase waterbug productivity for native fish and platypus • Facilitate the downstream dispersal of juvenile platypus in April/May to colonise other habitat areas	F1 G1 MI1 PR1 V2 WQ1
Year-round fresh (trigger-based, 50-300 ML/day as required) *Triggers:* • *oxygen level below 5 mg/L* • *low or cease-to-flow river conditions* • *high water temperatures*	• Destratify pools and improve water quality (increase oxygen levels) along the river in reach 4, ensuring there is adequate oxygen to support aquatic animals (such as native fish and platypus)	WQ1

1 The reach 4 flow will target 50-60 ML per day. However, reducing the flow to 20-30 ML per day at reaches 2 and 3 may be considered in autumn to expose the river's mudflats and promote native vegetation recruitment. To achieve these two flow rate targets, water for the environment from the Goulburn River would be delivered to reach 4 at the Campaspe Siphon via the Waranga Western Main Channel.

Scenario planning

Table 5.6.4 outlines potential environmental watering and expected water use in a range of planning scenarios.

Flood events in 2022 and 2024 affected the condition of the Campaspe River. The upper banks and tops of banks benefitted from the higher flows by removing terrestrial and agricultural vegetation. However, the frequent and prolonged inundation reduced the diversity and abundance of many streamside and littoral vegetation species on the lower section of the bank and reduced in-stream vegetation biomass. Although the floods were a natural disturbance event for the river, the benefits of previous years of environmental watering built system resilience to help the river rebound quickly.

The environmental water supply outlook for 2025-26 is expected to be high in all planning scenarios, so all planned environmental watering actions are likely to be delivered at magnitudes to improve the composition and condition of native plants growing on the water's edge and help continue the recovery from the 2022 and 2024 flood damage. Some tier 1 watering actions have been proposed at higher magnitudes and/or durations under tier 2 to increase environmental benefits, but the decision to target these relies on additional water becoming available. The trigger-based, year-round fresh is also planned as a tier 2 action. Delivering this action is typically required at short notice in response to water quality triggers in reach 4. Delivering this action at short notice relies on the availability of water for the environment from the Goulburn River to be delivered to reach 4 at the Campaspe Siphon via the Waranga Western Main Channel.

Planned watering actions for the Campaspe River aim to meet low-flow targets throughout the year and to deliver a mix of small- and medium-sized freshes in all planning scenarios. In the drought and dry planning scenarios, freshes and the winter/spring low flow will likely be delivered at the lower end of the target magnitude and duration ranges, in line with climatic conditions. Some watering actions will likely be achieved naturally in the average and wet planning scenarios. This means that water for the environment can be used to deliver freshes and a winter/spring low flow at the higher end of their recommended magnitudes to help increase populations of platypus, native fish and native plants and improve the condition of individuals. The North Central CMA will monitor water levels and quality throughout the year and deliver trigger-based freshes in any planning scenario, if needed to improve poor water quality.

In all planning scenarios, the flow may be lowered to about 20 ML per day in reaches 2 and 3 in autumn to encourage the recruitment of fringing plants on exposed mudflats. This would be a joint initiative between the North Central CMA and Arthur Rylah Institute vegetation ecologists, and it will be supported by dedicated monitoring if it proceeds. Lowering the flow in reach 4 may pose a risk to water quality, so the watering trial will only proceed if sufficient water can be delivered from the Western Waranga Channel to supplement the flow downstream of the Campaspe Siphon.

The carryover target of 6,000 ML in the drought and dry planning scenarios is based on the volume required to deliver a priority summer/autumn low flow during 2026-27 if there is a continuation of dry or drought conditions. No carryover targets are set for the average/wet planning scenario, as early-season allocations in 2026-27 will likely be sufficient to meet summer/autumn low-flow environmental flow demands.

Table 5.6.4 Campaspe River environmental watering planning scenarios

Planning scenario	Drought	Dry	Average/wet
Expected conditions	• Little to no natural flow from tributaries and local run-off • Low passing flow • Operational water deliveries	• Some natural flow from tributaries and local run-off • Increased passing flow • Operational water deliveries	• Moderate-to-high natural flow from tributaries and local run-off • Increased passing flow • Operational water deliveries • An expected spill of Eppalock Reservoir
Expected availability of water for the environment	• 35,000 ML	• 35,000 ML	• 27,500 ML
Campaspe River (targeting reach 4)			
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow (lower magnitude) • Winter/spring fresh (one lower-magnitude, lower-duration fresh) • Summer/autumn low flow • Summer/autumn freshes (three lower-magnitude, lower-duration freshes)	• Winter/spring low flow (lower magnitude) • Winter/spring fresh (one lower-magnitude, lower-duration fresh) • Summer/autumn low flow • Summer/autumn freshes (three lower-magnitude, lower-duration freshes)	• Winter/spring low flow (up to full magnitude) • Winter/spring fresh(es) (one to two freshes[1]) • Summer/autumn low flow • Summer/autumn freshes (three freshes up to full magnitude)

Planning scenario	Drought	Dry	Average/wet
Potential environmental watering – tier 2 (additional priorities)	• Year-round fresh (if required) • Winter/spring low flow (higher magnitude) • Winter/spring fresh (higher magnitude) • Summer/autumn freshes (tier 1 freshes at full magnitude)	• Year-round fresh (if required) • Winter/spring low flow (higher magnitude) • Winter/spring fresh (full magnitude and duration)	• Year-round fresh (if required) • Winter/spring fresh(es) (full duration)
Possible volume of water for the environment required to achieve objectives	• 29,000 ML (tier 1) • 1,200 ML (tier 1 Goulburn)[2] • 12,500 ML (tier 2)	• 29,000 ML (tier 1) • 1,200 ML (tier 1 Goulburn)[2] • 18,200 ML (tier 2)	• 27,500 ML (tier 1) • 1,200 ML (tier 1 Goulburn)[2] • 10,000 ML (tier 2)
Priority carryover requirements for 2026-27	• 6,000 ML	• 6,000 ML	• N/A

1 A second winter/spring fresh may be delivered in average and wet conditions to further improve streamside vegetation by wetting riverbanks, support fish movement and clear accumulated leaf litter to reduce the risk of blackwater events during the summer high flow.

2 The possible volume of water required from the Goulburn River could increase to 4,700 ML if it is more effective to source water from Waranga Western Main Channel to deliver a year-round fresh to reach 4 at the Campaspe Siphon, subject to water availability.

5.6.2 Coliban River

System overview

The Coliban River is the major tributary of the Campaspe River and flows into Lake Eppalock. It is highly regulated, with three storages harvesting water primarily for urban use (Figure 5.6.1).

The operation of the Malmsbury, Lauriston and Upper Coliban reservoirs regulates the flow in the Coliban River below Malmsbury Reservoir. An important distinction between the Coliban River and other regulated Victorian systems is the lack of irrigation demand that may be met by managed releases downstream of system storages. Flow in the river is influenced by the passing flow entitlement, which depends on catchment inflows and major flood events in the catchment.

The VEWH does not have any environmental entitlements in the Coliban system, but the passing flow can be managed — for example, it can be accumulated and released when most needed — to help reduce some risks associated with a critically low summer/autumn flow, including low oxygen levels in the river between Malmsbury Reservoir and Lake Eppalock. A small volume of Commonwealth water for the environment is held in the system, which has not been delivered in the past. The North Central CMA has had ongoing conversations with program partners about the entitlement and the potential to use it in the future.

Environmental values

The Coliban River provides habitat for platypus, rakali (water rats) and small-bodied native fish (such as flathead gudgeon and mountain galaxias). The Coliban River also contains a diverse range of waterbugs supported by stands of emergent and submergent aquatic vegetation. It is bordered by remnant patches of streambank shrubland vegetation and woodland containing river red gum, callistemon, woolly tea tree and inland wirilda, which provide habitat for terrestrial animals.

Environmental objectives in the Coliban River

F1 – Maintain the abundance and diversity of small-bodied native fish
MI1 – Maintain an adequate diversity and biomass of waterbugs to break down dead organic matter and supply the river's food chain
PR1 – Maintain the platypus population
V1 – Maintain the cover and diversity of aquatic plants **V2** – Maintain the cover and diversity of fringing vegetation while limiting encroachment into the middle of the channel **V3** – Maintain streamside woody vegetation and facilitate recruitment
WQ1 – Maintain water quality to support aquatic life and ecological processes

Traditional Owner cultural values and uses

The Coliban River system is on the Country of the Djaara people, represented by the Dja Dja Wurrung Clans Aboriginal Corporation (DJAARA).

DJAARA provided the following statement for the 2025-26 seasonal watering proposals and plan.

> "DJAARA have a unique opportunity, as the first owners of the land and water that includes the Coliban River, to apply ancient Djaara Cultural principles and management practices to the current water management context.
>
> "Empowering DJAARA to manage water in the catchment enables DJAARA to provide overarching guidance to holistically manage water to meet environmental, social and economic values.
>
> "Cultural values do not sit as another competing value and use of the water. Rather, Cultural values provide the lens for all values to be viewed through and met. If we are enhancing Cultural values, uses and practices in the Coliban River, we are enabling environmental, social and economic values to be supported.
>
> "In November 2023, DJAARA launched its water strategy ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy***, setting a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.
>
> "Through implementation of the Dhelkunyangu Gatjin Strategy, facilitated by the Wanggal Partners Group, which has representation by the North Central CMA and water management agencies operating on Djaara *Djandak* (Country), the agencies continue to work to support DJAARA's increased engagement in planning and delivering environmental water, including identifying opportunities for DJAARA to play a greater role in its management and administration and the transfer of environmental water entitlements to DJAARA."

DJAARA have expressed that the resources allocated to managing environmental water on *Djandak* do not include sufficient allowance to appropriately engage with Djaara members, for them to meaningfully articulate Cultural values and the Djaara Cultural lens, to establish watering objectives to guide environmental water management, nor for the review of the six seasonal watering proposals on *Djandak*. For the development of the 2025-26 seasonal watering proposals, DJAARA and the North Central CMA agreed to allocate DJAARA's limited resource allowance to developing a joint management approach that would embed DJAARA in the development process, trialling the approach for Birchs Creek and Coliban River.

The Djaara Nation Statement in the Victorian Government's 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and the ***Dhelkunya Dja Dja Dja Wurrung Country Plan 2014-2034*** also describe Djaara's objectives for managing *gatjin* (water) on *Djandak* (Country) and articulate Djaara's support for reinstating environmental flows as an overall management objective.

The Dhelkunyangu Gatjin Strategy's aim is DJAARA ownership and management of environmental water. Kapa Gatjin, the Djaara water knowledge group, and the North Central CMA have together identified sites where water for the environment can support Djaara's aspirations for the Coliban River, and they have identified opportunities for DJAARA to be more involved in managing and administering environmental water. This has prompted ongoing conversations over the past 12 months with DJAARA about environmental water in the Coliban and other North Central CMA waterways. In recent years, DJAARA has completed several Aboriginal Waterways Assessments in the upper and lower catchments of the Coliban River.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.6.6**, the North Central CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as swimming, canoeing, and fishing)
- riverside recreation and amenity (such as socialising, relaxing, birdwatching, bushwalking, camping, and cycling)
- socioeconomic benefits, including tourism to Malmsbury, diversions for domestic and stock uses, benefits to the local and regional economies from recreational activities, ecosystem services (such as carbon storage, groundwater recharge and water quality regulation), lower salinity costs and blackwater and blue-green algae risks for landholders and contributions to community enjoyment, health, and recuperation.

Table 5.6.5 shows the social, recreational and economic benefits of Coliban River environmental watering.

Table 5.6.5 Social, recreational and economic benefits of environmental watering, Coliban River

Beneficiary	Connection to the river	Values & uses	How have these benefits been considered
Recreational fishers	• Anglers have a close connection to the river and an interest in maintaining its health.	• Flows associated with the movement or dispersal of fish encourage them to move through the system, promoting healthy fish populations and providing recreational fishing opportunities.	• Summer low flow and freshes • Winter low flow and high flow
Stock and domestic licence holders	• Stock and domestic diverters along the Coliban River rely on unregulated and passing flows for their households, as there is no specific stock and domestic entitlement.	• Many potential watering actions target water quality. • Low flow and freshes improve water quality for diverters when the river has no natural flow.	• Summer low flow and freshes • Winter low flow and high flow
Unpowered boat users	• Canoers have a close connection to the river and an interest in maintaining its health and the provision of water for recreation.	• Water for the environment provides river flow and improved water quality for canoeing, a popular recreational activity on the river.	• Summer low flow and freshes, winter low and high flow
Campers	• Campers have a close connection to the river and an interest in maintaining its health and aesthetic values.	• There are many places along the Coliban where visitors can camp and enjoy a healthy river environment.	• All potential watering actions
Bushwalkers and cyclists	• Bushwalkers and cyclists have a close connection to the river and an interest in maintaining its health and aesthetic values.	• There are walking and cycling tracks on Malmsbury Common, a popular site for active and passive recreation, with the river a key feature that contributes to the wellbeing of the community and visitors and to the local economy.	• All potential watering actions

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.6.6 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.6.6 Coliban River potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Coliban River (targeting reach 1)		
Winter/spring low flow (2-15 ML/day during June to November)	• Increase wet areas for native aquatic and streamside plants while limiting terrestrial species encroaching on the river channel • Increase flow to mix water in pools to prevent stagnation and a decline in water quality • Increase the channel area for habitat for waterbugs At 7-10 ML/day: • maintain a connected river that allows small-bodied native fish and platypus to disperse throughout the reach	F1, MI1, PR1, V1, V2, WQ1
Winter/spring fresh (one fresh of 25-160 ML/day for three to five days during July to September)	• Increase the water depth through riffle-run habitats to 8-20 cm for a 25-50 ML/day event to increase the wetted river perimeter to increase habitat for waterbugs • Increase the water depth through riffle-run habitats to 45-60 cm for a 160 ML/day event to: – disperse native fish throughout the river and colonise sites – encourage female platypus to select a nesting burrow higher up the bank to reduce the risk of a greater flow later in the year flooding the burrow when juveniles are present – increase the wetted river perimeter for fringing and edge vegetation – clear sediment and biofilms from hard substrates in the bottom of the channel to increase productivity	F1, MI1, PR1, V1, V2

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow (2-10 ML/day during December to May)	• Wet the channel to maintain in-stream aquatic and fringing vegetation • Maintain aquatic habitat that supports waterbugs, native fish and platypus • Maintain water quality, including oxygen levels At 7-10 ML/day: • maintain up to 6 cm water depth between pools for native fish movement, and to maintain pool depths	**F1** **MI1** **PR1** **V1, V2** **WQ1**
Summer/autumn fresh(es) (one to two freshes of 25-160 ML/day for three to five days during December to May)	• Increase the water depth through riffle-run habitats to 8-20 cm for a 25-50 ML/day event to maintain water quality and habitat for waterbugs • Increase the water depth through riffle-run habitats to 45-60 cm for a 160 ML/day event to: – facilitate the movement of fish and platypus – clean sediment and biofilms from river substrates – wet the benches and low banks to promote the growth and recruitment of fringing vegetation	**F1** **MI1** **PR1** **V1, V2, V3** **WQ1**
Pulsed summer/autumn low flow (5-15 ML/day for up to 14 days during December to May, trigger-based) *Triggers:* • *oxygen level below 5 mg/L* • *low or cease-to-flow river conditions* • *high water temperatures*	• Improve water quality, including oxygen levels • Maintain refuge habitat for aquatic animals, including fish and platypus	**F1** **PR1** **WQ1**

Scenario planning

Table 5.6.7 outlines potential environmental watering and expected water use in a range of planning scenarios.

The potential environmental flows required for the Coliban River include a low flow and freshes in all planning scenarios, but the magnitude of particular flows and the number and duration of freshes that can be delivered vary between planning scenarios due to available supply and the expected contribution of the natural flow in the system. If supply is limited, a low flow will be delivered at the lower end of the recommended magnitude to maintain some connecting flow for a more extended period. Freshes will be delivered where possible to facilitate the dispersal of platypus and fish and clean biofilms from in-stream surfaces.

In all planning scenarios, the highest-priority potential watering action in the Coliban River is the summer/autumn low flow to maintain sufficient habitat for native fish, platypus and waterbugs. Natural baseflow and tributary inputs help to maintain some flow through the Coliban River during winter and spring each year, but long sections of the river contract to a series of pools or completely dry during late summer and autumn, especially in dry and drought years. Deliveries of water for the environment in summer and autumn help to maintain water quality, especially when oxygen levels are low. They also maintain the depth of pools in the upper reaches to help sustain populations of native fish and platypus.

In 2024-25, the passing flow released from Malmsbury Reservoir was managed at a flow rate close to 4 ML per day during winter, increasing to 8-10 ML per day in spring and returning to a rate of 4 ML per day during summer to maintain a continuous low flow and allow the remaining water to accrue and be used to deliver a summer/autumn fresh in late April/early May 2025. Providing Malmsbury Reservoir does not spill over winter/spring 2025, any remaining water carried over from 2024-25 will be used to help maintain a continuous low flow in all planning scenarios in 2025-26. If a continuous flow cannot be maintained, shorter, pulsed flows may be delivered to maintain pool habitats for native fish and platypus. These trigger-based pulses will most likely be needed in the dry planning scenario, but they may also be needed in the wetter planning scenarios if there is insufficient supply to deliver a continuous low flow in late summer or early autumn. Where possible, summer and autumn freshes will be delivered to facilitate the movement of fish and platypus and support fringing vegetation. These freshes will aim to be delivered in March or April to support the dispersal of juvenile platypus.

An aspirational carryover target of 720 ML has been set for all planning scenarios to supply high-potential summer and autumn low flow in 2026-27. This target is unlikely to be achieved in most years due to the limited availability of water for the environment in the Coliban system and yearly variations in climatic conditions. The carryover target will be revised throughout the year based on climatic forecasts, the risk of spills and the extent to which priority actions for 2025-26 have been met. For example, if forecasts indicate a high likelihood of dry conditions in 2026-27, setting aside supply for carryover might become a higher priority than delivering a second summer/autumn fresh in 2025-26. Alternatively, if Malmsbury Reservoir is predicted to spill, delivering at least one summer/autumn fresh in 2025-26 will be a higher priority than achieving the full 720 ML carryover target.

Table 5.6.7 Coliban River environmental watering planning scenarios

Planning scenario	Drought	Dry	Average to wet
Expected conditions	• Little to no natural flow	• Some natural flow	• Extended periods of natural flow, including some high-flow events and reservoir spills
Expected availability of water for the environment	• 1,477 ML	• 1,698 ML	• 2,648 ML
Coliban River (targeting reach 1)			
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow (lower magnitude) • Summer/autumn low flow (lower magnitude) • Summer/autumn fresh (one lower-magnitude fresh)	• Winter/spring low flow (lower magnitude) • Summer/autumn low flow • Summer/autumn fresh (one lower-magnitude fresh)	• Winter/spring low flow (lower magnitude) • Summer/autumn low flow • Summer/autumn fresh(es) (one to two lower-magnitude fresh[es]) • Pulsed summer/autumn low flow (trigger-based)
Potential environmental watering – tier 2 (additional priorities)	• Pulsed summer/autumn low flow (trigger-based)	• Pulsed summer/autumn low flow (trigger-based)	• Winter/spring fresh • Summer/autumn fresh (one tier 1 fresh at increased magnitude) • Winter/spring low flow (greater magnitude for 30 days)
Possible volume of water for the environment required to achieve objectives	• 1,458 ML (tier 1) • 210 ML (tier 2)	• 1,690 ML (tier 1) • 210 ML (tier 2)	• 2,052 ML (tier 1) • 1,864 ML (tier 2)
Priority carryover requirements for 2026-27	• 0-720 ML		

5.7 Loddon system

Waterway manager – North Central Catchment Management Authority

Storage manager – Goulburn-Murray Water

Environmental water holders – Victorian Environmental Water Holder and the Commonwealth Environmental Water Holder

The Loddon system includes the Loddon River system (including Serpentine and Pyramid creeks), the Boort wetlands and Birchs Creek subsystems.

5.7.1 Loddon River system (including Serpentine and Pyramid creeks)

System overview

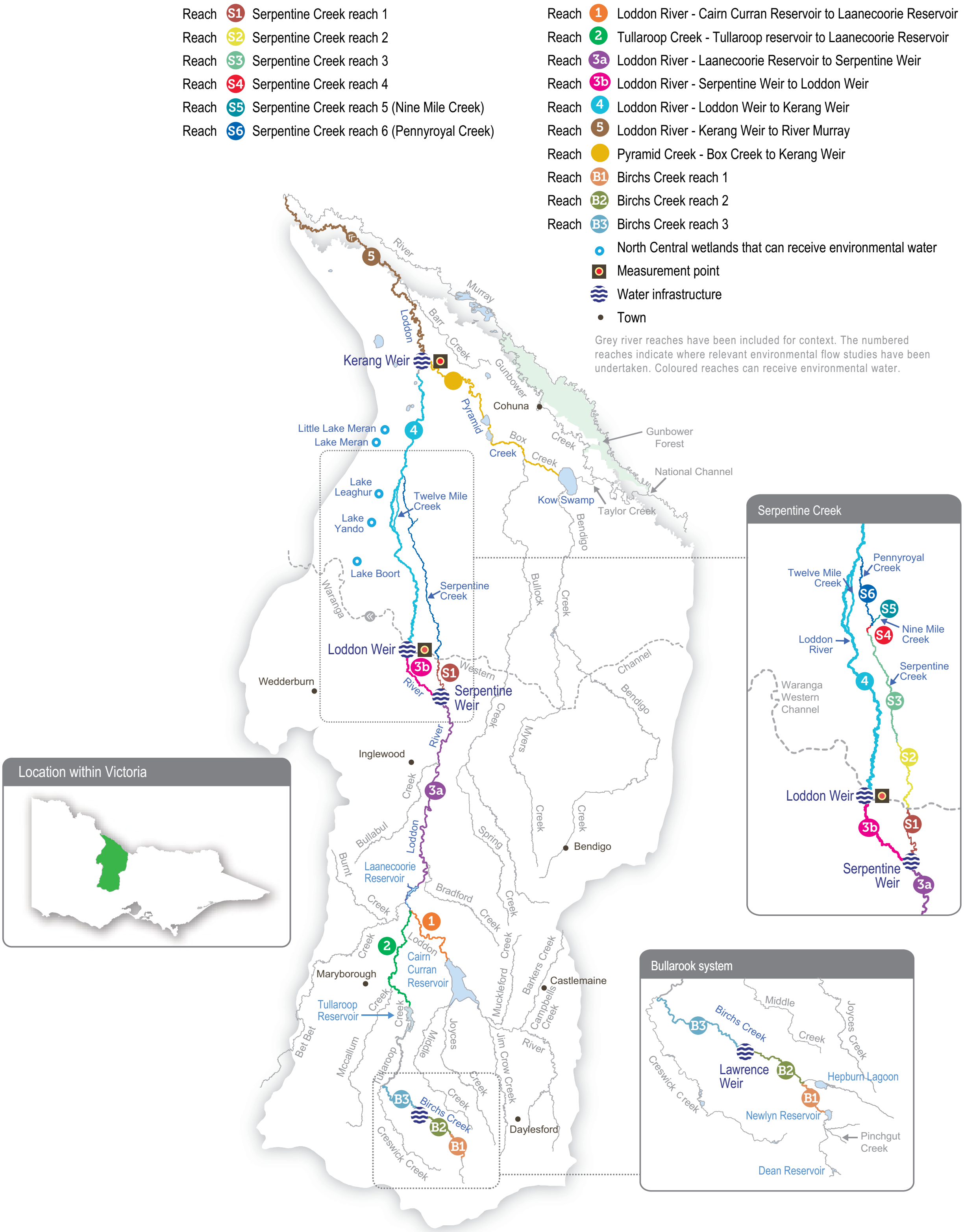
The Loddon River flows from the Great Dividing Range in the south to the Murray River in the north (Figure 5.7.1). The middle section of the Loddon River is characterised by many distributary streams and anabranches that carry water away from the river onto the floodplain. Pyramid Creek joins the lower Loddon River at Kerang, at which point the Loddon becomes part of the Murray River floodplain.

The two main storages on the Loddon River are Cairn Curran Reservoir and Tullaroop Reservoir. Laanecoorie Reservoir is a smaller storage used to regulate water released from the larger upstream storages. The operation of the Bridgewater, Serpentine, Loddon and Kerang weirs regulates the Loddon River's flow downstream of Laanecoorie Reservoir.

Water for the environment can be delivered to the Loddon River from Cairn Curran or Tullaroop reservoirs or from the Goulburn system via the Waranga Western Channel, which intersects with the Loddon River at Loddon Weir. Water is provided to Pyramid Creek through releases from Kow (Ghow) Swamp, which receives water diverted from the Murray River at Torrumbarry Weir. Water is diverted from the Loddon River to the Loddon Valley Irrigation Area to supply agriculture and to Serpentine Creek to support environmental values and supply agriculture.

The highly regulated nature of the Loddon system provides challenges and opportunities for the effective management of water for the environment. The ability to manipulate the timing of releases at multiple locations can help achieve environmental outcomes at discrete locations. However, coordinating environmental and consumptive flows is difficult through the irrigation season, especially when irrigation demand is high or the flow in the river is highly variable. These issues can constrain the timing and delivery of water for the environment or lead to a flow that exceeds the recommended flow rates above Loddon Weir. The structures for managing irrigation water also form barriers in the waterway that restrict native fish movement throughout the river and make it difficult to meet environmental objectives.

Figure 5.7.1 Loddon River system



Environmental values

The Loddon River system supports platypus, rakali (water rats) and several native fish species (such as Murray cod, golden perch, silver perch, river blackfish and Murray-Darling rainbowfish). Streamside vegetation varies in condition depending on the recent water regime, the extent of clearing and historic and current land management practices. The remaining relatively intact areas support various woodland birds and other native animals. Important plant species across the system include cane grass, tangled lignum, black box and river red gum.

Although fish populations in the Loddon system are affected by the many barriers caused by weirs and reservoirs, many species are still found throughout the catchment. Native fish are most abundant and diverse in the upper catchment. River blackfish are found in Serpentine Creek, and Murray-Darling rainbowfish are found in the middle and lower sections of the Loddon River.

The highest-priority reach for water for the environment is from Loddon Weir to Kerang Weir. The reach does not carry irrigation water and relies heavily on environmental flows to maintain its environmental condition. Environmental flows to this reach aim to maintain water quality, increase the abundance and diversity of native fish and improve the condition of in-stream and streamside vegetation. Environmental flows are delivered to the upper Loddon River and Serpentine Creek to maintain or increase river blackfish and platypus populations.

Pyramid Creek and the lower Loddon River support large-bodied fish (such as golden perch, Murray cod and silver perch) and are important corridors for fish migration between the Loddon, Murray and Gunbower Creek systems. Engineering works to provide fish passage at the Chute and Kerang Weir on the Loddon River, Box Creek regulator on Pyramid Creek, Taylors Creek Weir on Taylors Creek, and Fish Point Weir and Little Murray Weir on the Little Murray River in recent years have been important in reopening these migration routes. The Arthur Rylah Institute has monitored fish movement and populations in Pyramid Creek and the lower Loddon River since 2017. The monitoring indicates that the combined flows in the lower Loddon River and Pyramid Creek stimulate native fish movement through the fishways.

Environmental objectives in the Loddon River system

CN1 – Maintain productive and dynamic food webs

CN2 – Maintain the diversity and abundance of biofilms

F1 – Increase the small- and large-bodied native fish populations

F2 – Provide habitat for fish to feed and breed and opportunities for movement between habitats

G1 – Improve the channel form and features, including deep pools and benches

G2 – Maintain the condition of suitable substrate to maintain ecosystem processes

G3 – Engage flood runners, distributary channels, anabranches and backwaters

MI1 – Maintain the diversity and increase the abundance of waterbugs and waterbug functional feeding groups

PR1 – Increase the populations and recruitment of platypus

PR2 – Maintain stable rakali (water rat) populations in the long term

V1 – Maintain the condition of streamside and floodplain vegetation

V2 – Maintain and increase the extent of in-stream vegetation

WQ1 – Maintain water quality to support aquatic animals and minimise the occurrence of blackwater events

Traditional Owner cultural values and uses

Dja Dja Wurrung (Djaara people), Barapa Barapa and Wamba Wemba people are the First Peoples of the Loddon River and the North Central CMA, and the VEWH acknowledge their rights to practice their culture and identity as Traditional Owners, to maintain their relationship and care for the river and the natural resources on their land, and to protect places and areas of importance to their land.

Djaara, represented by the Dja Dja Wurrung Clans Aboriginal Corporation (trading as DJAARA), are recognised as the Traditional Owners in the upper part of the Loddon catchment. The 2013 Recognition and Settlement Agreement between DJAARA and the Victorian Government provides DJAARA with the right to participation, employment and incorporation of traditional ecological knowledge into natural resource management.

The Barapa Barapa and Wamba Wemba peoples are Traditional Owners with connections in the lower part of the catchment.

In the upper part of the catchment, Kapa Gatjin, the Djaara water knowledge group, and the North Central CMA work together to identify opportunities and sites where environmental water can support Djaara objectives for the Loddon River. A key aspiration is for Djaara to be more involved in managing and administering environmental water, with the aim of owning and managing it in future. DJAARA's ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy*** sets a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.

DJAARA provided the following statement for the 2025-26 seasonal watering proposals and plan.

> "DJAARA have a unique opportunity, as the first owners of the land and water that includes the Loddon River, to apply ancient Djaara Cultural principles and management practices to the current water management context.
>
> "Empowering DJAARA to manage water in the catchment enables DJAARA to provide overarching guidance to holistically manage water to meet environmental, social and economic values.
>
> "Cultural values do not sit as another competing value and use of the water. Rather, Cultural values provide the lens for all values to be viewed through and met. If we are enhancing Cultural values, uses and practices in the Loddon River, we are enabling environmental, social and economic values to be supported.
>
> "In November 2023, DJAARA launched its water strategy ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy***, setting a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.
>
> "Through implementation of the Dhelkunyangu Gatjin Strategy, facilitated by the Wanggal Partners Group, which has representation by the North Central CMA and water management agencies operating on Djaara *Djandak* (Country), the agencies continue to work to support DJAARA's increased engagement in planning and delivering environmental water, including identifying opportunities for DJAARA to play a greater role in its management and administration and the transfer of environmental water entitlements to DJAARA."

DJAARA have expressed that the resources allocated to managing environmental water on *Djandak* do not include sufficient allowance to appropriately engage with Djaara members, for them to meaningfully articulate Cultural values and the Djaara Cultural lens, to establish watering objectives to guide environmental water management, nor for the review of the six seasonal watering proposals on *Djandak*. For the development of the 2025-26 seasonal watering proposals, DJAARA and the North Central CMA agreed to allocate DJAARA's limited resource allowance to developing a joint management approach that would embed DJAARA in the development process, trialling the approach for Birchs Creek and Coliban River.

In the lower part of the catchment, the Barapa Barapa and Wamba Wemba Traditional Owners communicated their cultural objectives for the Loddon River and other waterways in the *Barapa Barapa Healthy Country Plan 2018-2021*. Objectives that relate to the Loddon River system include:

- by 2033, all wetlands surrounding the Murray River, Gunbower Forest, Loddon River and associated lakes will have good plant life and healthy native fish (cod and yellow belly), mussel and turtle populations
- by 2033, the Murray, Gunbower and Loddon rivers and associated lakes will have enough water, their water quality is improving, and the water will be clear for most of the year in good years
- Barapa Barapa people are actively involved in water management
- there are fewer fish and plant deaths from toxic blackwater events.

Table 5.7.1 summarises Traditional Owner cultural values and uses considered when proposing watering actions.

Table 5.7.1 Traditional Owner cultural values and uses, Loddon River system

Waterway and/or reach	Traditional Owner group	Values/uses/ objectives/ opportunities	What environmental watering aims to do
Loddon River Cairn Curran to Durham Ox, Tullaroop Creek, Serpentine Creek reach 1	• Kapa Gatjin, the Djaara water knowledge group	Objectives • A Djaara-led environmental watering program and management plan that provides guidance for environmental water, among other water entitlements and flows • Overarching holistic monitoring and management of waterways and flows to optimise outcomes for the environment and other values, maximising the value delivered through the program	• DJAARA supported to perform monitoring and planning activities • Activation of a DJAARA/North Central CMA joint management approach to environmental water planning and delivery
Loddon River (Durham Ox to the Little Murray River), Serpentine Creek, Pyramid Creek	• Barapa Barapa Wamba Wemba Water for Country Steering Committee	• Healthy plant and fish life (Murray cod, golden perch) and other aquatic life (turtles, mussels) • Active involvement in water management on Country • The Barapa Barapa and Wamba Wemba are the Traditional Owners in the northern part of the Loddon catchment, and there are artefacts of cultural practices throughout the Loddon and Pyramid system and its floodplain • The river and floodplain are valued as food and fibre sources and sites of cultural significance (such as scar trees, camp sites, meeting places and burial places)	• Flows that are designed to support food and fibre species of cultural value and facilitate cultural activities • Environmental water management helps preserve values held highly by Traditional Owner groups, including native fish, turtles and potentially crayfish (yabbies)

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

The Loddon River system and Boort wetlands provide a diverse range of social, recreational and economic values. Recreation and tourism activities include camping, fishing, powered and non-powered boating, water sports, birdwatching and hunting.

In planning the potential environmental watering actions in **Table 5.7.2**, the North Central CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing, powered and non-powered boating, water skiing and water sports)
- riverside recreation and amenity (such as birdwatching, bushwalking, camping and cycling)
- community events and tourism (such as water skiing competitions at Bridgewater and associated visitation)
- socioeconomic benefits (such as diverters for domestic and stock uses, local and regional economic benefits from increased visitation and ecosystem services, including carbon storage, groundwater recharge and nutrient recycling).

Environmental flows may be planned to align with a social or recreational objective so long as environmental objectives are not compromised. This is indicated in **Table 5.7.2** by an icon, as pictured below and also explained in **Figure 1.2.3**. Bridgewater Weir pool is a nationally recognised waterskiing location, with national competitions held annually. The North Central CMA will work with Goulburn-Murray Water to manage the delivery of low flow rates and the timing of freshes over summer/autumn to optimise conditions for the annual water skiing competition at Bridgewater Weir pool, where possible.

Watering will also support water sports activities (e.g. canoeing, kayaking, rowing, swimming, water skiing)

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.7.2 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.7.2 Loddon River system potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Loddon River (targeting reach 4)		
Winter/spring low flow (25-100 ML/day during June to November)[1]	At 25 ML/day in drought and when storages are below 60 GL: • a low flow will provide a depth of at least 7 cm in the channel in riffle and run habitats, maintaining connectivity between pools At 50 ML/day: • a low flow will provide a minimum level of continuous flow through the reach and maintain water quality and adequate depth in pools to provide habitat for aquatic plants, waterbugs, fish and rakali (water rats) At 100 ML/day: • increase the water depth for fish, platypus and rakali (water rat) dispersal (especially for male juvenile platypus) to colonise new breeding territory in winter and provide foraging habitat • prevent silt and fine sediment from settling on submerged wood and other hard surfaces • inundate a variety of habitats to increase the growth of biofilms and support waterbug productivity • inundate native fringing bank vegetation to support seed germination and growth, and prevent the encroachment of exotic terrestrial plants in the river channel	CN2, F1, G2, MI1, PR1, V1, V2, WQ1
Winter/spring low flow trial(s) (one to three trials of 100-200 ML/day for 10-30 days during June to November if triggered by an unregulated flow event)	• Increase the water depth to support the movement of platypus and native fish between reaches to access new habitat	F2, PR1
Winter/spring high flow (one high flow of 400-450 ML/day for six to seven days during August to November[2]**)**	• Provide sufficient velocity to scour accumulated sediment from pools and scour biofilms, promoting the growth of new biofilms and increasing waterbug productivity • Flush accumulated organic matter from the banks, benches, flood runners and anabranches to increase productivity and reduce the risk of a blackwater event in summer • Wet the banks to promote the recruitment and growth of streamside and emergent vegetation • Stimulate native fish movement and breeding	CN1, F1, F2, G1, G3, MI1, V1, V2, WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow (25-50 ML/day during December to May)[3]	At 25 ML/day: • provide a depth of at least 7 cm in the channel in riffle and run habitats to maintain connectivity between pools; this will only wet about 50% of the channel width • maintain aquatic communities through summer and ensure connectivity between habitats; this will not maintain flowing conditions in the Loddon River west branch At 50 ML/day: • maintain an adequate depth in pools for aquatic plants and to provide habitat for waterbugs, fish and rakali (water rats) • provide a continuous flow through all reaches • maintain water quality throughout most of the reach, except the Loddon River west branch during warm weather • wet the banks and shallow riffles to support the growth of in-stream and fringing non-woody vegetation	F1, MI1, PR2, V1, V2, WQ1
Summer/autumn low-flow trial (50-100 ML/day for six weeks during December to May)	• Maintain water quality and help prevent low-oxygen blackwater events • Prevent the emigration of native fish species due to poor water quality	F1, F2, WQ1
Summer/autumn freshes (three freshes of 100 ML/day for three days during December to May)	• Increase the water level to promote seed germination and the growth of fringing emergent aquatic plants • Increase connectivity between deep pools to promote the local movement of fish and prompt the dispersal of juvenile platypus in autumn • Generate sufficient force to flush fine sediment and old biofilms from submerged wood and other hard surfaces, promoting the growth of new biofilms and increasing waterbug productivity • Freshen water quality and reoxygenate pools	CN1, CN2, F2, MI1, PR1, V1, WQ1
Autumn high flow (one high flow of 400 ML/day for six days[4] **during March to April)**	• Trigger and facilitate the upstream movement of golden perch, silver perch and Murray cod older than one year • Facilitate the dispersal of juvenile platypus • Generate sufficient force to flush fine sediment and old biofilms from submerged wood and other hard surfaces, promoting the growth of new biofilms and increasing waterbug productivity	CN1, CN2, F2, G2, MI1, PR1

Potential environmental watering action	Expected watering effects	Environmental objectives
Year-round fresh (trigger-based, 100-200 ML/day for three to five days as required) *Triggers:* • *dissolved oxygen level below 5 mg/L* • *low or cease-to-flow river conditions* • *high water temperatures*	• Destratify pools and improve water quality (increase oxygen levels) along the river in reach 4, ensuring there is adequate oxygen to support aquatic animals (such as native fish and platypus)	WQ1
Pyramid Creek and Loddon River (targeting reach 5)		
Year-round low flow (90-300 ML/day at Box Creek regulator)	At 90 ML/day: • the low flow will maintain connectivity between pools, maintain water quality at a level that can support fish and waterbugs and provide habitat for aquatic animals At 200 ML/day: • increase longitudinal connectivity to allow native fish and platypus to access new habitats • improve water quality by reducing salinity levels • increase the wetted area to maintain and promote the growth of fringing emergent (non-woody) vegetation along the lower banks of the channel At 300 ML/day: • facilitate greater movement for large-bodied native fish • increase hydrodynamic diversity and improve the quality of flowing habitats	F1, F2 MI1 PR1 V1 WQ1
Winter/spring high flow (one high flow of 650 ML/day at Kerang Weir for six to seven days during August to November)[5]	• Trigger the migration, spawning and recruitment of native fish species, including Murray cod • Maintain connectivity between habitats and improve water quality • Provide sufficient energy to flush accumulated sediment from pools and substrates	CN1 F1, F2 G1 WQ1
Autumn high flow (one high flow of 650 ML/day at Kerang Weir for six days during March to April)[6]	• Trigger and facilitate the upstream movement of golden perch, silver perch and Murray cod older than one year • Maintain connectivity between habitats and improve water quality • Facilitate platypus dispersal • Provide sufficient energy to flush accumulated sediment from pools and substrates	CN1 F1, F2 G1 PR1 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Serpentine Creek (targeting reach 1)[7]		
Winter/spring low flow (10-30 ML/day during June to November)	At 10 ML/day: • maintain connectivity between pools to allow the dispersal of small- to medium-bodied native fish • provide a sufficient flow to maintain water quality by oxygenating pools • maintain foraging habitat for platypus • maintain the wetted area to support in-stream aquatic vegetation (such as water ribbons, eel weed and milfoil) At 20-30 ML/day: • maintain habitat for larger native fish and facilitate movement for aquatic animals • wet exposed roots, woody debris, emergent vegetation and leaf packs to provide habitat for aquatic animals • inundate low benches, banks and some secondary channels to help increase waterbug productivity and native fish breeding, including river blackfish breeding • provide flow variability to maintain the diversity of the fringing vegetation	F1 G2 MI1 PR1 V2 WQ1
Winter/spring fresh (one fresh of 40-120 ML/day for two days during August to November)	At 40 ML/day: • provide connectivity for fish and waterbugs to access different habitat areas • transport organic matter that has accumulated in the channel to facilitate its breakdown and incorporation into the food web, with a low risk of low-oxygen blackwater • wet the banks to promote the recruitment and growth of streamside and emergent vegetation At 120 ML/day: • maintain the channel form and scour pools • encourage female platypus to select nesting burrows higher up the bank to reduce the risk of a greater flow later in the year flooding burrows with juveniles in them • flush accumulated leaf litter from the banks and low benches to reduce the risk of blackwater events during summer	CN1, CN2 F1 G2 MI1 PR1 V2 WQ1

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow (10-20 ML/day during December to May)	At 10 ML/day: • provide connectivity between pools to allow the dispersal of small- to medium-bodied native fish • provide a sufficient flow to maintain water quality by oxygenating pools • maintain foraging habitat for platypus • maintain the wetted area to support in-stream aquatic vegetation (such as water ribbons, eel weed and milfoil) At 20 ML/day: • maintain habitat for larger native fish and facilitate movement of aquatic animals • wet exposed roots, leaf packs and woody debris to provide habitat for aquatic animals	F1 MI1 PR1 V2 WQ1
Summer/autumn freshes (three freshes of 40 ML/day for two days during December to May)	• Maintain the channel form by inundating the benches • Generate sufficient force to flush fine sediment and old biofilms from submerged wood and other hard surfaces, promoting the growth of new biofilms, increasing waterbug productivity and replenishing the food supply for aquatic animals • Increase connectivity between pools to promote the local movement of fish and prompt the dispersal of juvenile platypus in autumn • Provide flow variability to maintain the diversity of fringing vegetation (such as emergent aquatic plants) • Freshen the water to improve its quality by diluting salt, reoxygenating the water and flushing poor-quality water in pools, transporting accumulated nutrients and carbon downstream	CN1, CN2 F1 G1 MI1 PR1 V2 WQ1

1 A winter/spring low flow of 50 ML per day is below the passing flow magnitude in most planning scenarios and can result in the VEWH banking passing flow savings for use in other potential watering actions. The combined volume in Cairn Curran and Tullaroop reservoirs must exceed 60,000 ML to enable passing flow savings.

2 In the drought, dry and average scenarios, the high flow of this event is planned to be delivered for six to seven days, but there is a three-day ramp-up and six-day ramp-down period. It is planned to be delivered naturally in the wet planning scenario.

3 The summer/autumn low-flow rate in May is below the passing-flow magnitude in most planning scenarios and can result in the VEWH banking passing-flow savings for use in other potential watering actions. The combined volume in Cairn Curran and Tullaroop reservoirs must exceed 60,000 ML to enable passing-flow savings.

4 In the drought, dry and average planning scenarios, the high flow of this event is planned to be delivered for six days, but there is a three-day ramp-up and six-day ramp-down period. It is planned to be delivered naturally in the wet scenario.

5 Winter/spring and autumn freshes are planned to occur at the same time in the Loddon River and Pyramid Creek, with the peaks timed to meet at Kerang Weir. 650 ML per day is the total combined target at Kerang Weir.

6 Winter/spring and autumn freshes are planned to occur at the same time in the Loddon River and Pyramid Creek, with the peaks timed to meet at Kerang Weir. 650 ML per day is the total combined target at Kerang Weir.

7 The flow delivered from Serpentine Weir may be restricted to manage end-of-system outfalls to avoid third-party impacts until an alternate solution is found.

Scenario planning

Table 5.7.3 outlines potential environmental watering and expected water use in a range of planning scenarios.

Due to potentially dry conditions and low storage volumes in 2025-26, there are five planning scenarios for the Loddon system. There are two drought planning scenarios to account for the combined volume of Cairn Curran Reservoir and Tullaroop Reservoir potentially dropping below 60 GL (or 60,000 ML). If it did, the operational passing flow rate would be reduced from 77 ML per day in the cooler months and 14 ML per day in the warmer months to 14 ML per day all year. The reduction of the operational passing flow means that water for the environment is required to make up a much greater portion of the targeted flow rate, greatly affecting the potential watering actions that may be delivered. A drought planning scenario for when the storages hold above 60,000 ML is also included.

Loddon River

In the Loddon River, the delivery of a continuous, year-round low flow, three summer/autumn freshes and a fresh to respond to poor water quality are high priorities in all planning scenarios to maintain habitat for native fish, platypus and native vegetation and prevent poor water quality.

A flow of 50 ML per day is preferred during summer and autumn to minimise the risk of poor water quality during warm weather. In both drought planning scenarios, the summer/autumn low flow will be reduced to 25 ML per day to conserve water supplies. A 25 ML per day flow is unlikely to maintain water quality throughout the reach but is likely to provide connectivity for aquatic animals to find refuge elsewhere. If storages are under 60 GL, 25 ML per day will be maintained all summer/autumn, but when storages are above 60 GL, the lower rate will only be delivered in April and May when there is less water quality risk. Reducing the passing flow to 25 ML per day in May (in consultation with Goulburn-Murray Water) can accrue additional water that will be used to supplement flows in 2026-27.

In most planning scenarios, the winter/spring low flow will be delivered between 50-77 ML per day in June and November to create a transition flow between the warmer and cooler seasons. In the drought planning scenario, when storages are below 60 GL, the North Central CMA recommend remaining at the summer/autumn low-flow rate of 25 ML per day for June to conserve water supplies and create a transition between autumn and winter. Delivering the winter/spring low flow at a greater magnitude aims to improve the condition of vegetation higher up the bank, improve water quality and increase the abundance of native fish and platypus.

Coordinated winter/spring high flows in the Loddon River and Pyramid Creek are a high priority in all planning scenarios, except if drought storages are below 60 GL. They would trigger the upstream movement of native fish from the Murray system for feeding and breeding, and remove accumulated organic matter on the banks and benches. This action is not expected in the driest conditions. It will be delivered at a lower duration in the drought, dry and average planning scenarios and will be achieved with natural flow in wet conditions.

An autumn high flow will likely be delivered in average and wet conditions to cue the movement and dispersal of juvenile golden perch and silver perch from the Murray River into the Loddon River, Pyramid Creek and Gunbower Creek. This flow is intended to be coordinated with a similar flow in Pyramid Creek. It will be a high priority if there are to be large numbers of young native fish in the mid-Murray system, and it is not expected to be delivered in drought conditions.

Fish ecologists have recommended trialling different flow rates to improve fish outcomes in the Loddon River if sufficient water is available. The first trial involves increasing the winter/spring flow to 200 ML per day after an unregulated event to improve fish passage past low-level barriers. The second trial aims to increase the summer/autumn low flow to 100 ML per day during the warmest months — likely in January and February, or if hot conditions are forecast at other times — to reduce the risk of fish emigration. It will also test whether adaptive flow management can lessen water quality issues in the mid-Loddon River. The first trial is proposed in the wet planning scenario in response to unregulated flows or spills at Loddon Weir. The second trial may be delivered in average and wet conditions. Each trial will only be implemented if appropriate monitoring is in place to assess its effect and to inform adaptive management. The trial has been included in annual planning since 2022-23, and a review is required at the end of 2025-26 to inform future planning.

Pyramid Creek

Pyramid Creek is regionally significant for native fish. Fish populations within Pyramid Creek have increased since the Millennium Drought, and removing fish barriers means it is now a vital dispersal corridor for fish moving between the Murray River, Kow (Ghow) Swamp and Gunbower Creek. Maintaining an adequate low flow to allow fish to remain in Pyramid Creek all year (including during the non-irrigation season) and delivering high flows to cue and facilitate fish movement at key times of the year are high priorities in all planning scenarios.

Modelling conducted as part of the FLOWS study indicates that maintaining a low flow of at least 200 ML per day throughout the year in Pyramid Creek is optimal for resident fish populations, but a flow of about 90 ML per day should provide minimum habitat requirements. Operational flow during the irrigation season usually provides a flow of about 300 ML per day, and water for the environment will likely be used to maintain a flow of 200 ML per day for as long as possible during the irrigation shutdown period.

The winter/spring high flow in Pyramid Creek has a target flow rate of 650 ML per day at Kerang Weir to cue and facilitate fish movement between the Murray River and the Loddon system during their breeding season. It is a high priority in all planning scenarios, except if drought storage are below 60 GL, and it requires coordinated releases in Pyramid Creek and reach 4 of the Loddon River. A similar-sized event in autumn is recommended for the average and wet planning scenarios when large numbers of juvenile fish are likely to migrate from the Murray River into the Loddon system. The autumn high flow may also facilitate the dispersal of juvenile platypus in years following successful spring breeding.

Serpentine Creek

In Serpentine Creek, the main priority will be to maintain a low flow throughout the year to provide habitat for native fish, waterbugs, rakali (water rats) and platypus and to deliver freshes in summer/autumn to improve water quality, allow fish and platypus movement and improve the condition of streamside vegetation. Winter/spring freshes are also a priority in dry, average and wet conditions to flush organic material from the bank to reduce the risk of low-oxygen blackwater in summer, but they are not required or delivered at a lower magnitude in the drought scenarios.

These flows are needed in all planning scenarios but will likely be delivered at the lower end of the recommended range to avoid inundating private property at the end of the system. Lower-magnitude flows are expected to maintain connectivity between habitats but will not provide as much habitat complexity for aquatic plants and animals as environmental flows delivered at the upper end of the recommended range.

Carryover of 3,000 ML is prioritised into 2026-27 in the drought and dry planning scenarios. If conditions are drier, this water will ensure delivery of the priority summer/autumn freshes and a summer low flow in the Loddon River. No carryover targets are set in the average and wet planning scenarios, meaning water allocated in 2026-27 will be required to achieve priority actions identified for that year.

Table 5.7.3 Loddon River system environmental watering planning scenarios

Planning scenario	Drought (storages below 60 GL)	Drought (storages above 60 GL)	Dry	Average	Wet
Expected conditions	• Negligible contributions from unregulated reaches and tributaries of the Loddon River • Consumptive water deliveries in the irrigation season (but not in reach 4) • Combined volume in storages below 60 GL • Passing flow reduced to 14 ML/day all year	• Negligible contributions from unregulated reaches and tributaries of the Loddon River • Consumptive water deliveries in the irrigation season (but not in reach 4) • Combined volume in storages above 60 GL • Operational passing flow varies throughout the year	• Small inflows from unregulated reaches and tributaries of the Loddon River, contributing to a low flow • Consumptive water deliveries in the irrigation season (but not in reach 4)	• The natural flow will provide a low flow and multiple freshes, most likely in winter/spring • Consumptive water deliveries in the irrigation season (but not in reach 4) • Spills from Loddon system storages are possible	• Spills from Loddon system storages will provide an extended-duration high flow • Overbank flow is most likely in winter/spring
Expected availability of water for the environment	• 15,327 ML	• 15,327 ML	• 18,610 ML	• 20,844 ML	• 18,035 ML

Planning scenario	Drought (storages below 60 GL)	Drought (storages above 60 GL)	Dry	Average	Wet
Loddon River (targeting reach 4)					
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow (delivered at 50 ML/day, 25 ML/day in June) • Summer/autumn low flow (delivered at 25 ML/day) • Summer/autumn freshes (three freshes) • Year-round fresh if triggered	• Winter/spring low flow (delivered at 77 ML/day, 50 ML/day in June and November) • Winter/spring high flow (one high flow for six days) • Summer/autumn low flow (delivered at 50 ML/day, 25 ML/day in April and May) • Summer/autumn freshes (three freshes) • Year-round fresh if triggered	• Winter/spring low flow (delivered at 100 ML/day, 50 ML/day in June and November) • Winter/spring high flow (one high flow for six days) • Summer/autumn low flow (delivered at 50 ML/day) • Summer/autumn freshes (three freshes) • Year-round fresh if triggered	• Winter/spring low flow (delivered at 100 ML/day, 77 ML/day in June and November) • Winter/spring high flow (one high flow for seven days) • Summer/autumn low flow (delivered at 50 ML/day) • Summer/autumn low flow trial • Summer/autumn freshes (three freshes) • Autumn high flow (one high flow) • Year-round fresh if triggered	• Winter/spring low flow (delivered at 100 ML/day) • Winter/spring low flow trial, if triggered • Winter/spring high flow (one high flow) • Summer/autumn low flow (delivered at 50 ML/day) • Summer/autumn low flow trial • Summer/autumn freshes (three freshes) • Autumn high flow (one high flow) • Year-round fresh if triggered
Potential environmental watering – tier 2 (additional priorities)	• Winter/spring low flow (delivered at 77 ML/day, 50 ML/day in June and November) • Summer/autumn low flow (delivered at 50 ML/day, 25 ML/day in April and May)	• Winter/spring low flow (delivered at 100 ML/day) • Summer/autumn low flow trial	• Winter/spring low flow (delivered at 100 ML/day) • Winter/spring low flow trial, if triggered • Autumn high flow (one high flow) • Summer/autumn low flow trial	• Winter/spring low flow (delivered at 100 ML/day) • Winter/spring low flow trial, if triggered	• N/A

Planning scenario	Drought (storages below 60 GL)	Drought (storages above 60 GL)	Dry	Average	Wet
Possible volume of water for the environment required to achieve objectives	• 9,900 ML (tier 1) • 7,000 ML (tier 2)	• 9,900 ML (tier 1) • 9,000 ML (tier 2)	• 13,300 ML (tier 1) • 11,700 ML (tier 2)	• 18,700 ML (tier 1) • 3,400 ML (tier 2)	• 14,300 ML (tier 1) • 0 ML (tier 2)
Pyramid Creek and Loddon River (targeting reach 5)					
Potential environmental watering – tier 1 (high priorities)	• Year-round low flow		• Year-round low flow • Winter/spring high flow (one high flow)	• Year-round low flow • Winter/spring high flow (one high flow) • Autumn high flow (one high flow)	• Year-round low flow • Winter/spring high flow (one high flow) • 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	• 2,000 ML (tier 1)	• 4,000 ML (tier 1)	• 4,000 ML (tier 1) • 2,000 ML (tier 2)	• 6,000 ML (tier 1)	
Serpentine Creek (targeting reach 1)					
Potential environmental watering – tier 1 (high priorities)	• Winter/spring low flow (delivered at 10 ML/day) • Summer/autumn low flow (delivered at 10 ML/day) • Summer/autumn freshes (three freshes)	• Winter/spring low flow (delivered at 10 ML/day) • Winter/spring fresh (one fresh delivered at 40 ML/day) • Summer/autumn low flow (delivered at 10 ML/day) • Summer/autumn freshes (three freshes)	• Winter/spring low flow (delivered at 10 ML/day) • Winter/spring fresh (one fresh) • Summer/autumn low flow (delivered at 10 ML/day) • Summer/autumn freshes (three freshes)		

Planning scenario	Drought (storages below 60 GL)	Drought (storages above 60 GL)	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• N/A	• Winter/spring low flow (delivered at 20 ML/day) • Winter/spring fresh (one fresh delivered at 120 ML/day) • Summer/autumn low flow (delivered at 20 ML/day)	• Winter/spring low flow (delivered at 20 ML/day) • Summer/autumn low flow (delivered at 20 ML/day)	• Winter/spring low flow (delivered at 30 ML/day) • Summer/autumn low flow (delivered at 20 ML/day)	
Possible volume of water for the environment required to achieve objectives	• 1,300 ML (tier 1) • 0 ML (tier 2)	• 1,350 ML (tier 1) • 3,830 ML (tier 2)	• 1,480 ML (tier 1) • 3,700 ML (tier 2)	• 1,440 ML (tier 1) • 5,200 ML (tier 2)	• 1,160 ML (tier 1) • 4,500 ML (tier 2)
Priority carryover requirements for 2026-27	• 3,000 ML			• N/A	

5.7.2 Boort wetlands

System overview

The Boort wetlands are on the floodplain west of the Loddon River, below Loddon Weir. They consist of temporary and permanent freshwater lakes and swamps: Lake Boort, Lake Leaghur, Lake Yando, Little Lake Meran and Lake Meran (Figure 5.7.1). Together, the Boort wetlands cover over 800 ha. Numerous other wetlands in the district are not currently managed with water for the environment.

The natural watering regimes of wetlands throughout the broader Loddon system have been substantially modified by the construction of levees and channels across the floodplain and by constructing and operating reservoirs and weirs along the Loddon River. Water is delivered to the Boort wetlands through Loddon Valley Irrigation Area infrastructure.

Water for the environment is shared between the Boort wetlands and the Loddon River system. Channel capacity constraints sometimes limit the ability to deliver water for the environment to the wetlands. The VEWH and the North Central CMA work with the storage manager (Goulburn-Murray Water) to best meet environmental objectives within capacity constraints.

Environmental values

The Boort wetlands provide habitat for a range of plant and animal species. At Lake Yando, 12 rare plant species have been recorded, including jerry-jerry and water nymph. Bird species recorded at Lake Boort, Lake Leaghur and Lake Meran include the white-bellied sea eagle, Latham's snipe and eastern great egret. Little Lake Meran is a swampy woodland with black box trees on the higher wet margins and river red gums fringing the waterline.

Environmental objectives in the Boort wetlands

A1 – Increase the size and diversity of native frog populations, including by enhancing breeding opportunities

B1 – Support a high diversity of wetland birds by enhancing feeding and breeding conditions

F1 – Increase the large and small-bodied fish populations

M1 – Increase the diversity and biomass of waterbugs

T1 – Maintain freshwater turtle populations, in particular Murray River turtles

V1 – Rehabilitate and increase the extent of emergent and aquatic vegetation (aquatic herblands, tall marsh), intermittent swampy woodland and riverine chenopod woodland

V2 – Maintain the health and restore the distribution of river red gums and associated understorey species

V3 – Maintain the extent and restore the health of black box vegetation on the fringes of the wetlands

V4 – Maintain the extent of spiny flatsedge

Traditional Owner cultural values and uses

In planning for environmental flows in the Boort wetlands, the North Central CMA works with Barapa Barapa and Wamba Wemba Traditional Owners and the Dja Dja Wurrung Clans Aboriginal Corporation (trading as DJAARA).

Lake Boort is within the Dja Dja Wurrung Registered Aboriginal Party (RAP) boundary and is home to Djaara (Dja Dja Wurrung people). A key aspiration for Djaara is to be more involved in managing and administering environmental water, with the aim of owning and managing it in future. DJAARA's ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy*** sets a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.

DJAARA provided the following statement for the 2025-26 seasonal watering proposals and plan.

"DJAARA have a unique opportunity, as the first owners of the land and water that includes the Boort wetlands, to apply ancient Djaara Cultural principles and management practices to the current water management context.

"Empowering DJAARA to manage water in the catchment enables DJAARA to provide overarching guidance to holistically manage water to meet environmental, social and economic values.

"Cultural values do not sit as another competing value and use of the water. Rather, Cultural values provide the lens for all values to be viewed through and met. If we are enhancing Cultural values, uses and practices in the Boort wetlands, we are enabling environmental, social and economic values to be supported.

"In November 2023, DJAARA launched its water strategy ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy***, setting a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.

"Through implementation of the Dhelkunyangu Gatjin Strategy, facilitated by the Wanggal Partners Group, which has representation by the North Central CMA and water management agencies operating on Djaara *Djandak* (Country), the agencies continue to work to support DJAARA's increased engagement in planning and delivering environmental water, including identifying opportunities for DJAARA to play a greater role in its management and administration and the transfer of environmental water entitlements to DJAARA."

DJAARA have expressed that the resources allocated to managing environmental water on *Djandak* do not include sufficient allowance to appropriately engage with Djaara members, for them to meaningfully articulate Cultural values and the Djaara Cultural lens, to establish watering objectives to guide environmental water management, nor for the review of the six seasonal watering proposals on *Djandak*. For the development of the 2025-26 seasonal watering proposals, DJAARA and the North Central CMA agreed to allocate DJAARA's limited resource allowance to developing a joint management approach that would embed DJAARA in the development process, trialling the approach for Birchs Creek and Coliban River.

The Djaara Nation Statement in the Victorian Government's 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and the ***Dhelkunya Dja Dja Dja Wurrung Country Plan 2014-2034*** also describe Djaara's objectives for managing *gatjin* (water) on *Djandak* (Country) and articulate Djaara's support for reinstating environmental flows as an overall management objective.

Table 5.7.4 summarises Traditional Owner cultural values and uses considered when proposing watering actions.

Table 5.7.4 Traditional Owner cultural values and uses, Boort wetlands

Traditional Owner group	Values & uses	What environmental watering aims to do
Boort wetlands		
Barapa Barapa and Wamba Wemba Traditional Owners	• Cultural plants and cultural practices	• Water for the environment and natural flooding supports culturally important plants in the Boort wetlands and allows the continuation of cultural practices, including harvesting of food, medicinal and weaving plants. • Water for the environment supports the growth of cultural plants that enable a continuation of cultural practices (i.e. harvesting nardoo at Yando Swamp, also known as Lake Yando). • Barapa Barapa and Wamba Wemba Traditional Owners value cultural plants in the Boort wetlands as they provide opportunities for cultural practices to continue • Barapa Barapa and Wamba Wemba Traditional Owners recognise the value of resources that occur on the drawdown after inundation of wetlands, providing food for animals and cultural plants (such as old man weed). This aspiration can be supported by allowing wetlands to draw down naturally after receiving water to expose mudflats. This is a consideration at Little Lake Meran, Yando Swamp and Lake Leaghur. • Having a diversity of habitat and vegetation responses is a priority for Barapa Barapa and Wamba Wemba Traditional Owners. They highlighted the importance of having a range of water depths across wetlands, which creates a more diverse vegetation response and results in a range of resources becoming available over a longer timeframe. • Barapa Barapa Traditional Owners have undertaken revegetation activities as part of the Decision Support Tool Revegetation Project at Lake Leaghur. There are also opportunities for Traditional Owners' involvement with monitoring and revegetation at other wetlands. • Water for the environment deliveries can be managed in future so revegetated areas at Lake Leaghur are provided with an appropriate water regime (i.e. plants receive water but are not drowned) to ensure their ongoing survival and opportunities for natural recruitment.

Traditional Owner group	Values & uses	What environmental watering aims to do
(continued) **Barapa Barapa and Wamba Wemba Traditional Owners**	• Cultural animals and cultural practices	• Environmental flows can support the preservation and improvement of cultural animals (i.e. totem species). Environmental flows will also aim to ensure that culturally important animals (i.e. food sources, such as black swans) have sufficient feeding and breeding habitat to build their populations.
	• Healthy Country	• Providing drought refuge habitat (for frogs, turtles and birds) and maintaining areas with healthy habitat is a high priority for Barapa Barapa and Wamba Wemba Traditional Owners. Current conditions provide for this, but once wetlands dry out, they feel it is important to ensure that water is delivered to healthy areas to elicit a good vegetation response and support wetland fauna. • Future environmental water deliveries will ensure there is water in high-potential Boort wetlands regardless of whether natural flooding occurs. This will provide refuge habitat for waterbirds, woodland birds, turtles and frogs and ensure high-quality feeding and breeding habitat is available.
	• Cultural heritage	• Cultural heritage artefacts are common at Boort wetlands as they have been important gathering sites for Traditional Owners. The loss of fringing trees and changes to natural watering regimes have left sediments around these wetlands exposed for prolonged periods, resulting in some cultural artefacts being uncovered. • Delivering water for the environment can support the growth of fringing red gums and tall marsh, reduce erosion at these wetlands and help keep cultural heritage artefacts covered.

Traditional Owner group	Values & uses	What environmental watering aims to do
Lake Boort		
Djaara	• Environmental water management helps preserve historical and contemporary values Djaara hold highly, including promoting a sense of place and spiritual connection. Lake Boort is a priority in the Dja Dja Wurrung Country Plan.*	• The drawdown after the 2024 flood will continue to be monitored.
	Objectives • A Djaara-led environmental watering program and management plan that provides guidance for environmental water, among other water entitlements and flows • Overarching holistic monitoring and management of waterways and flows to optimise outcomes for the environment and other values, maximising the value delivered through the program	• DJAARA supported to perform monitoring and planning activities • Activation of a DJAARA/North Central CMA joint management approach to environmental water planning and delivery

* This is taken from engagement before 2024-25.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.7.5**, the North Central CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing and water sports)
- waterway recreation and amenity (such as birdwatching, camping and duck hunting)
- community events and tourism (such as attracting locals and visitors for birdwatching and hunting)
- socioeconomic benefits (such as aesthetic benefits for landholders, groundwater recharge and appropriate water levels and quality for flood mitigation, nutrient treatment and carbon storage).

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.7.5 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.7.5 Boort wetlands potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Lake Yando (top-up in spring/summer)	• Support breeding habitat for waterbirds, frogs and turtles over spring and summer after winter/spring inundation • Support the growth of planted river red gums and other aquatic and herbland vegetation • Allow aquatic and semi-aquatic plants to complete their life cycles and set seed, to maintain a viable seedbank	A1, B1, MI1, T1, V1, V2
Lake Yando (partial fill in autumn)	• Drown terrestrial weeds and trigger the early germination of aquatic vegetation, which in turn would promote the early establishment of aquatic vegetation • Facilitate the early establishment and proliferation of waterbug populations, which will become important food sources for waterbirds • Provide wetland habitat for waterbirds, frogs and turtles over autumn/winter • Continue supporting the growth of planted river red gums and other aquatic and herbland vegetation	A1, B1, MI1, T1, V1, V2

Scenario planning

Table 5.7.6 outlines potential environmental watering and expected water use in a range of planning scenarios.

Wet conditions in recent years naturally filled all the Boort wetlands except Little Lake Meran, which was filled with environmental water. Wetlands have all been allowed to draw down since the most recent flooding in January 2024, but only Lake Yando has completely dried.

Environmental water delivery to Lake Yando is a priority in all planning scenarios. In the drought, dry and average scenarios, it is partially filled in autumn, to prime the wetland and stimulate some ecological processes before the larger watering event in spring 2026. This delivery will also provide high-quality habitat and feeding opportunities for waterbirds and provide a refuge as other wetlands in the district enter drying cycles.

In the wet planning scenario, Lake Yando is expected to have some inundation of flood water, most likely in spring. Depending on the level of inundation, water for the environment may be used to top up the water level and/or extend the inundation period to support waterbird breeding or to allow wetland plants to complete their life cycles through spring/summer. The autumn partial fill is not expected to be delivered in wet conditions, as the wetland will likely hold water, but it may be delivered if there is significant drawdown over summer.

All other wetlands in the Boort wetlands system will be allowed to draw down as recommended in their management plans to support dry-phase ecosystem processes or to support the growth of native vegetation around the edges and on the banks of the wetlands, providing a range of habitats for waterbirds, frogs and turtles.

Priority carryover is required in all planning scenarios to complete the planned fill at Lake Yando in winter/spring 2026, but priority carryover in wet conditions will only be needed if the spring/summer top-up is not required.

Table 5.7.6 Environmental watering planning scenarios, Boort wetlands

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• No natural inflow to wetlands	• Minimal natural inflow to wetlands from local catchment run-off is possible	• Moderate inflow from local catchment run-off, but little, if any, inflow from nearby creeks or flood runners	• Extended durations of high flow and overbank flow from creeks and flood runners, which fill most wetlands
Expected availability of water for the environment[1]	• 15,327 ML	• 18,610 ML	• 20,844 ML	• 18,035 ML
Potential environmental watering – tier 1 (high priorities)	• Lake Yando (partial fill in autumn)	• Lake Yando (partial fill in autumn)	• Lake Yando (partial fill in autumn)	• Lake Yando (top-up in spring/ summer)
Potential environmental watering – tier 2 (additional priorities)	• N/A			• Lake Yando (partial fill in autumn)
Possible volume of water for the environment required to achieve objectives	• 300 ML (tier 1)	• 200 ML (tier 1)	• 200 ML (tier 1)	• 300 ML (tier 1) • 200 (tier 2)
Priority carryover requirements for 2026-27	• 500 ML			

1 Loddon system entitlements are shared between the Loddon River system and the Boort wetlands.

5.7.3 Birchs Creek

System overview

Birchs Creek is a tributary of the Loddon River located in the southernmost part of the catchment. The creek rises in the ranges northeast of Ballarat and flows northwest through Newlyn and Smeaton before joining Tullaroop Creek near Clunes (Figure 5.7.1). The lower parts of the catchment are extensively cleared, where the creek meanders through an incised basaltic valley. The creek contains a regionally significant platypus community and a vulnerable river blackfish population.

Birchs Creek is part of the broader Bullarook system, which contains two small storages — Newlyn Reservoir and Hepburn Lagoon — that provide water for irrigation and urban supply. The storages fill and spill during winter or spring in years with average or above-average rainfall. The VEWH holds water for the environment in Newlyn Reservoir, but none in Hepburn Lagoon.

Birchs Creek receives tributary inflows from Rocky Lead, Langdons, Lawrence and Tourello creeks. Groundwater provides reliable baseflows to the downstream reaches of Birchs Creek in most years.

The VEWH is allocated 100 ML in Newlyn Reservoir on 1 December each year, provided that seasonal determinations in the Bullarook system are at least 20 per cent. Any unused allocation from 1 December can be carried over until 30 November of the following water year, but if Newlyn Reservoir spills from 1 July to 30 November, the volume held in carryover is lost. Any water remaining on 30 November is forfeited. When seasonal determinations are below 20 per cent, the VEWH does not receive an allocation, and the system's resources are used to protect essential human needs.

Environmental values

Birchs Creek supports threatened aquatic plants, and its deep pools provide habitat for aquatic animals during dry periods. The creek contains native fish, including regionally significant populations of river blackfish and mountain galaxias, as well as flathead gudgeon and Australian smelt. Recent monitoring indicates that platypus are present throughout the entire creek.

Environmental objectives in Birchs Creek

F1 – Maintain the abundance and diversity of small- and medium-bodied native fish, including river blackfish, mountain galaxias, flathead gudgeon and Australian smelt

MI1 – Maintain waterbug populations and the diversity of functional groups to drive productive and dynamic food webs

PR1 – Maintain platypus populations

V1 – Maintain the diversity and abundance of in-stream aquatic plants

V2 – Maintain a diverse variety of native fringing plants and communities of plants growing on the water's edge

WQ1 – Maintain water quality to support aquatic life and environmental processes

Traditional Owner cultural values and uses

Birchs Creek is on the Country of the Djaara people, represented by the Dja Dja Wurrung Clans Aboriginal Corporation (DJAARA). The 2013 Recognition and Settlement Agreement between DJAARA and the Victorian Government provides DJAARA with the right to participation, employment and incorporation of traditional ecological knowledge into natural resource management.

DJAARA provided the following statement for the 2025-26 seasonal watering proposals and plan.

> "DJAARA have a unique opportunity, as the first owners of the land and water that includes the Coliban River, to apply ancient Djaara Cultural principles and management practices to the current water management context.
>
> "Empowering DJAARA to manage water in the catchment enables DJAARA to provide overarching guidance to holistically manage water to meet environmental, social and economic values.
>
> "Cultural values do not sit as another competing value and use of the water. Rather, Cultural values provide the lens for all values to be viewed through and met. If we are enhancing Cultural values, uses and practices in the Coliban River, we are enabling environmental, social and economic values to be supported.
>
> "In November 2023, DJAARA launched its water strategy ***Dhelkunyangu Gatjin: Working together to heal water: Djaara Gatjin Strategy***, setting a *baring* (pathway) for DJAARA to become the environmental water manager on Djaara Country and a *baring* for Djaara Lore to inform water management decisions. This transition is being progressed by working in partnership with authorities and the community to manage water for a healthy, sustainable future.
>
> "Through implementation of the Dhelkunyangu Gatjin Strategy, facilitated by the Wanggal Partners Group, which has representation by the North Central CMA and water management agencies operating on Djaara *Djandak* (Country), the agencies continue to work to support DJAARA's increased engagement in planning and delivering environmental water, including identifying opportunities for DJAARA to play a greater role in its management and administration and the transfer of environmental water entitlements to DJAARA."

DJAARA have expressed that the resources allocated to managing environmental water on *Djandak* do not include sufficient allowance to appropriately engage with Djaara members, for them to meaningfully articulate Cultural values and the Djaara Cultural lens, to establish watering objectives to guide environmental water management, nor for the review of the six seasonal watering proposals on *Djandak*. For the development of the 2025-26 seasonal watering proposals, DJAARA and the North Central CMA agreed to allocate DJAARA's limited resource allowance to developing a joint management approach that would embed DJAARA in the development process, trialling the approach for Birchs Creek and Coliban River. The Djaara Nation Statement in the Victorian Government's 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and the ***Dhelkunya Dja Dja Wurrung Country Plan 2014-2034*** also describe Djaara's objectives for managing *gatjin* (water) on *Djandak* (Country) and articulate Djaara's support for reinstating environmental flows as an overall management objective.

In planning for environmental flows in Birchs Creek, DJAARA and the North Central CMA identified the creek as a potential site for future projects. The *Dhelkunya Dja Dja Wurrung Country Plan 2014-2034* can provide the foundation to identify and integrate cultural values, which **Table 5.7.7** shows, into Bullarook system environmental water planning.

Table 5.7.7 summarises Traditional Owner cultural values and uses considered when proposing watering actions.

Table 5.7.7 Traditional Owner cultural values and uses, Birchs Creek (all reaches)

Values/uses/objectives/opportunities	What environmental watering aims to do
Objectives • A Djaara-led environmental watering program and management plan that provides guidance for environmental water, among other water entitlements and flows • Overarching holistic monitoring and management of waterways and flows to optimise outcomes for the environment and other values, maximising the value delivered through the program	• DJAARA supported to perform monitoring and planning activities • Activation of a DJAARA/North Central CMA joint management approach to environmental water planning and delivery

Note: The Traditional Owner group is DJAARA with Kapa Gatjin, the Djaara water knowledge group, being DJAARA representatives.

Increasing the involvement of Traditional Owners in planning and managing environmental flows and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its program partners. This is reinforced by legislation and policy commitments, including the *Water Act 1989*, the ***Victorian Aboriginal Affairs Framework***, the 2016 ***Water for Victoria***, the 2022 ***Water is Life: Traditional Owner Access to Water Roadmap*** and, in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in **Table 5.7.8**, the North Central CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing)
- riverside recreation and amenity (such as cycling and walking, particularly in Newlyn, Smeaton and Clunes, and improved amenity at key community spaces like Andersons Mill)
- improved water quality (such as for domestic and stock use)
- socioeconomic benefits (such as increased tourism and visitation to key community spaces).

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of held environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are sometimes used to describe the delivery of environmental water, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 5.7.8 describes the potential environmental watering actions in 2025-26, their expected watering effects — the intended physical or biological effects of the watering action — and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 5.7.8 Birchs Creek potential environmental watering actions, expected watering effects and environmental objectives

Potential environmental watering action	Expected watering effects	Environmental objectives
Birchs Creek (targeting reach 2)[1]		
Winter fresh (one fresh of 27 ML/day for three days during June)	• Maintain and support the growth and germination of streamside vegetation by increasing soil moisture and depositing sediment on the bank and benches • Scour old biofilms and organic matter that have accumulated in the channel, and cycle nutrients throughout the creek • Improve water quality by freshening refuge pools and provide connectivity between pools for fish and platypus movement	F1 MI1 PR1 V2 WQ1
Summer/autumn freshes (three freshes of 10-15 ML/day for three days during December to May)	• Increase the water depth to maintain and support seed germination and the growth of in-stream aquatic vegetation • Expand riffle and run areas to provide waterbug habitat • Top up pools to refresh water quality (particularly oxygen levels) and increase connectivity between pools for fish and platypus movement	F1 MI1 PR1 V1 WQ1

1 Environmental flows target outcomes in reach 3, but compliance can only be assessed in reach 2.

Scenario planning

Table 5.7.9 outlines potential environmental watering and expected water use in a range of planning scenarios.

Water for the environment in Birchs Creek is primarily used to deliver winter/spring freshes and summer/autumn freshes, where these are not met by the natural flow or consumptive water deliveries. The volume of water for the environment available is insufficient to deliver any other environmental flows recommended for the system.

The environment did not receive an allocation in December 2024, so no carryover is available to deliver winter/spring freshes in 2025 in any planning scenario. However, winter/spring freshes will likely be delivered naturally by reservoir spills in average and wet conditions.

In the drought and dry planning scenarios, the environment is also unlikely to receive an allocation in December 2025, as seasonal determinations in the Bullarook system are expected to be below 20 per cent. In these scenarios, the operational passing flow in the creek will be managed to protect critical human and environmental needs.

Summer/autumn freshes may be prioritised in average and wet conditions, if required, to avoid critical loss of environmental values when the system is likely under the greatest stress. Summer/autumn freshes should be delivered at the upper magnitude where possible, either by augmenting natural or consumptive flows or using water for the environment to deliver greater-magnitude freshes after one fresh has been met naturally. If not required to deliver summer/autumn freshes, allocation may be reserved to deliver a winter fresh in June 2026, or alternatively carried over to deliver a winter/spring fresh in 2026-27 before the water is forfeited on 30 November 2026.

Table 5.7.9 Birchs Creek environmental watering planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• The reservoir is unlikely to spill • Extremely low flow in winter/spring • Limited irrigation releases due to low allocations	• The reservoir is unlikely to spill • Low flow in winter/spring • Moderate irrigation releases	• Reservoir spills are certain in winter/spring • Some natural flow through summer/autumn • Groundwater contributes to baseflow throughout the year	• Reservoir spills are certain in winter/spring • Natural flow through summer/autumn • Groundwater contributes to baseflow throughout the year
Expected availability of water for the environment	• 0 ML		• 100 ML (2025 allocation)	
Birchs Creek (targeting reach 2)				
Potential environmental watering – tier 1 (high priorities)	• N/A		• Summer/autumn freshes (three freshes)	• Summer/autumn freshes (three freshes) • Winter fresh (one fresh)
Potential environmental watering – tier 2 (additional priorities)	• N/A		• Winter fresh (one fresh)	• N/A
Possible volume of water for the environment required to achieve objectives	• N/A		• 100 ML (tier 1) • 100 ML (tier 2)	• 0 ML (tier 1)
Priority carryover requirements for 2026-27	• N/A		• If the 100 ML allocation is received on 1 December 2025 and water for the environment is not required to achieve 2025-26 watering actions, it will be carried over into 2026-27 for use by 30 November 2026.	

SECTION 6:
Further information

6.1 Acronyms and abbreviations

AHD	Australian Height Datum (also see Glossary entry)
ARC	Australian Research Council
BGLC	Barengi Gadjin Land Council Aboriginal Corporation
CEWH	Commonwealth Environmental Water Holder
CMA	Catchment management authority
DDAC	Duduroa Dhargal Aboriginal Corporation
DEECA	Department of Energy, Environment and Climate Action
DJAARA	Dja Dja Wurrung Clans Aboriginal Corporation
EMAC	Eastern Maar Aboriginal Corporation
EVC	Ecological Vegetation Class
FPMMAC	First People of the Millewa-Mallee Aboriginal Corporation
GL	Gigalitre (also see Glossary entry)
GLaWAC	Gunaikurnai Land and Waters Aboriginal Corporation
GMTOAC	Gunditj Mirring Traditional Owners Aboriginal Corporation
GWMWater	Grampians Wimmera Mallee Water
IVT	Inter-valley transfer
ML	Megalitre (also see Glossary entry)
MLDRIN	Murray Lower Darling River Indigenous Nations
RAP	Registered Aboriginal Party
SCBEWC	Southern Connected Basin Environmental Watering Committee
TLaWC	Taungurung Land and Waters Council
VEWH	Victorian Environmental Water Holder
WMPP	Wimmera-Mallee Pipeline Project
WTOAC	Wadawurrung Traditional Owners Aboriginal Corporation
WWAC	Wamba Wemba Aboriginal Corporation
YYNAC	Yorta Yorta Nation Aboriginal Corporation

6.2 Glossary

Acid sulfate soils – Naturally occurring soils containing high quantities of iron sulfate. These soils are stable when inundated but can generate sulphuric acid and severe environmental impacts when exposed to air.

Adaptive (management, watering) – An iterative decision-making process based on continuous learning that aims to improve outcomes over time. Also known as 'learning by doing'.

Allocation (of water) – The specific volume of water made available against a water entitlement in a given water year. Allocation water is water that is actually available to use or trade in any given year, including new allocations and carryover.

Australian Height Datum (AHD) – Height above sea level.

Azolla – A native aquatic fern that grows in waterways in dense patches. Its presence usually indicates high levels of nutrients.

Bank erosion – The wearing away of the banks of a stream or river, as distinct from erosion of the bed.

Bank slumping – When a coherent mass of loosely consolidated materials or rock layers that form part of the riverbank moves a short distance down a slope. Bank slumping is usually associated with bank erosion.

Bankfull flow – A flow of sufficient size to reach the top of the riverbank, with little flow spilling onto the floodplain.

Biodiversity – The variety of plant and animal species in a particular habitat or environment.

Biofilm – A slimy film of bacteria, other microbes and organic materials that covers underwater surfaces, including rocks and snags.

Blackwater – A natural occurrence caused by the breakdown of organic matter in a waterway leading to discolouration. Sometimes, the breakdown of organic matter can deplete oxygen in the waterway. When the depletion is severe, fish and other animals that breathe underwater can die, and this is referred to as hypoxic blackwater.

Brackish (wetland, herbland) – Water that is moderately salty but not as salty as seawater. It may result from the mixing of seawater with freshwater, as in estuaries.

Carryover – Allows entitlement holders to retain ownership of unused water allocated or purchased from the current season into the following season, according to specified rules.

Catchment management authority (CMA) – A Victorian statutory authority responsible for the integrated planning and coordination of land, water and biodiversity management in a designated catchment and land protection region. Victoria's CMAs are listed in **section 6.3**.

Cease-to-flow – The period in which there is no discernible flow in a river and partial or total drying of the river channel.

Commonwealth Environmental Water Holder (CEWH) – The environmental water holder and associated staff that manage water entitlements recovered by the Commonwealth Government through investments in water-saving infrastructure, water purchases and other water recovery programs. The CEWH holds the entitlements.

Community – In the context of this plan, a group of people who live in the same geographical area or have a shared background, interest, affiliation or membership. 'Community' is also capitalised when Traditional Owners in submissions for this plan have done so to identify their Aboriginal community as distinct from the general community.

Confluence – The point where a tributary joins a larger river (called the main stem) or where two streams meet to become the source of a river of a new name.

Consumptive water – Water owned by water corporations or private entitlement holders held in storages and actively released to meet domestic, stock, town and irrigation needs.

Country – Aboriginal culture revolves around relationships to the land and water. For Traditional Owners, Country is a part of who they are, just as they are a part of it. Country must be respected. Traditional Owners of Country are authorised to speak for Country and its heritage.

Diadromous fish – Fish that migrate between freshwater and saltwater to complete specific parts of their life cycle.

Drawdown – Water released or allowed to evaporate from a dam, reservoir or wetland to lower the water level. Drawdowns in storages are usually done for operational or maintenance purposes and may be done in wetlands to support specific ecological outcomes.

Ecological vegetation class – A standard unit for classifying vegetation types in Victoria based on floristic, structural and environmental features.

En route (water) – Water that has been released from a storage and is moving downstream to meet an urban, irrigation or operational need.

Entitlement (to water) – The right to a volume of water that can usually be stored in a reservoir and taken and used under specific conditions and the right to receive water allocations, depending on resource availability.

Environmental flows study – A scientific study of the flow requirements of a particular river and/or wetland system used to inform decisions about managing and allocating water resources.

Environmental objective – A measurable environmental outcome sought from deliberate management actions (such as the delivery of water for the environment) in a particular system. Achieving an environmental objective may take years or even decades.

Environmental water – Water available under environmental entitlements that is actively managed to maintain the health of rivers and wetlands.

Environmental watering – The active delivery of environmental water to support particular environmental objectives by altering the flow in a river or the water level in a wetland.

Environmental water entitlement – A legal right to take and use water to maintain the Environmental Water Reserve or improve a water ecosystem's environmental values and health. It covers an environmental entitlement, environmental bulk entitlement, water share, section 51 or take and use licence or supply agreement.

Environmental water management plan – A plan developed by a waterway manager setting long-term environmental objectives and the necessary water regime to support those objectives.

Environmental watering program – The overarching Victorian program for planning and delivering water for the environment and involving all program partners.

Estuary – A partially enclosed body of water along the coast where freshwater from rivers and streams meets and mixes with saltwater from the sea.

Expected watering effect – A physical, chemical, biological or behavioural effect expected from a potential watering action. Each potential action will have one or more expected watering effects.

Fishway – A series of pools built like steps to enable fish to travel past an artificial obstruction like a dam or weir.

Fledging – The stage at which a young bird grows feathers, becomes independent and can fly and leave its nest.

Flow component – A component of a river system's flow regime that can be described by its size, timing, frequency and length, for example, cease-to-flow and overbank flow.

Fresh – A small increase in the size of a flow over a short length of time within a river. A fresh can occur in any season and usually lasts from several days to a few weeks.

Geomorphology – The scientific study of landforms and the processes that shape them.

Gigalitre (GL) – One billion litres of water or a thousand megalitres.

Groundwater – Water held underground in the soil or in pores and crevices in rock.

Headwater – A tributary stream of a river close to or forming part of its source.

Headworks – A collection of water storage infrastructure (such as reservoirs, diversion weirs and channels) that supports the harvest and distribution of water within one or more catchment regions.

Held environmental water – A component of the Environmental Water Reserve that is 'held' in storage to allow water holders to plan for its use and delivery, as opposed to a component of the Environmental Water Reserve that is not held in storage (such as passing flows and unregulated flows).

Heritage river – A river listed under the *Heritage Rivers Act 1992* and part of a river and river catchment area in Victoria with significant nature conservation, recreation, scenic or cultural heritage attributes.

High-reliability (allocation, water shares) – A legally recognised, secure entitlement to a defined share of water. Water shares are classed by their reliability, which is defined by how often full seasonal allocations are expected to be available. Allocations are made to high-reliability water shares before low-reliability shares.

Hydrology – The study of the properties of water and its movement in relation to land.

Inter-valley transfer – The transfer of water between river systems to meet demands due to water trade between river systems.

Irrigation release – The release of water for irrigation purposes.

Juvenile – A stage of life at which an animal or plant is not yet fully mature.

Land manager – An agency or authority responsible for conserving natural and cultural heritage on public land, including parks and reserves (such as Parks Victoria and DEECA).

Low flow – A relatively stable, sustained flow in a river, generally being its minimum natural level for that season.

Managed release – A deliberate release of stored water for the environment to deliver a potential watering action and associated environmental outcomes.

Megalitre (ML) – One million litres of water.

Midden – A site of cultural significance where Aboriginal people left the remains of their meals and other domestic waste.

Millennium Drought – The Millennium Drought of 1997 to 2009 was the most severe drought experienced in Victoria since European settlement. The drought broke in 2010, the fifth-wettest year on record, and resulted in severe flooding in the summer of 2010-11.

Operational (release, delivery, flow) – A release of water from a storage to support the operation of the water distribution system or make water available to consumptive water users.

Overbank (flow, flood) – A flow event that exceeds the capacity of the river channel and inundates neighbouring floodplains.

Passing flow – A release of water from a storage to operate a river and distribution system, often to help deliver water for environmental or consumptive uses, maintain environmental values and provide other community benefits. Inflows to the storage generally determine the volume of a passing flow.

Potential watering action – An environmental flow component identified for a particular system in a particular year.

Program partner – An organisation responsible for delivering part of the environmental watering program. The VEWH's program partners include Victoria's waterway managers (catchment management authorities and Melbourne Water), DEECA, other environmental water holders, storage managers and land managers. Traditional Owners are also increasingly partnering in the environmental watering program.

Pulse – Water released to increase the size of a flow for a short length of time, usually to cue an ecological response like triggering the movement of fish.

Ramsar-listed (site) – A site (such as a wetland) listed as internationally significant under the Convention on Wetlands of International Importance signed in Ramsar, Iran, in 1971.

Reach – A section of a river, generally defined in an environmental flows study.

Recreational values – The objectives and benefits that recreational users and community members associate with using waterways for recreation and enjoying nature. They include wellbeing and enjoyment derived from social interaction, physical activity and relaxation connected to sporting events, fishing, waterskiing, rowing, paddling, camping, walking and gathering with friends and family.

Recruitment – The process where individuals are added to a population, such as when plants and animals mature from their early life stages to breeding ages.

Regional catchment strategy – A long-term environmental strategy for a catchment management region developed to guide the collective efforts of government, organisations and communities to protect and improve the health of the land, water and biodiversity resources. Catchment management authorities lead the development of these strategies, but the planning belongs to the community.

Regional waterway strategy – An eight-year strategy prepared by a waterway manager for the rivers, wetlands and estuaries in its catchment. It is the single regional planning document for waterways in the area.

Remnant vegetation – Patches of native trees, shrubs and grasses remaining after disturbance (such as by land clearing).

Return flow – The part of a delivery of water for the environment that flows back into the river channel or out the end of a river system and is available for use further downstream. Return flows may be captured and stored for later reuse, but they are more commonly used as the water moves downstream.

Riffle – A shallow section of stream where water flows at a higher velocity, turbulence increases and the surface is disturbed.

Riparian vegetation – Plants that grow along the banks of waterways, in the zone between the waterway and the land next to it.

Seasonal watering plan – The VEWH's annual operational document describing potential actions to deliver water for the environment across Victoria in the coming water year.

Seasonal watering proposal – An annual proposal outlining the regional priorities for using water for the environment in each water year that waterway managers submit to the VEWH to consider for its seasonal watering plan.

Seasonal watering statement – A statement by the VEWH to allow a CMA or Melbourne Water to apply water from specific environmental entitlements to deliver the watering actions specified in the seasonal watering plan.

Self-determination – The United Nations Declaration on the Rights of Indigenous Peoples describes self-determination as the ability for Indigenous people to freely determine their political status and pursue their economic, social and cultural equity based on their own values and way of life. This means that Traditional Owners have the right to make choices that best reflect them as they make their way to self-determination and self-governance.

Shared benefits – Benefits achieved when water is managed primarily to meet the needs of the entitlement holder, but secondary environmental, cultural, recreational, social or economic benefits are also provided without requiring additional water.

Slackwater habitat – An area of a river or stream with little or no current. The area may be immediately downstream of an obstruction like a rock or at the margins of the channel, and it is often an important place for waterbugs, fish larvae and small-bodied fish.

Spawning – The process of fish releasing eggs and sperm to reproduce.

Stakeholder – An organisation, group or individual with an interest in the environmental watering program. Program partners engage with stakeholders when planning or delivering water for the environment or reporting on watering outcomes.

Storage manager – An authority appointed by the Minister for Water to operate major water storages in a river basin to deliver water to entitlement holders.

Terrestrial – Land-based.

The Living Murray program – The intergovernmental program that holds an average of 500,000 ML of water for the environment each year to use at six iconic sites along the Murray River.

Tier 1 – Potential watering actions the waterway manager proposes to deliver with the predicted supply (including by supply other than through managed environmental water releases) under each planning scenario to achieve the intended environmental objectives, given current environmental conditions and proposed deliveries of water for the environment.

Tier 2 – Potential watering actions that may be delivered if opportunities arise. Some of these actions can and should be delivered if more water becomes available through increased allocation or water trade or transfers, or if tier 1 actions are achieved with less environmental water than expected. Other tier 2 actions are not considered essential to deliver during the year under a planning scenario but are likely to be needed in coming years. They may be delivered during the year if environmental conditions change or to take advantage of operational circumstances.

Trade – see Water trading

Traditional Owners – People who, through membership of a descent group or clan, are responsible for caring for particular Country. A Traditional Owner is authorised to speak for Country and its heritage.

Tributary – A smaller river or creek that flows into a larger river.

Unregulated (entitlement) – An entitlement to water declared during periods of unregulated flow in a river system, usually when high rainfall causes river flow to exceed consumptive and system storage demands.

Unregulated flow – A natural streamflow that cannot be captured in a major reservoir or storage.

Victorian Environmental Water Holder (VEWH) – The independent statutory body responsible for holding and managing Victorian water for the environment entitlements and allocations.

***Water Act 1989* –** The legislation that governs water entitlements and establishes how Victoria's water resources are managed.

Water allocation – See Allocation (of water).

Waterbug – An aquatic animal without a backbone that can be seen with the naked eye. Worms, snails, mites, bugs, beetles, dragonfly larvae, shrimps and freshwater crayfish are all referred to as waterbugs.

Water for the environment – Water available for environmental purposes, including entitlements held by the VEWH, passing flows and unregulated flows.

Water trading – The process of buying, selling or exchanging rights to water. A water trade can be a permanent transfer of ownership of a water entitlement or the trade of an annual water allocation. The Minister for Water sets rules for water trading in Victoria. The term 'trade' in the seasonal watering plan refers to the purchase, sale or transfer of allocation water.

Water year – The twelve-month period from 1 July to 30 June used for allocating, managing and reporting the use of water entitlements.

Waterway manager – The agency or authority (regional CMAs or Melbourne Water) responsible for the environmental management of a catchment or waterway.

Waterway – A river, wetland, creek, floodplain, estuary or other body of water.

6.3 Contact details

For further information about the *Seasonal Watering Plan 2025-26*, please contact the VEWH.

Victorian Environmental Water Holder

Ground floor, 8 Nicholson Street,
East Melbourne, Victoria 3002
PO Box 500, East Melbourne, Victoria 3002

(03) 9637 8951
general.enquiries@vewh.vic.gov.au
www.vewh.vic.gov.au

Please contact the relevant waterway manager for specific information about each system and specific seasonal watering proposals.

Corangamite CMA

64 Dennis Street, Colac, Victoria 3250
PO Box 159, Colac, Victoria 3250

1800 002 262
info@ccma.vic.gov.au
www.ccma.vic.gov.au

East Gippsland CMA

574 Main Street, Bairnsdale, Victoria 3875
PO Box 1012, Bairnsdale, Victoria 3875

(03) 5152 0600
reception@egcma.com.au
www.egcma.com.au

Glenelg Hopkins CMA

79 French Street, Hamilton, Victoria 3300
PO Box 502, Hamilton, Victoria 3300

(03) 5571 2526
www.ghcma.vic.gov.au

Goulburn Broken CMA

168 Welsford Street, Shepparton, Victoria 3630
PO Box 1752, Shepparton, Victoria 3630

(03) 5822 7700
reception@gbcma.vic.gov.au
www.gbcma.vic.gov.au

Mallee CMA

Agriculture Victoria Centre, Corner Koorlong Avenue and Eleventh Street, Irymple, Victoria 3498
PO Box 5017, Mildura, Victoria 3502

(03) 5051 4377
reception@malleecma.com.au
www.malleecma.com.au

Melbourne Water

990 La Trobe Street, Docklands, Victoria 3008
PO Box 4342, Melbourne, Victoria 3001

131 722
enquiry@melbournewater.com.au
www.melbournewater.com.au

North Central CMA

628–634 Midland Highway, Huntly, Victoria 3551
PO Box 18, Huntly, Victoria 3551

(03) 5448 7124
info@nccma.vic.gov.au
www.nccma.vic.gov.au

North East CMA

Level 1, 104 Hovell Street, Wodonga, Victoria 3690
PO Box 616, Wodonga Victoria 3689

1300 216 513 or (02) 6043 7600
necma@necma.vic.gov.au
www.necma.vic.gov.au

West Gippsland CMA

16 Hotham Street, Traralgon, Victoria 3844
PO Box 1374, Traralgon, Victoria 3844

1300 094 262
www.wgcma.vic.gov.au
(which includes a contact form)

Wimmera CMA

24 Darlot Street, Horsham, Victoria 3400
PO Box 479, Horsham, Victoria 3402

(03) 5382 1544
wcma@wcma.vic.gov.au
www.wcma.vic.gov.au

For specific information about the other environmental water holders in Victoria, please contact one of the following organisations.

Murray-Darling Basin Authority

33 Allara Street, Canberra City, ACT 2601
GPO Box 1801, Canberra City, ACT 2601

(02) 6279 0100 or 1800 630 114
www.mdba.gov.au

Commonwealth Environmental Water Holder

John Gorton Building, King Edward Terrace, Parkes, ACT 2600
GPO Box 858, Canberra, ACT 2061

(02) 5156 4570
ewater@dcceew.gov.au
www.dcceew.gov.au/cewh

ISSN: 2203-6520 (Online)

Disclaimer