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Wimmera Mallee long-term watering plan

2026 update



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We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

DEECA is committed to genuinely partnering with Victorian Traditional Owners and Victoria's Aboriginal community to progress their aspirations.



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Abbreviations

ANAE	Australian National Aquatic Ecosystems (Murray-Darling Basin classification system)
BWS	Basin-wide environmental watering strategy
CAMBA	China-Australia Migratory Bird Agreement
CEWH	Commonwealth Environmental Water Holder
CMA	Catchment Management Authority
CMS	MDBA Constraints Management Strategy 2013 to 2024
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEECA	Victorian Department of Energy, Environment, and Climate Action
EEO	Expected environmental outcome
EVC	Ecological Vegetation Class
EWAG	Environmental Watering Advisory Group
EWMP	Environmental Water Management Plan
EWMEP	Environmental Water Monitoring and Evaluation Program
EWP	Environmental watering plan (Basin Plan chapter 8)
HEW	Held environmental water
JAMBA	Japan-Australia Migratory Bird Agreement
LTWP	Long-term Watering Plan
MDBA	Murray-Darling Basin Authority
PCV	Permissible Consumptive Volume
PEA	Priority environmental asset
PEF	Priority ecosystem function
PEW	Planned environmental water
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RWS	Regional Waterway Strategy
SDL	Sustainable Diversion Limit
SCBEWC	Southern Connected Basin Environmental Watering Committee
TLM	The Living Murray program
VEWH	Victorian Environmental Water Holder
WRPA	Water resource plan area
VWMS	Victorian Waterway Management Strategy

Glossary

Term	Basin Plan definition	Victorian definition	Example
Asset (see also priority environmental asset)	A water-dependent ecosystem that satisfies at least one of the following criteria: • is formally recognised in international agreements or, with environmental watering, is capable of supporting species listed in those agreements • is natural or near-natural, rare or unique • provides vital habitat • supports Commonwealth, State or Territory listed threatened species or communities • supports, or with environmental watering is capable of supporting, significant biodiversity. For expanded definitions see Schedule 8, also C8, P5, S8.49.	A significant water-dependent ecosystem (place). May be a single wetland, wetland complex, or a river.	<i>Lake Hindmarsh</i> <i>Ranch Billabong</i> <i>Wimmera River</i> <i>Yarriambiack Creek</i>
Basin Plan	The <i>Basin Plan 2012</i> (Cth) was developed in accordance with the Commonwealth <i>Water Act 2007</i> (Cth). It sets out an overarching framework underpinned with specific obligations to enable sustainable use of water resources within the Murray-Darling Basin.		
Basin States	State and Territory jurisdictions within the Murray-Darling Basin (Australian Capital Territory, New South Wales, Queensland, South Australia, Victoria).		
Country Plan		Traditional Owner plan prioritising goals and actions for Country.	<i>Growing What Is Good Country Plan: Voices Of The Wotjobaluk Nations</i> <i>Wotjobaluk, Jaadwa, Jadawadjali, Wergaia And Jupagulk Peoples</i>
Ecosystem function	A process within or between assets which supports physical or trophic dynamics that benefit the asset and contribute to achieving ecological objectives. Under the Basin Plan an ecosystem function meets at least one of the following criteria: • “supports the creation and maintenance of vital habitats and populations	A physical process involving the interactions, movement, energy exchange, or condition of biota, soil, water, nutrients, or other physical features, and will support an environmental value.	<i>Lateral connectivity between floodplains, anabranches and wetlands</i> <i>Water quality</i> <i>Drought refuges.</i>

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Term	Basin Plan definition	Victorian definition	Example
	- supports the transportation and dilution of nutrients, organic matter and sediment - provides connections along a watercourse (longitudinal connections) - provides connections across floodplains, adjacent wetlands and billabongs (lateral connections)" (C8, P5, S8.50) (for details see Schedule 9).		
Ecological/environmental objective	An objective for the protection, and if necessary, restoration, of a priority environmental asset or priority ecosystem function (C1, P3, S1.07).	The desired condition for specific environmental value(s) that may be managed with environmental water. An objective includes a desired trajectory (e.g. 'maintain' or 'improve') for a desired measurable outcome (e.g. 'extent or 'species richness'). Measured through the more specific ecological target (see below).	<i>Improve abundance of large-bodied native fish</i> <i>Maintain species richness of frog communities.</i>
Ecological/environmental target	A target that must be met in order to achieve an ecological objective. (C1, P3, S1.07)	A measurement of progress towards, or achievement of, the ecological objective. Targets should be specific, measurable, attributable, realistic and timebound. Measured by environmental monitoring at the event-based, intervention, or condition scales. Results of this measurement indicate whether adaptive management is required to accomplish the objective (for example, management of the timing, frequency, duration or volume of environmental water).	<i>A positive trend in the catch per unit effort (CPUE) of large bodied native fish over the 10-year period to 2025.</i> <i>Maintain the number of native frog species recorded in 8 out of 10 years to 2025.</i>
Ecological vegetation class (EVC)		The standard unit for classifying vegetation types in Victoria - refer to website here .	<i>Wimmera bioregion EVC 19: Riparian Shrubland</i>
Environmental water management plan (EWMP)		Victorian asset-based long-term (~10 year) plan that sets out environmental watering objectives and hydrological requirements	<i>Environmental Watering Management Plan - Wimmera River, Yarriambiack Creek and Terminal Lakes</i>
Environmental watering requirement	The environmental watering requirements of a priority environmental asset or priority ecosystem function, as the case may	<u>Hydrological objectives</u> : the flow components (river) or flooding regime (wetland/floodplain) that will	<i>Winter fresh of 1,000 – 1,800 ML/day for 1-2</i>

Term	Basin Plan definition	Victorian definition	Example
	be, identified using the methods set out in Part 5 of Chapter 8. For details see C8, P5, S8.51.	support an environmental value reliant on hydrology for all or part of its life cycle. May consist of one or more of cease-to-flows, minimum flows, freshes, bank-full flows, and over-bank flows in a river, or filling volumes and drying in a wetland, plus timing (which seasons during the year), durations (how long does it need to occur for) and recurrence interval (every year or less frequently). May vary for dry, average and wet conditions depending on the hydrological tolerances of the environmental value. <u>Environmental watering requirements / regime</u>: an integration of the hydrological objectives at a specific asset that will support one or more of the ecological objectives, and be the means to achieve the ecological targets. Measured by compliance monitoring for environmental water deliveries.	<i>days, once per year in Jul-Aug.</i> <i>Maintain baseflows year-round, winter freshes each year, and winter overbank flows 1 in 3 years.</i>
Environmental entitlement	see <i>held environmental water</i>	An environmental entitlement is a right to water granted to the Victorian Environmental Water Holder for the purpose of maintaining the Environmental Water Reserve or improving environmental values and health of the water ecosystems and other users that depend on environmental condition. Issued by the Minister for Water under the <i>Water Act 1989</i> (Vic) and relate to the Commonwealth definition for <i>held environmental water</i>	
Environmental value		In this context, an environmental value is a water-dependent species or community present in or supported by an asset or an ecosystem function.	<i>Murray cod, river red gums, wetland</i> <i>Ecological Vegetation Classes (EVCs), brolga.</i>
Held environmental water	Water available under a water access right; or a water delivery right; or an irrigation right; for the purposes of achieving environmental outcomes (including water that is specified in a	Water that is set aside for the environment as an environmental entitlement, as per the <i>Water Act 1989</i> (Vic).	

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Term	Basin Plan definition	Victorian definition	Example
	water access right to be for environmental use).		
Passing flow		The volume of water that water corporations or licensed diverters are obliged to provide out of storage or past a diversion point before water can be taken for consumptive use.	
Planned environmental water	As per the <i>Water Act 2007</i> (Cth), water that is committed or preserved for achieving environmental outcomes and cannot be taken or used for any other purpose.	In Victoria, these are passing flows, only where specifically provided for environmental purposes.	
Priority environmental asset or ecosystem function	An ecological asset or ecosystem function (defined above) that can be managed with environmental water (C8, P5, S9.49).	An asset with significant environmental values (as per Schedule 8 of the Basin Plan), that can be managed with some form of environmental water. Important ecosystem functions (as per Schedule 9 of the Basin Plan) that can be managed with some form of environmental water, and are likely to support environmental values at a priority asset.	See Asset
Regional waterway strategy		Required under the <i>Water Act 1989</i> (Vic), waterway managers must prepare planning documents for each CMA region's river, estuary and wetland management.	https://www.necma.vic.gov.au/About/Publications/Strategies/North-East-Waterway-Strategy <i>Wimmera Waterway Strategy</i>
Seasonal watering plan	Annual environmental watering priorities as required by Basin states under per Basin Plan s.8.23.	A requirement under the <i>Water Act 1989</i> (Vic), the VEWH prepares a plan each year to prioritise use of the water holdings, based on waterway manager seasonal watering proposals.	<i>Seasonal watering plan 2025-26</i>
Seasonal watering proposal		Victorian planning document identifying desired environmental water use for rivers, wetlands and estuaries that receive environmental water.	<i>Mallee CMA Murray Wetlands 2025-26</i>

Summary

This long-term watering plan (LTWP) has been prepared by the Victorian Government in accordance with its obligations under the Murray-Darling Basin Plan ('Basin Plan'). It concerns the Wimmera-Mallee water resource plan area, which extends from the Grampians through to the broad floodplains of the Wimmera, Avon-Richardson and Avoca river systems and up to the Murray River floodplain in north western Victoria. The landscape of this water resource plan area is dominated by the terminal lakes and wetlands of these waterways.

This is a minor update to the 2021 LTWP for the Wimmera-Mallee, as required under the Basin Plan (s. 8.22) following an update to the Basin-wide environmental watering strategy by the Murray Darling Basin Authority (MDBA) in 2025. This update:

- aligns with the 2025 Basin-wide environmental watering strategy expected environmental outcomes and the First Nations objectives
- incorporates Water is Life: Traditional Owner Access to Water Roadmap policy, particularly for Traditional Owners having an increased role in determining how environmental water is used for the purpose of healing Country
- updates other sections that have evolved in the past five years such as the priority ecological assets, constraints, climate change risks and monitoring.

This LTWP focuses on the use of environmental water to achieve ecological outcomes in the Wimmera-Mallee water resource plan area. It has been developed with regard to the Basin-wide environmental watering strategy (MDBA, 2025a) and primarily uses a bottom-up approach, drawing on a considerable body of work undertaken at the regional and asset scale by catchment management authorities (CMAs) in their regional catchment strategies, regional waterway strategies and environmental water management plans (EWMPs). The LTWP describes ecological objectives and targets for water-dependent priority environmental assets (PEAs) (rivers and wetlands) and ecosystem functions in the region, and explains the corresponding environmental watering requirements for these objectives. Full objectives and watering requirements can be found in the EWMPs and in the database accompanying this update (DEECA, 2026). This LTWP does not provide detailed management guidance for priority environmental assets; this information remains in the asset-scale EWMPs.

The Wimmera-Mallee LTWP fits within Victoria's existing water entitlement and policy framework and has been prepared using best available information at the time of writing. The Wimmera-Mallee LTWP is one of three LTWPs prepared to meet Victoria's planning obligations under Chapter 8 of the Basin Plan. The other LTWPs have also been updated: the Victorian Murray and Northern Victoria water resource plan areas.

Key elements of this plan can be summarised as follows:

Priority environmental assets

There is one main river system and associated wetlands in the Wimmera-Mallee water resource plan area that meet criteria for priority environmental assets (PEAs), in that they are able to receive environmental water, and meet criteria set out in Schedule 8 of the Basin Plan. This is the Wimmera River system, which receives held environmental water, and includes the Wimmera Mallee Pipeline Wetlands.

Priority ecosystem functions

Five main priority ecosystem functions (PEFs) have been identified for this LTWP in the Wimmera-Mallee water resource plan area concerning longitudinal hydrological connectivity between river reaches, surface water salinity, refuges for native fish species, geomorphic habitat, and water quality. These are considered priority in that they may be managed with environmental water and meet criteria in Schedule 9 of the Basin Plan.

Water-dependent ecological values

The Wimmera-Mallee water resource plan area supports important water-dependent ecological values including native fish (e.g. freshwater catfish, flat-headed gudgeon and Australian smelt); vegetation (e.g. spiny lignum, ridged water milfoil and cane grass); waterbirds (e.g. brolga, blue-billed duck, Australian painted snipe); frogs, turtles, and platypus. Ecosystem functions that support these ecological values include geomorphological condition and hydrological connectivity.

Objectives

The LTWP identifies 18 objectives for priority environmental assets and ecosystem functions to support waterway health in the Wimmera-Mallee water resource plan area. These are listed in the table below and were developed from the ecological objectives set in asset-scale EWMPs, which were prepared by CMAs in consultation with local communities.

Objectives were extracted from individual EWMPs and standardised so that each included a trajectory (e.g. improve), aspect (e.g. abundance) and value (e.g. large-bodied native fish). Similar objectives across assets and ecosystem functions were grouped, producing a set of objectives relevant across the water resource plan area.

Targets have been developed for a subset of the objectives.

Theme	No.	Objectives
Connectivity and Functions	WM1	Improve longitudinal connectivity (between river reaches) to facilitate movement of native fish
	WM2	Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation
	WM3	Maintain refuges for native fish species
	WM4	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)
	WM5	Maintain water quality to provide suitable conditions for water-dependent biota
Vegetation	WM6	Improve the abundance and maintain the species richness and extent of aquatic vegetation
	WM7	Improve the condition of riparian and floodplain EVCs
	WM8	Improve the condition of wetland EVCs
	WM9	Maintain the condition of black box dominated EVCs
	WM10	Improve condition and maintain extent of river red gum dominated EVCs and lignum dominated EVC
Waterbirds	WM11	Improve breeding opportunities and habitat for waterbirds
	WM12	Improve food resources and feeding opportunities for waterbirds
Fish	WM13	Improve the abundance of large-bodied fish
	WM14	Improve habitat and movement and maintain species richness of native fish
Other	WM15	Improve habitat for Platypus and Rakali communities
	WM16	Maintain habitat for crayfish, turtle and frog communities
	WM17	Improve abundance and maintain diversity of macroinvertebrates
	WM18	Maintain species richness of frog communities

Cooperative arrangements

Victoria has strong cooperative arrangements for the management and delivery of environmental water between holders of held environmental water, waterway managers and owners and managers of environmental assets. The Victorian government has established these arrangements in consultation with delivery partners and communities. The arrangements are underpinned by a range of policy, regulatory and governance frameworks.

A range of authorities collaborate to deliver environmental water in Victoria: waterway managers (CMAs), Traditional Owners, storage managers (water corporations), environmental water holders and public land managers. All must engage with Traditional Owners in undertaking their functions.

The Wimmera, North Central and Mallee CMAs work across the Wimmera-Mallee, partnering with Traditional Owner groups in the planning and management of waterways and catchments. In the Wimmera-Mallee these groups are the Barengi Gadjin Land Council Aboriginal Corporation – representing the Traditional Owners of the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia, and Jupagulk peoples (known collectively as the Wotjobaluk Nations); Dja Dja Wurrung Clans Aboriginal Corporation; and First People of the Millewa-Mallee – representing Latji Latji, and Ngintait Traditional Owners; and the Wamba Wamba Aboriginal Corporation – representing the Wamba Wamba/Wemba Wemba Traditional Owners.

Grampians Wimmera-Mallee Water is the responsible water corporation.

Coordination and cooperation between Victorian environmental watering partners is critical in ensuring the success of environmental watering activities across the State. As the decision-making body for use of Victoria's held environmental water, the Victorian Environmental Water Holder (VEWH) leads the coordination process.

An annual process takes place that involves preparation of Seasonal Watering Proposals by CMAs and/or Traditional Owners; preparation of the Seasonal Watering Plan by the VEWH; consideration and prioritisation of actions in the Seasonal Watering Plan, in consultation with the Commonwealth Environmental Water Holder (CEWH) and the Murray-Darling Basin Authority (MDBA); the release of seasonal watering statements by the VEWH; and delivery coordination and consultation with storage managers¹.

Water is Life commits to the increased role of Traditional Owners in determining how environmental water is used for the purpose of healing Country. As part of this, Traditional Owners may submit seasonal watering proposals to VEWH independently or in partnership with waterway managers (CMAs).

Constraints

The Wimmera-Mallee water resource plan area is not a priority area considered in the MDBA's *Constraints Management Strategy 2013 to 2024*. The MDBA has identified that relaxation of constraints in the Wimmera-Mallee would have little environmental benefit from a Basin-scale perspective of environmental outcomes.

The EWMPs in the Wimmera Mallee identify a number of physical constraints arising from limited watercourse capacity and outlet release capacity. A number of studies have been undertaken in recent years to identify ways to overcome some of these constraints (recognising that some are unfeasible to address) and the Wimmera CMA continues to lead the implementation of the recommendations from such studies.

Risks

A detailed risk assessment was undertaken for the Wimmera-Mallee Water Resource Plan (DELWP, 2019a). Long-term risks associated with providing for the environmental water requirements under this plan fall into two broad categories:

- risk of failure to achieve (or demonstrate achievement of) the intended ecological objective
- risk of adverse impacts in the provision of environmental water.

The risks associated with a failure to achieve the intended ecological objectives are grouped into four types of risk:

- failure to provide recommended watering regime,
- failure to provide complementary works,
- external factors (e.g. bushfire, climate change), and;
- failure to demonstrate outcomes.

The risks associated with adverse impacts arising from the provision of environmental water are grouped by their impact on environmental, social and economic values.

1. In other Victorian water resource plan areas, the Southern Connected Basin Environmental Water Committee (SCBEWC) is also involved in the process.

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A climate risk update has also been included in this 2026 LTWP.

Existing processes are in place for managing these risks at the regional and site-specific scale.

Consultation

Consultation has occurred through a three-part devolved approach. It has aimed to:

- *involve* local communities, who have worked directly with CMAs in the development and delivery of EWMPs to ensure information and concerns were understood and considered.
- *collaborate* with the VEWH and CMAs, who have provided material and guidance for the LTWP.
- *consult* with the water corporations, land managers, MDBA, CEWH, upstream and downstream states, and Traditional Owners, who provided information where relevant and feedback on the content.

Traditional Owners

Water is Life acknowledges the truth of the historic and ongoing harms of colonisation and the dispossession of land and water rights from Traditional Owners. Given this history of dispossession, the Victorian Government has made a commitment to work in partnership with Traditional Owners and First Nations to support their right to self-determination.

Traditional Owners were invited to participate in the LTWP update. Several Traditional Owner groups expressed interest to DEECA in learning about Basin Plan and the role of LTWPs. However, no groups were able to review the Wimmera Mallee LTWP draft.

Traditional Owners contribute to long-term waterway health planning through regional waterway strategies (currently under review and due 2027), long-term environmental water planning through EWMPs (as updated), and annual environmental water planning via seasonal watering proposals.

Traditional Owners will continue to be engaged throughout Basin Plan implementation by Victorian and Commonwealth agencies.

Next Steps

This LTWP is one of many steps towards full implementation of Basin Plan. Monitoring and evaluation of the ecological objectives and targets in this LTWP is required, to report on achievement of environmental outcomes at the asset scale (Basin Plan Matter 8).

The next LTWP will be informed by the following:

- Outcomes of the 2026 Basin Plan Review
- The next update to the Basin-wide environmental watering strategy
- New environmental watering sites (priority environmental assets)
- Updates to EWMPs
- New Victorian Waterway Management Strategy
- New Regional Waterway Strategies
- New evidence and knowledge generated from programs such as Victoria's Environmental Water Monitoring and Evaluation Program (EWMEP).

1 Introduction

The Murray-Darling Basin Plan aims to improve water security and establish a sustainable and long-term adaptive management framework for Murray-Darling Basin water resources.

The Basin Plan was released in November 2012 and sets out an overarching framework underpinned with specific obligations, to enable sustainable use of water resources within the Murray-Darling Basin.

The Murray-Darling Basin Authority (MDBA) works with Basin states to implement the Basin Plan. In Victoria, the responsibility for meeting state obligations for the Basin Plan is being met by the Department of Energy, Environment and Climate Action (DEECA), with important contributions from all water resource and asset managers.

All Basin states must develop a series of planning documents under the Basin Plan, including long-term watering plans (LTWPs) for environmental assets and ecosystem functions.

Separate LTWPs have been developed for each of Victoria's water resource plan areas, including the Wimmera-Mallee, Northern Victoria and the Victorian Murray (Figure 1). These areas are based on surface water plan area boundaries (not catchment boundaries) and include priority rivers and wetlands that may be managed with environmental water.

This LTWP for the Wimmera-Mallee water resource plan area incorporates information and planning that is both general to Victoria and specific to the water resource plan area. The first version of this LTWP was released in 2015 (DELWP, 2015a), followed by an update in 2020 (DELWP, 2020), and this update in 2026.

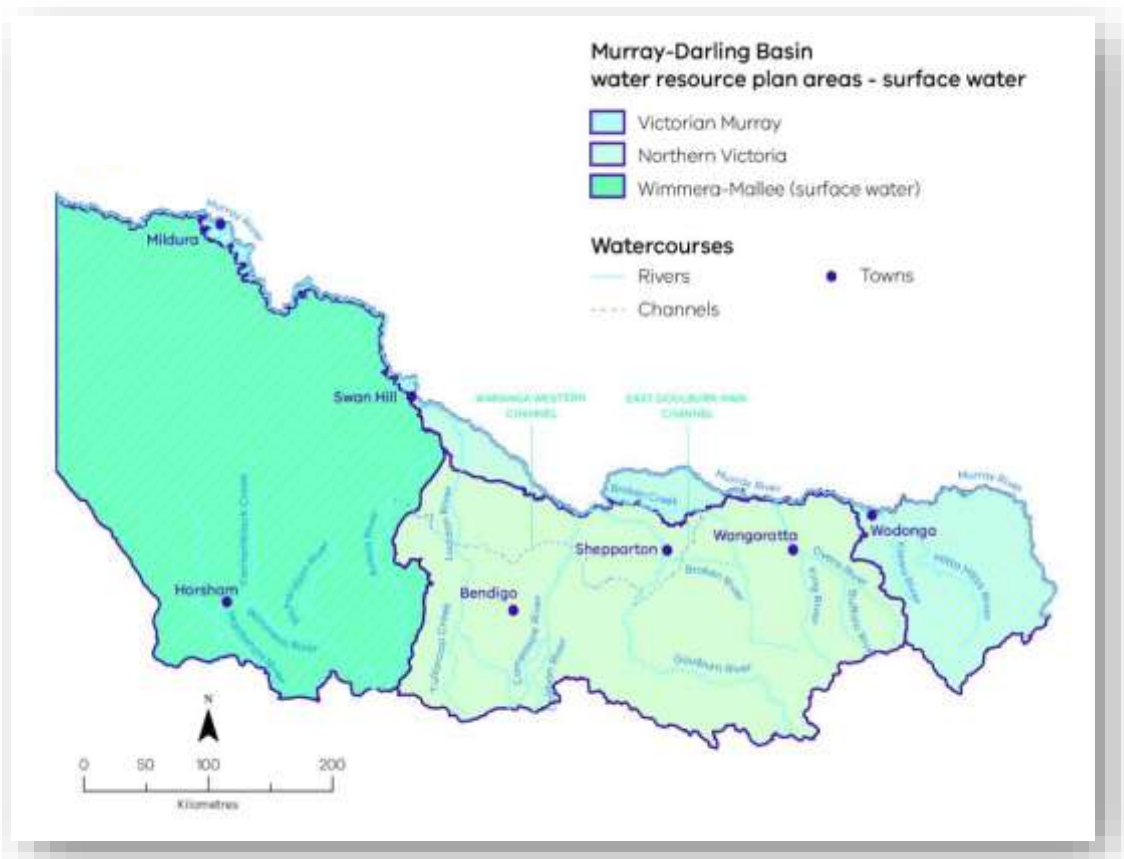


Figure 1: Victoria's three surface water resource plan areas – Victorian Murray, Northern Victoria, and Wimmera-Mallee.

1.1 Context

The construction and operation of water storages and other water interception activities have altered the natural flow regime of rivers and inundation patterns of wetlands. These environments now operate in a way that is significantly modified from natural conditions. Without continuation of environmental watering in Victoria, the future trajectory of river and wetland biota and condition would continue to decline. The provision of a suitable watering regime and complementary activities (see section 8) is essential to achieve the objectives and targets outlined in this plan.

Using environmental water to improve environmental conditions does not require the provision of a completely natural water regime. Specific components of a watering regime can have specific impacts on biota, or vital parts of their lifecycle. Water requirements to meet objectives and targets can be developed so that the volume, timing, duration, frequency and quality of environmental water that is provided is specifically linked to the proposed outcomes from the environmental flows.

Environmental watering cannot restore healthy waterways; many rivers and wetlands are so modified that this is not feasible. However, environmental watering can restore some components of the natural flow regime in our highly modified waterways to support critical ecological processes and to minimise some of the impacts of river and wetland modifications.

Basin Plan

The *Basin Plan 2012* (Cth) establishes long-term management objectives in relation to:

- environmental outcomes
- water quality and salinity
- long-term average sustainable diversion limits
- trading in the water market.

For the **environmental outcomes** of the Basin Plan, the MDBA and Basin states (QLD, NSW, VIC, ACT and SA) are working toward attainment of four overarching objectives:

- to protect and restore water-dependent ecosystems of the Murray-Darling Basin
- to protect and restore the ecosystem functions of water--dependent ecosystems
- to ensure that water--dependent ecosystems are resilient to climate change and other risks and threats
- to ensure that environmental watering is co-ordinated between managers of planned environmental water, owners and managers of environmental assets, and holders of held environmental water.

While overall Basin Plan implementation provides for the attainment of these objectives, the most specific actions are set out in Chapter 8 'Environmental Watering Plan', which outlines planning required from the MDBA and Basin states to achieve the objectives. This planning provides for both long-term and annual environmental water objectives, at both the Basin and a more localised scale, as shown in Figure 2.

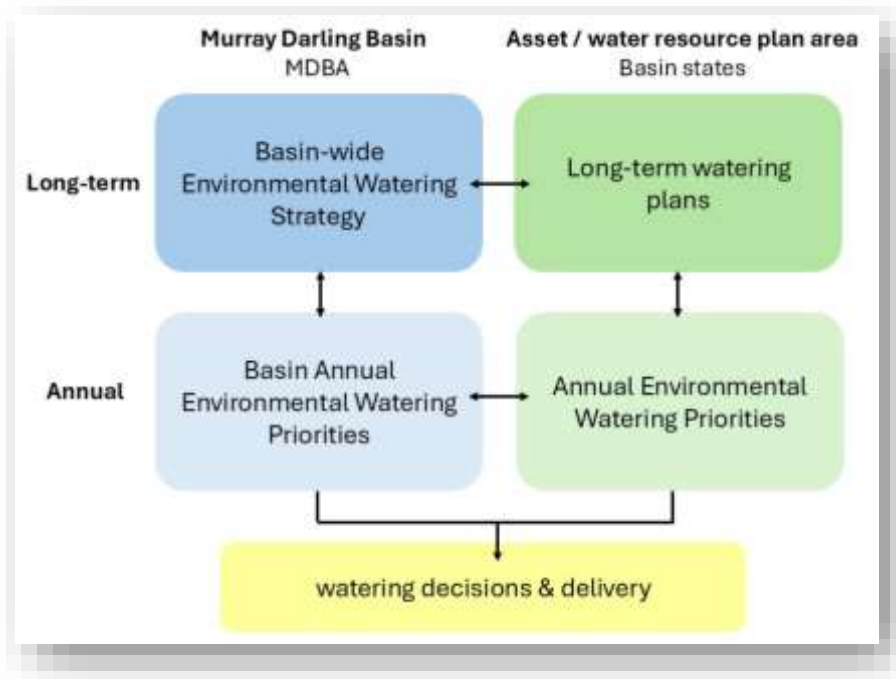


Figure 2: The long-term and annual planning documents required under Basin Plan Chapter 8 'Environmental Watering Plan'.

To date, the MDBA and Basin states have completed annual watering priorities for each watering season since 2014-15. The MDBA also released its first Basin-wide environmental watering strategy in late 2014. This was updated in 2019 and most recently in 2025 (MDBA, 2025a).

1.2 Scope of the plan

This plan focuses on identifying the environmental watering objectives and requirements of priority river and wetland assets and ecosystem functions to achieve ecological outcomes in the Wimmera-Mallee water resource plan area. It identifies the priority environmental assets and ecosystem functions for the water resource plan area, long-term ecological objectives and targets for these, watering requirements to meet the objectives and targets, cooperative arrangements between delivery partners, high level constraints for the water resource plan area and the long-term risks of providing environmental water. It also outlines potential ways to monitor and evaluate the targets in this plan.

Due to the environmental watering focus, this plan is not intended to provide holistic management for catchments or waterways, which is addressed in the Victorian Waterway Management Strategy (DEPI, 2013a). However, in recognition of co-dependencies between all waterway management issues, this LTWP includes a section on complementary actions that must work alongside environmental watering to meet waterway health outcomes.

This plan has been prepared according to the existing Victorian environmental water planning and management framework and using best available information at the time of writing.

The information in this plan has come primarily from asset-based Environmental Water Management Plans (EWMPs) that have been developed by Catchment Management Authorities (CMAs) to guide environmental water use over the long-term. EWMPs have been used as underlying documents to this plan because the content aligns well with Basin Plan requirements for LTWPs. Refer to Appendix B for links to individual EWMPs.

EWMPs are prepared by CMAs in consultation with their local communities. They set out the important water-dependent values of an asset, the condition of the asset, water related threats, management goals, objectives and targets for environmental watering and the water regime required to meet the objectives. EWMPs also identify constraints to watering at an asset and the risks associated with meeting the watering objectives. The purpose and content of EWMPs are explained in more detail in Appendix B.

A common set of terms has been defined for this LTWP to enable consistent language within this document and cross referencing between Victoria's three LTWPs and existing state planning documents (see Glossary). The definitions and terminology have been based on that adopted and used through Victoria in the development and implementation of EWMPs.

1.3 Purpose of the long-term watering plan

LTWPs assist planning for environmental water outcomes, to meet the Basin Plan objectives and targets, and the overall ecological objectives for water-dependent ecosystems outlined in Part 2 of Chapter 8 of Basin Plan.

The requirements for LTWPs are outlined in Chapter 8 of the Basin Plan. A LTWP must have regard to the Basin-wide environmental watering strategy (MDBA, 2025a) and be consistent with the principles the Basin Plan sets out for environmental watering (Chapter 8, Part 6). A table detailing each of the Basin Plan requirements and where they are met in the LTWP is provided in Appendix A. This LTWP also recognises there are Basin-wide obligations to take account of cultural outcomes.

Victoria's LTWPs have collated long-term environmental water planning information for priority rivers, wetlands and ecosystem functions in the northern Victorian water resource plan areas and inform:

- Victoria's Annual Watering Priorities (as per Figure 2).
- the Basin-wide environmental watering strategy and Basin Annual Watering Priorities (as per Figure 2).
- Water resource plans, particularly the environmental watering requirements
- Long-term outcomes and environmental water demand in the Commonwealth Environmental Water Holder's (CEWH) Portfolio Management Plans.
- Decisions for environmental watering by the Southern Connected Basin Environmental Watering Committee (SCBEWC) where relevant.

1.3.1 Updates to the plan

This second update to the Wimmera Mallee LTWP is required under Basin Plan due to release of the third edition of the Basin-wide environmental watering strategy in 2025 (Figure 3), and to meet the 5-yearly review cycle. Under Basin Plan, both of these are triggers for updating the LTWP. It is a minor update that includes:

- Alignment with the updated 2025 Basin-wide environmental watering strategy. There are three new items that LTWPs must be consistent with:
 - A revised date of 2027 for expected outcomes
 - The inclusion of First Nations outcomes
 - A recommendation to consider complementary social and economic outcomes in environmental water management (refer section 1.6.8 Shared benefits)
- Incorporation of Water is Life: Traditional Owner Access to Water Roadmap (DELWP 2022a), which was released after the previous LTWP update. This sets important policy for Victoria, including that Traditional Owners have an increased role in environmental water management (refer section 1.6.1)
- Minor updates to Priority Environmental Assets and Ecological Functions, including the objectives and watering requirements (refer sections 3 and 4)
- Minor updates to other LTWP content including constraints to watering, complementary actions, monitoring programs to evaluate the LTWP targets and long-term risks (sections 7, 8, 9 and 10).

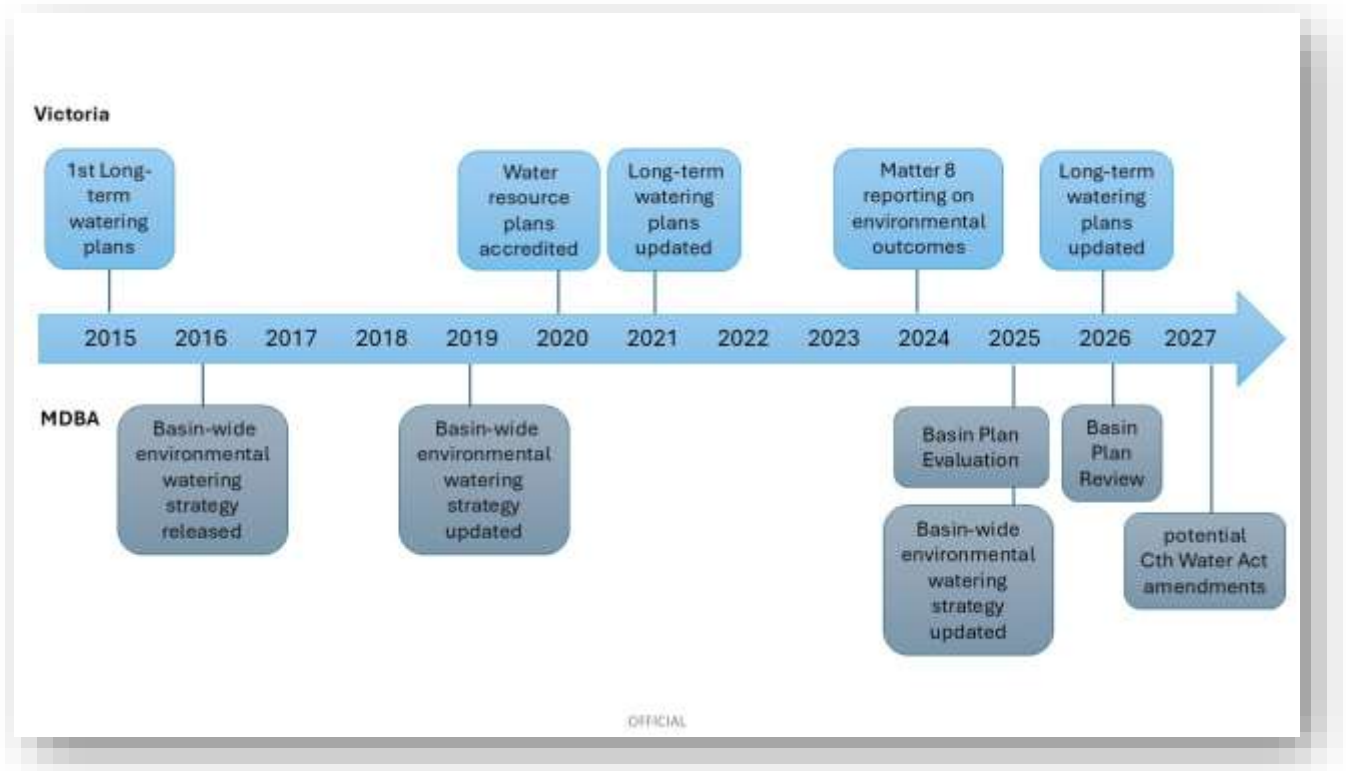


Figure 3. Victoria's long-term environmental water planning process in the context of other planning and strategic documents.

1.4 Basin-wide environmental watering strategy

The Basin-wide environmental watering strategy (BWS) (MDBA, 2025a) was first published by the MDBA in 2014 and updated in 2019 and 2025. Its purpose is to assist environmental water managers to plan and manage environmental watering at the Basin scale. The BWS identifies expected environmental outcomes (EEOs) grouped under four ecological themes: river flows and connectivity, native vegetation, waterbirds and fish. The BWS expected environmental outcomes relevant to Victoria are listed in Appendix I; alignment of LTWP objectives to the BWS expected environmental outcomes is shown in section 4.3.

As well as having regard to the BWS EEOs, LTWPs must also be consistent with any assets or functions and their requirements, identified within the BWS that support vegetation, waterbirds and fish at the Basin-scale.

The 2025 BWS also includes a policy to work with First Nations to increase opportunities for involvement in environmental water management. As part of this, a standalone Southern Basin First Nations Input to the BWS was coordinated by Murray Lower Darling Rivers Indigenous Nations (MLDRIN). Consistency of this LTWP with this policy is outlined in Table 7 (section 4.3) and Appendix I.

1.5 Division 6 principles

The Basin Plan sets out 11 principles (Division 6 of the environmental water plan (Chapter 8)) to be applied in environmental watering and requires Basin states to have regard to them when developing long-term watering plans. Alignment with Division 6 principles is addressed in 0.

1.6 Victorian frameworks

1.6.1 Traditional Owners

The Victorian Government recognises Aboriginal people as Australia's First Peoples, and as the Traditional Owners and Custodians of the land and waters on which we work and live. In 2025 the Statewide Treaty came into effect, establishing Gellung Warl as a permanent representative and decision-making body for

First Peoples in Victoria. As the first Treaty with First Peoples in Australia this was an historic achievement and marks the beginnings of new relationship between First Peoples and the State of Victoria.

Water is Life: Traditional Owner Access to Water Roadmap

In 2022 the Victorian Government released Water is Life - Traditional Owner Access to Water Roadmap (DELWP, 2022a). This is an important framework to create and maintain a careful and considered balance between Traditional Owner self-determination in water access and management, and the rights and entitlements of a range of stakeholders. Water is Life sets out the Victorian government commitments and policy pathways in the short, medium, and long term to increase decision-making and resources for Traditional Owners in the management of water landscapes, as well as increasing Traditional Owner access to water. This includes outcomes and actions in the Murray-Darling Basin.

Water is Life commits to a greater role for Traditional Owners in determining how environmental water is used for the purpose of healing Country, including a stronger role in environmental water planning and decision-making, and opportunities to directly manage environmental water allocations.

Water is Life identifies targeted outcomes that the Victorian government commits to, including:

1. Recognition of waterways and their surrounding lands as living, integrated, natural, and cultural entities in law, with Traditional Owners recognised as a unique 'voice' of the living entities.
2. Traditional Owners entering formal partnership agreements with the water sector that increase the capacity and resources available to Traditional Owners to make and implement decisions about water landscape management on their Country.
3. Traditional Owners having increased role in determining how environmental water is used for the purpose of healing Country.
4. Increased involvement of Traditional Owners in public land management.
5. Recognition of Traditional Owners as waterway managers for specific locations.
6. Recognition of Traditional Owners as environmental water holders.
7. Water being returned to Traditional Owner groups across Victoria through the issue of water entitlements for their self-determined use.
8. Access to land not being a barrier to Traditional Owners applying for or holding water entitlements.
9. Traditional Owners becoming funded to pay any fees and charges associated with their water entitlements unless use is purely commercial
10. That where Traditional Owners become purely commercial users of water, they will become responsible for an increasing portion of fees and charges over time to full cost recovery.
11. Traditional Owners becoming able to hold and manage water in culturally appropriate ways.

Outcomes 3, 5 and 6 have direct effect on environmental water management in Victoria. As part of outcome 3, five Traditional Owner groups led the development of 'Water for Country – Guidance provided by and for Traditional Owners Making Proposals for the Use of Environmental Water in Victoria'. This collaborative process was supported by the VEWH (Victorian Environmental Water Holder) and DEECA, with guidance from an independent facilitator. Through this process, Traditional Owner-led proposals were developed for Molesworth Billabongs (Northern Victoria) and Musk Duck Wetland (Victorian Murray). Both proposals were included as pilot watering projects in the VEWH's 2025-26 Seasonal Watering Plan (VEWH, 2025a). These sites were Musk Duck Wetland (Ned's Corner East) led by First People of the Millewa Mallee Aboriginal Corporation in partnership with Mallee CMA, and Molesworth Recreation Reserve led by Taungurung Land and Waters Council Aboriginal Corporation². These sites are included in the relevant LTWP updates as priority environmental assets.

Preliminary work has progressed for further parts of Outcome 3 and also Outcomes 5 and 6 to understand current *Water Act 1989* legislative mechanisms to enable Traditional Owners to take on transfer of water allocation and/or specific waterway management responsibilities, and explore legislative barriers.

² Refer to VEWH's Seasonal Watering Plan 2025-26 (VEWH, 2025a)

1.6.2 Entitlement framework

Environmental water in Victoria is defined and protected as the Environmental Water Reserve under the *Water Act 1989* (Vic) and is provided in three ways:

- **Environmental water entitlements:** a proportion of water held by the environment in perpetuity. In general, the entitlements are a share of the available resource (inflows) in storages that can be released to meet specific environmental needs.
- **Obligations on consumptive entitlements:** the volume of water that water corporations or licensed diverters are obliged to provide out of storage or past a diversion point before water can be taken for consumptive use.
- **'Above cap' water:** the water available above limits on consumptive volumes of surface water and groundwater. Most water available to the environment is 'above cap' water, which can be a very unreliable source of water.

In regulated systems, environmental water is set aside mainly through environmental water entitlements. In unregulated rivers, environmental water is provided primarily through management of existing diversions via licence conditions, rostering and restriction rules.

Section 5 provides further details on the provision of environmental water in Victoria, including explanations of held and planned environmental water. More information is also provided in the Wimmera-Mallee Water Resource Plan (DELWP, 2019a).

1.6.3 Waterway management framework

State Strategy

The state policy for the environmental management of waterways is documented in the Victorian Waterway Management Strategy (VWMS) (DEPI, 2013a). A new VWMS is currently being finalised. The VWMS outlines the overarching policy for management of Victorian waterways. It establishes integrated, devolved decision making. The VWMS recognises that environmental condition underpins environmental, social, cultural and economic values.

The VWMS documents policies and actions for major waterway management themes including environmental water management, riparian management, water quality, the river channel, wetlands and invasive species management in waterways.

The Victorian Waterway Management Program is based on an adaptive management cycle, where learning occurs at all stages and is used to update and improve the program in subsequent cycles. It comprises three main phases:

- Strategy and planning;
- Implementation and monitoring; and
- Evaluation and reporting.

Community participation and research and innovation occur across all parts of the Program. The Program is a partnership between state government, regional agencies and authorities, other management partners (such as Traditional Owners) and local communities. DEECA is responsible for establishing the state policy framework for waterway management. Regional implementation is led by waterway managers from the nine catchment management authorities and Melbourne Water. Some waterway manager functions may be led by the relevant Traditional Owners at specific locations (see section 1.6.1).

Regional Strategies

In northern Victoria, CMAs are appointed as waterway managers under Part 10 of the Victorian *Water Act*.

CMAs have established regional catchment strategies that are the primary integrated planning framework for land, water and biodiversity management in each region in northern Victoria, providing an overarching strategic framework for actions. CMAs have also prepared regional waterway strategies that identify the regional priorities for on-ground works and environmental water based on the **values** (environmental, social, cultural, economic), **threats**, and **condition**.

In the Wimmera-Mallee water resource plan area, the relevant CMAs and their Regional Waterway Strategies are:

- Wimmera; Wimmera Waterway Strategy 2014-22 (Wimmera CMA, 2014))
- Mallee; Mallee Waterway Strategy 2014-22 (Mallee CMA, 2014)
- North Central; North Central CMA Waterway Strategy 2014-22 (North Central CMA, 2014).

Regional waterway strategies are currently being reviewed and will be updated by 2027.

The next iteration of regional waterway strategies will be outcomes-focused, considering the broad range of waterway values. They will also be adaptable to reflect shifts in priorities based on new information and impacts of climate change and extreme events.

Traditional Owner role in regional waterway strategies

Ministerial Guidelines for regional waterway strategies (DEECA, 2024a) direct CMAs to seek collaboration with Traditional Owners when developing a strategy. Traditional Owners have the right to partner in decisions, and this may mean they embed their self-determined vision, outcomes, and priorities for managing waterways on their Country into the regional waterway strategies. Alternatively, Traditional Owners can develop a separate document to sit alongside the regional waterway strategies.

Victorian Government commitments in Water is Life include actions for increasing the resourcing for and role of Traditional Owners in the care and management of waterways and catchments. The development and implementation of regional waterway strategies are intended to play a significant role in progressing these actions (see section 1.6.1). See the full [Ministerial Guidelines](#) (DEECA, 2024a) to understand this further.

1.6.4 Environmental water planning and management framework

River regulation and licenced surface and groundwater use across Victoria has affected the natural hydrological regimes required to support environmental values, resulting in reduced variability of flows and degraded aquatic ecosystems.

To provide more appropriate regimes for the environment, the adaptive management cycle is applied and includes:

- ensuring environmental water needs are understood
- ensuring environmental water is protected – this includes having appropriate policy and legislation in place
- ensuring the water regime is managed to meet targeted ecological objectives (planning and delivering water for the environment)
- overcoming physical or operational constraints to enable best use of the water and maximise outcomes for the environment
- monitoring of environmental water management in order to demonstrate outcomes and adaptively manage planning and delivery; and
- reviewing the process in order to adapt and improve as required.

Necessary to support these are:

- clear roles and responsibilities
- management of risks relating to environmental water
- adequate research to support environmental watering knowledge
- appropriate investment at each stage.

1.6.5 Environmental water planning, prioritisation and delivery

Using the State and regional strategies as a basis, waterway managers (CMAs in northern Victoria) and the VEWH undertake detailed and adaptable planning for environmental water at both the long-term and annual scales. Since 2025, Traditional Owners may also plan for the use of environmental water at sites which they nominate via the preparation of a Seasonal Watering Proposal that they may submit to the VEWH.

Figure 4 presents the environmental water planning and delivery framework in Victoria, and how this aligns with the Basin Plan. This includes national and state legislation, state and regional waterway strategies, asset-based EWMPs, regional Seasonal Watering Proposals, and the state-wide Seasonal Watering Plan released by the VEWH each year. Different partners (including DEECA, VEWH, Traditional Owners, CMAs, water corporation and MDBA) lead or are involved in each component. Traditional Owners currently partner or input into several components of this framework, however, there is still considerable work needed to facilitate their participation, partnership and leadership in environmental watering.

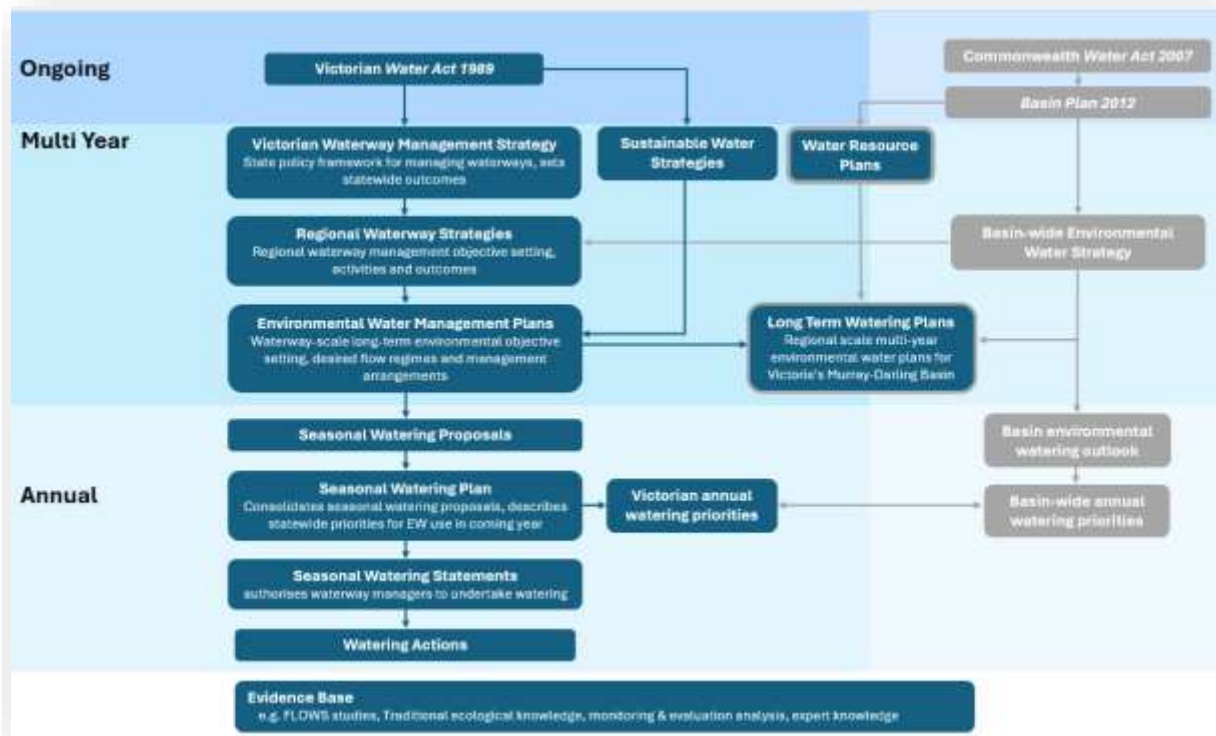


Figure 4. The Environmental water planning and management framework in Victoria and how it intersects with the Murray-Darling Basin Plan and associated instruments.

The VEWH's annual Seasonal Watering Plan identifies priority watering actions across the state by applying criteria that include the extent of environmental benefit, certainty of achieving environmental benefit, water requirements of a site, feasibility of the watering action and overall cost effectiveness (Figure 5).

GUIDING MATTERS	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
In addition to the matters above the VEWB must consider opportunities to provide for the following	
Cultural, social, recreational and economic benefits	• Traditional Owner values and uses • Social and recreational values and activities • Economic benefits

Figure 5. VEWB (2025a) criteria for prioritising environmental watering actions

1.6.6 Seasonally adaptive approach

Victoria uses a 'seasonally adaptive' approach to identify annual watering actions, along with complementary works and measures, recognising that achieving objectives may require more than just delivering water (Table 1). It is a flexible way to deal with short-term climatic variability and helps to guide annual priorities and manage conditions from wet through to drought, depending on the amount of water available in a particular year. This approach recognises that it will take time to realise the ecological outcomes associated with the BWS and the objectives outlined in the Basin Plan. For example, increasing the abundance and

diversity of native fish populations is likely to require successful recruitment over multiple years, depending on such things as the life history of the target species, availability and quality of habitat (including refuge habitat during dry periods), the opportunity for fish to migrate and spawn and management of invasive species.

Table 1. Victoria's seasonally adaptive approach to river and wetland management

	Drought	Dry	Average	Wet
Expected conditions	No or negligible contributions from unregulated flows; waterways may stop flowing at times, more likely in summer and autumn	Minor contributions from unregulated reaches and tributaries, more likely in winter and spring	Unregulated flows provide extended low flows and multiple freshes, more likely in winter and spring; minor storage spills may occur	Extended unregulated high flows, multiple large storage spills and overbank flooding, more likely in winter and spring but possible at any time of year
Long-term ecological objectives	Long-term objectives to move towards ecologically healthy waterways are set through the Victorian and regional waterway management strategies			
Short-term ecological objectives	Avoided irreversible losses and enable capacity for recovery	Maintain basic functions of watered rivers and wetlands	Maintain or improve the ecological health of watered rivers and wetlands	Improve the health and resilience of watered rivers and wetlands
Annual management objectives	Protect - Avoid critical loss - Maintain key refuges - Avoid catastrophic events	Maintain - Maintain river functioning with reduced reproductive capacity - Maintain key functions of prioritised wetlands - Manage within dry-spell tolerances	Recover - Improve ecological health and resilience - Improve recruitment opportunities for key plant and animal species	Enhance - Maximise recruitment opportunities for key animal and plant species - Restore key floodplain wetland linkages
Use of Environmental water reserve	- Water critical refuges - Undertake emergency watering to avoid catastrophic events - Provide carryover (for critical environmental needs the following year)	- Provide summer and winter baseflows in prioritised river reaches - Water prioritised wetlands - Provide river flushes where required to break critical dry spells - Provide carryover (for critical environmental needs the following year) - If necessary, use the market to sell or purchase water	- Provide all aspects of the flow regime - Provide sufficient flows to promote breeding and recovery - Provide carryover to accrue water for large watering events - If necessary, use the market to sell or purchase water	- Provide overbank flow - Provide flows needed to promote breeding and recovery - If necessary, use the market to sell or purchase water
Other waterway management activities	- Protect refuges (including stock exclusion) - Increase awareness of the importance of refuges - Enhanced monitoring of high-risk areas and contingency plans in place - Investigate feasibility of translocations - Environmental emergency management plans in place - Protect prioritised areas through fencing, invasive species management, and water quality improvement works - Implement post-bushfire river recovery plans	- Protect refuges - Protect prioritised areas through fencing, invasive species management, and water quality improvement works - Environmental emergency management plans in place - Improve connectivity - Implement post-bushfire river recovery plans	- Protect and restore prioritised areas through fencing, invasive species management, water quality improvement, and in-stream habitat works - Monitor and survey river and wetland condition - Improve connectivity between rivers and floodplain wetlands	- Protect and restore prioritised areas through fencing, revegetation, invasive species management, water quality improvement and in-stream habitat works - Monitor and survey river and wetland condition - Emergency flood management plans in place - Implement post flood river restoration programs

1.6.7 Delivery partners

A number of key delivery partners are involved in environmental water outcomes in Victoria. These organisations and their roles are identified in the Cooperative Arrangements section of this plan (section 6).

1.6.8 Shared benefits

Shared or complementary benefits are additional opportunistic benefits that can be achieved from environmental watering, including social, cultural, recreational and economic benefits. While the primary purpose of environmental watering is to achieve ecological outcomes, the *Water Act 1989* (Vic) was amended in 2019 to require water resource managers, in performing their functions, to consider opportunities to provide for Aboriginal cultural values and uses of waterways, as well as social and recreational values and uses of waterways.

This aligns with guidance in the Basin-wide environmental watering strategy to look for opportunities to support complementary social and economic outcomes when planning and delivering environmental water where environmental outcomes are not compromised.

In 2025, *Water for Country – Guidance provided by and for Traditional Owners Making Proposals for the Use of Environmental Water in Victoria* was released. This provides guidance co-developed with Traditional Owners, for Traditional Owners to submit proposals for the use of environmental water in Victoria.

Water for Country (VEWH, 2025b) provides a new pathway for involving Traditional Owners in how environmental water is accessed and managed; supporting this pathway will strengthen how cultural values are considered (in the context of the *Water Act 1989* (Vic)) and understood in relation to environmental, social, economic and, health and wellbeing outcomes for Country and all people. The approach to Water for Country is to learn together and to learn by doing.

Caring for Country by accessing Environmental Water through a Seasonal Watering Proposal is one tool that Traditional Owners can now use, that sits within a broad range of healing and caring for Country initiatives. Environmental water may work or align closely with cultural water (Figure 6).

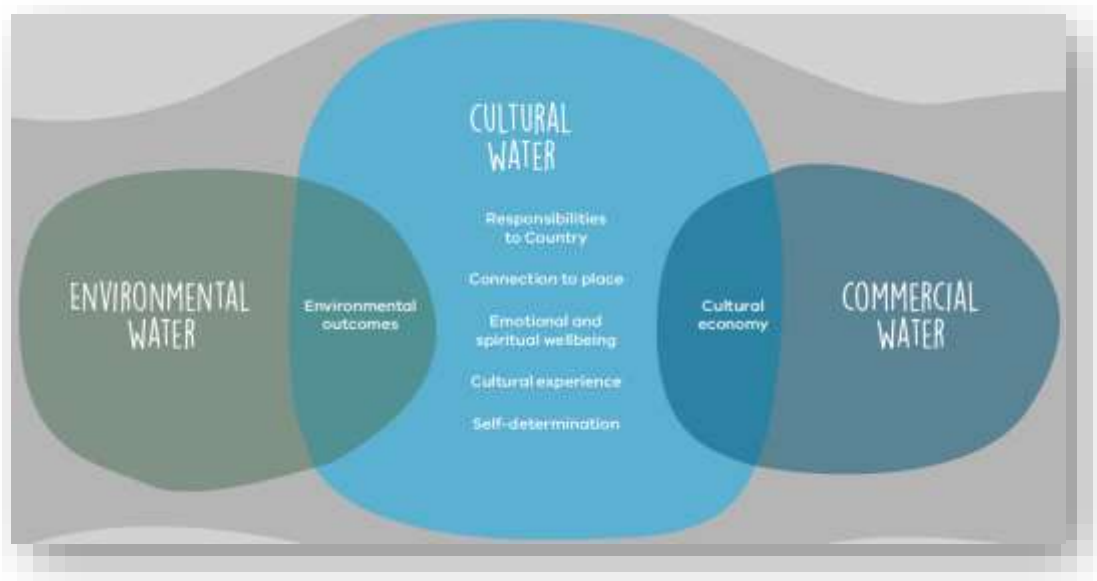


Figure 6. Cultural Water outcomes from Water is Life (DELWP, 2022a)

2 Water resource plan area

The Wimmera-Mallee water resource plan area extends from the Grampians in the south, through the broad floodplains of the Wimmera, Avon-Richardson and Avoca river systems and up to the Murray River floodplain in north-western Victoria. It contains sections of the Mallee, Wimmera and North Central CMA regions.

2.1 Features of the Wimmera-Mallee water resource plan area

The Wimmera-Mallee water resource plan area (Figure 7) is located in north-west Victoria and extends from the Grampians and the Pyrenees Ranges in the south, to Ouyen and Kerang in the north. The western extent of the water resource plan area is bounded by Victoria's border with South Australia, the Millicent Coast basin and the Northern Victoria water resource plan area to the east.

The Wimmera-Mallee water resource plan area is dominated by the Wimmera, Avon-Richardson and Avoca River systems. The three waterway systems flow north and terminate before reaching the River Murray. The wetlands of the Wimmera-Mallee water resource plan area include the terminal lakes, Lake Albacutya and Lake Hindmarsh, and the Wimmera-Mallee Pipeline wetlands, a large collection of wetlands located east of the terminal lakes.

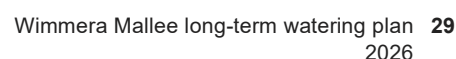
The surface water component of the Wimmera-Mallee water resource plan area is comprised of the Wimmera-Mallee surface water sustainable diversion limit (SDL) unit; and parts of three basins³ as shown in Figure 7:

- Basin 15 – Wimmera-Avon
- Basin 8 – Avoca
- Basin 14 – Mallee

The Wimmera-Avon rivers' surface water basin is not connected to the River Murray. The Avoca basin is infrequently connected to the River Murray via the Avoca floodway that connects with the Kerang Lakes during floods. The Mallee basin is a semi-arid zone that has no perennial streams, with localised runoff during exceptionally wet conditions and no surface water diversions. The Wimmera-Mallee (surface water) water resource plan area includes inter-basin water transfers from the Glenelg basin in the south, the River Murray in the north and the Goulburn system in the east. It also transfers water south to the Hopkins basin to supply towns such as Ararat.

The Wimmera-Mallee headworks system is a complex network of storages, channels and pipes that regulates flow in many of the waterways of the Wimmera-Mallee water resource plan area. This headworks system enables water to be shifted between storages and interconnects the three major river basins of the Wimmera, Avoca and Glenelg. Two notable changes to the regulated systems within this water resource plan area were the completion of the Wimmera-Mallee Pipeline in 2010 and the cessation of the Wimmera Irrigation Area. These two factors have greatly reduced the consumptive water demand requirements and system operating losses.

³ Australian Water Resources Council (AWRC) Major River Basins of Victoria



The highest point in the Grampians is Mount William at 1,167 m AHD, with the surrounding south-eastern area sitting at around 500 m AHD which quickly drops down into the low land areas of the terminal lakes and Mallee area located under 100 m AHD. Figure 8 presents the (relative) topography in the Wimmera-Mallee water resource plan area.

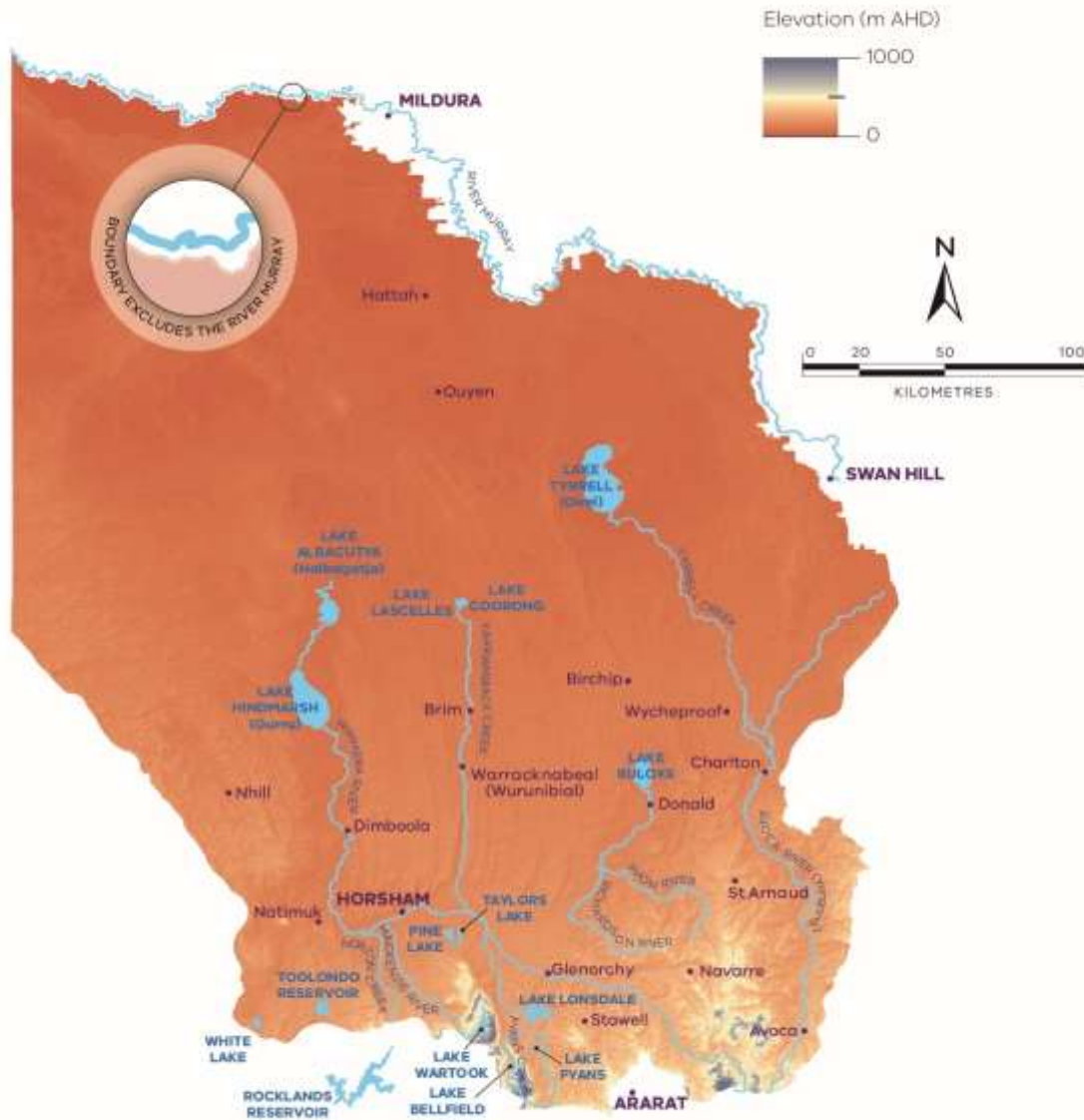


Figure 8. Topography in the Wimmera-Mallee water resource plan area

2.1.2 Geology, soils and land use

The region is relatively flat and sits on the geologically stable western plains of Victoria. The geology of the Wimmera-Mallee includes alluvium and dune deposits in the vast floodplain areas signifying wind-blown aeolian landscapes over the Woorinen Formation to the north of the water resource plan area, and Cambrian rock of the Grampians and St Arnaud groups in the south-east.

The dominant land-use in the Wimmera-Mallee region is dryland grazing/cropping in the south and irrigated cropping in the Murray floodplains (CSIRO, 2007). There is also some plantation forestry and viticulture in the higher rainfall areas in the south.

The remarkable nature of the landscape is its flatness that, along with the soil and geological nature of the landscape, supports the numerous lakes in the region. The flat topography increases the area's susceptibility to prolonged and extensive flooding (see Figure 9 below).

2.1.3 Rainfall distribution

The average annual rainfall for the region ranges from over 1,000 mm in the Grampians to less than 300mm at Hattah. The rainfall distribution for the Wimmera-Mallee is driest in early autumn, and wettest in winter (BoM, 2025).



Figure 9. Aerial view of flooding at Birchip township in 2018 (Source: Buloke Shire Council).

2.1.4 Waterways as living and connected entities

Water is Life commits to recognition of waterways and their surrounding land as living, integrated, natural and cultural entities in law, with Traditional Owners recognised as a unique ‘voice’ of the living entities (DELWP, 2022a). Waterways and Country are a connected system. This connection is more than physical, and includes connection to community wellbeing, to culture, and to identity. Water is the lifeblood of Country and waterways are the basis for many creation stories. The Victorian Government is committed to reforms that reinforce the link between waterway management and caring for Country.

These waterways provide environmental, economic, social and cultural benefits. The environmental condition of the waterways is the result of historic and enduring land and waterway management practices such as land clearing, urban development, agriculture on floodplains and regulated water regimes for water supply. The modifications have impacted on the hydrologic regime, physical form, riparian vegetation, water quality and instream ecology.

It is not intended that these streams be restored to a pre- colonisation state but be managed as ‘working rivers’ with agreed sustainable levels of modification and use (DEPI, 2013a).

2.2 Significant ecological values of the Wimmera-Mallee water resource plan area

The priority environmental assets of the Wimmera-Mallee water resource plan area support ecological values that are significant at the national and state level. The information below focuses on the priority environmental assets where held environmental water can be managed to deliver specific environmental outcomes.

Significant water-dependent ecological values in the Victorian Basin are listed in the 2024 Matter 8 reporting (DEECA, 2024b).

The following sections contain information from the Index of Stream Condition which was last completed in 2013. An update is currently in scope for completion by 2028 which will inform a future update to LTWPs. While condition in many systems may not have changed, we acknowledge that the information informing these assessments is not current.

2.2.1 Wimmera River

The Wimmera River priority environmental assets include the regulated section of the Wimmera River itself and associated tributaries (the MacKenzie River and the Mount William, Burnt and Bungally creeks). These assets are home to many significant native fish populations including one of Victoria's few self-sustaining populations of freshwater catfish, although the larger species are not regarded as indigenous to the region (Earth Tech, 2005).

The MacKenzie River contains the only known confirmed population of platypus in the Wimmera and also supports good populations of native fish, macroinvertebrates and turtles. Given the diverse habitat and fish species found in the MacKenzie River, in dry times in particular, it acts as a refuge for fish populations.

The lower Wimmera River from Polkemmet Bridge to Outlet Creek at the northern end of Lake Albacutya was declared a Heritage River due to its significant environmental (particularly areas with river red gum open forests and woodlands with an intact understorey and waterbird habitat) and social values (Land Conservation Council, 1991). The Wimmera River has also been declared a Wetland of National Importance.

The existing Index of Stream Condition results indicated the majority of the Wimmera River to be in moderate to poor environmental condition (DEPI, 2013b).

2.2.2 Terminal Lakes

There is a series of terminal lakes at the end of the Wimmera River and given their size (especially Lake Hindmarsh and Lake Albacutya) they fill only rarely, during very high flows from upstream. This wet-dry cycle produces an environment where the beds of the lakes are often colonised by terrestrial vegetation. Filling leads to replacement with aquatic species (such as water milfoil and emergent reeds). When inundated, the central areas of the lakes provide open water habitat for large fish, including Murray cod, freshwater catfish and golden perch, and large numbers of birds such as the Australian pelican, pied cormorant and black swan. Aquatic vegetation in the lakes provides habitat for smaller fish.

Surrounding the lakes, fringing woodlands are dominated by river red gum and black box.

Lake Albacutya was declared a Ramsar wetland site of international importance as a representative near-natural example of a 'seasonal intermittent freshwater lake' supporting vulnerable, endangered, or critically endangered species or threatened ecological communities and high numbers of waterbirds (see section 2.2.4). Both Lake Hindmarsh and Lake Albacutya are Wetlands of National Importance.

The true terminal lake of the Wimmera River system is the Wirrengren Plain which has not received inflows for well over a century. All of the terminal lakes comprise the Heritage River section of the Wimmera River.

2.2.3 Wimmera-Mallee Pipeline wetlands

The Wimmera–Mallee Pipeline wetlands include 52 dams and wetlands spread across the dry north-western area of Victoria on public and private land. They vary widely in wetland types (such as freshwater meadows, open freshwater lakes and freshwater marshes), size and vegetation communities (such as lignum and black box dominated EVCs). As a group, they are home to native waterbird populations including brolga, egrets, herons, blue-billed duck, freckled duck, Australian painted snipe and glossy ibis. Other biota present include the vulnerable growling grass frog, turtles and many other species. Watered from the Wimmera-Mallee Pipeline system, these wetlands act as important refuges and drinking holes throughout dry times in the region.

2.2.4 Ramsar wetlands

Ramsar sites are formally recognised for containing representative, rare or unique wetlands, or for being wetlands that are internationally important for conserving biodiversity. A wetland must satisfy one or more of the criteria for identifying wetlands of international importance to be designated to this list.

National guidelines are being developed to provide clear guidance on how Ramsar sites must be managed, under both the Ramsar Convention and Commonwealth Environment Protection and Biodiversity Conservation Act. A key component includes monitoring of a site's ecological character description, which is a baseline of wetland condition at the time of its listing as a wetland of international importance. The ecological character descriptions of all Australia's Ramsar-listed wetlands are at <http://www.environment.gov.au/water/wetlands/publications>.

The Basin Plan requirements for states in regard to Ramsar sites are:

- declared Ramsar wetlands that depend on Basin water resources maintain their ecological character (section 8.05 (2a) of the Basin Plan)
- a declared Ramsar wetland is an environmental asset that requires environmental watering (Schedule 8 Criteria for identifying an environmental asset)
- declared Ramsar wetlands have sufficient water quality to maintain the ecological character of those wetlands (section 9.04 (1) of the Basin Plan)

There are also water quality targets for declared Ramsar wetlands under Schedule 11 to the Basin Plan – Target values for target application zones.

These requirements are fulfilled in Victoria's water quality and salinity management plans in [Appendix A](#) of the Wimmera-Mallee Water Resource Plan (DELWP, 2019a).

Implementation of the Basin Plan contributes to maintaining the ecological character of Ramsar wetlands. Section 5.02 of the Basin Plan states that the Basin Plan aims to give effect to international agreements, such as the Ramsar Convention, through an integrated approach to water management. Section 8.05 of Basin Plan further specifies that water dependent ecosystems are to be protected and restored, in part, by ensuring that declared Ramsar wetlands maintain their ecological character. As noted in the Basin Plan, provision of environmental water needs to be supported by other management actions. It is the responsibility of jurisdictions to maintain the ecological character of Ramsar wetlands through various strategies, investment, partnerships and on-ground actions.

The Wimmera-Mallee water resource plan area has one Ramsar site⁴, Lake Albacutya. As discussed in section 2.2.2 above, this is a terminal lake of the Wimmera system and receives water only in exceptionally wet years when Lake Hindmarsh spills and overflows into Outlet Creek which then carries water into Lake Albacutya. It is significant largely in relation to its important bird habitat and threatened bird species, as well as several significant ecological vegetation communities, including a genetically distinct river red gum sub-species.

The Lake Albacutya Ramsar Site Management Plan (Appendix 2 of <https://wcma.vic.gov.au/docs/default-source/riversdocs/waterwaystrategy/wimmera-cma-waterway-strategy-2014-2022.pdf>) was developed in accordance with the Australian Ramsar Management Principles and provides more information on its management.

4. Kerang Wetlands are Ramsar listed and located within the Wimmera-Mallee water resource plan area but are watered from the River Murray and so are included in the Victorian Murray LTWP.

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The key threat to the ecological character of Lake Albacutya and its environmental values is its changed water regime, caused by a long history of river regulation and water extraction from the Wimmera River and, more recently, drying climate. It poses a threat to the health of the fringing eucalypt woodland as well as the waterbird and the regent parrot populations. The significant changes that were in place at the time of listing have since been exacerbated by drought and are predicted to continue with reduced rainfall due to climate change.

To maintain ecological character, it will be necessary to ensure that the hydrological regime is within the Ramsar guidelines for limits of acceptable change. However, this will be challenging, especially if reductions in rainfall persist. With the completion of the pipeline projects and the purchase of water to return to the environment, there is now water available to provide flows to the lower Wimmera River which in turn will benefit the terminal lakes in extremely wet years. Based on the historical flow record, there could be occasions where high flows during a sequence of very wet years have led to substantial volumes entering Lake Hindmarsh and Lake Albacutya. However modelling results to date suggest that due to the long (20 year) wet-dry periods for Lake Albacutya, the current 121-year hydrological record is too short to make definitive conclusions around the lake's hydrological regime (both current and desired) (Jacobs, 2014). Therefore, there is some uncertainty around the potential for Lake Albacutya's hydrological regime to remain within the limits of acceptable change.

Complementary land management actions are ongoing at Lake Albacutya and led by Parks Victoria, DEECA and the Wimmera CMA, in particular control of invasive fauna such as rabbits and weeds (e.g. bridal creeper, African love grass, boneseed and boxthorn).

3 Priority environmental assets within the Wimmera-Mallee water resource plan area

Priority environmental assets listed in this LTWP are water-dependent ecosystems that can be managed with environmental water and meet one or more of the criteria listed in Basin Plan Schedule 8 (see Glossary). An asset may be a single wetland or waterbody (e.g. Lake Hindmarsh), a wetland complex (e.g. Wimmera-Mallee Pipeline wetlands), or a river/creek (e.g. Mount William Creek). Asset locations are provided in Figure 10 and listed in Table 2.

The Wimmera River is the main river system in the Wimmera-Mallee water resource plan area. This river, together with its tributaries and associated terminal wetlands, are listed as priority environmental assets. Other priority environmental assets include Yarriambiack Creek and a suite of 52 wetlands in the centre of the water resource plan area that are watered by the Wimmera-Mallee pipeline.

It should be noted that there are some assets on the northern boundary of the Wimmera-Mallee water resource plan area (e.g. Hattah Lakes, Kerang Lakes) that are included in the LTWP for the Victorian Murray water resource plan area, as these receive water from the Murray River and upstream catchments, rather than from the Wimmera-Mallee catchments.

Wetlands that are listed in the Basin-wide environmental watering strategy as important environmental assets at the Basin scale for waterbirds in the Wimmera-Mallee water resource plan area are Lake Hindmarsh, Lake Albacutya, Lake Buloke, Hattah Lakes and Kerang Lakes. As noted above, Hattah Lakes and Kerang Lakes are included in the Victorian Murray LTWP. Lake Buloke, a terminal lake of the Richardson River cannot receive environmental water and hence is not included as a priority environmental asset in this LTWP.

Note that significant values have been identified by Traditional Owners in individual nation statements published in Victoria's Wimmera-Mallee Water Resource Plan (DELWP, 2019a) chapter 11, and Water is Life: Traditional Owner Access to Water Roadmap – Section B: Traditional Owner Statements (DELWP, 2022a).

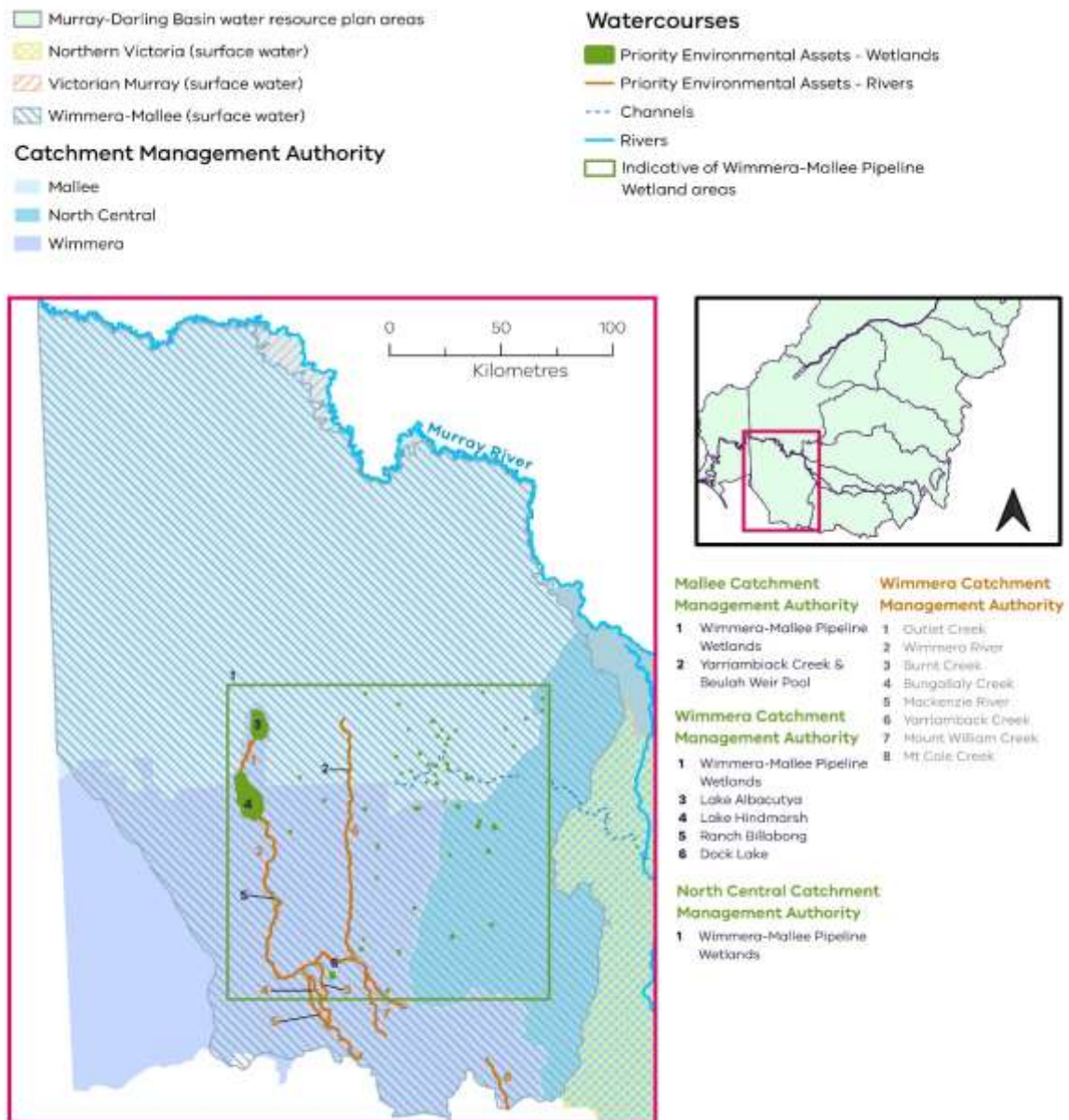


Figure 10. Priority environmental assets within the Wimmera-Mallee water resource plan area.

Table 2. Priority environmental assets in the Wimmera-Mallee water resource plan area

* refer to Appendix J

Asset Name	Basin	Asset Manager	Terminal lakes	Basin Plan Schedule 8 Criteria *	Asset characteristics
Wimmera River system					
Dock Lake	Wimmera-Avon	Wimmera CMA	-	3 5	Breeding and nursery habitat for waterbirds (e.g. whiskered tern)
Lake Albacutya ⁵	Wimmera-Avon	Wimmera CMA	-	1 3 4 5	Ramsar, JAMBA, CAMBA, ROKAMBA, Bonn Convention Exposed mudflats provide habitat for waders and shorebirds Threatened species under EPBC Act, FFG Act High biodiversity EVCs include endangered Lunette Woodland (EVC 652)
Lake Hindmarsh	Wimmera-Avon	Wimmera CMA	-	1 2 3	JAMBA, CAMBA, ROKAMBA, Bonn Convention Victoria's largest freshwater lake Exposed mudflats provide habitat for waders and shorebirds Important habitat for nursery sites Drought refuge Threatened species under EPBC Act, FFG Act High biodiversity EVCs include endangered Lunette Woodland (EVC 652)
Mount William Creek	Wimmera-Avon	Wimmera CMA	Lakes Hindmarsh, Lake Albacutya	3 4 5	Chain-of-ponds sequence Riffles Breeding and nursery habitat for Southern Pygmy Perch and Obscure Galaxias Inputs organic and inorganic sediment into terminal lakes Threatened species under EPBC Act, FFG Act, EVCs include Endangered Plains Woodland/Plains Sedgy Woodland (EVC 871)

⁵ Watering of Lake Albacutya is dependent on Lake Hindmarsh spilling

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Asset Name	Basin	Asset Manager	Terminal lakes	Basin Plan Schedule 8 Criteria *	Asset characteristics
Outlet Creek ⁶	Wimmera-Avon	Wimmera CMA	Lake Albacutya	4 5	Threatened species under EPBC Act
Ranch Billabong	Wimmera-Avon	Wimmera CMA	-	3 5	Significant cultural values including presence of a range of culturally significant plant species (e.g. sneezeweed).
Wimmera River	Wimmera-Avon	Wimmera CMA	Lakes Hindmarsh, Lake Albacutya	2 3 4 5	Heritage listed; Wetland of national importance Deep pools – drought refuge Connectivity and pathways for dispersal Breeding and nursery habitat for Freshwater Catfish Instream macrophytes provide food and habitat High load of large woody debris Threatened species under EPBC Act, FFG Act High biodiversity 26 EVCs in the system – including endangered Riverine Chenopod Woodland (EVC 103), Floodplain Riparian Woodland (EVC 56), Sand Ridge Woodland (EVC 264)
Yarriambiack Creek and Beulah Weir Pool	Wimmera-Avon	Wimmera and Mallee CMAs	Lake Coorong	3 4 5	Productive floodplain areas Threatened species under FFG Act EVCs in the region – including endangered Riverine Chenopod Woodland (EVC 103), Black Box Woodland Lignum (EVC 663), Low Rises Woodland (EVC 66), Plains Woodland (EVC 803).
MacKenzie River, Burnt and Bungalally Creeks system					
MacKenzie River	Wimmera-Avon	Wimmera CMA	Lakes Hindmarsh, Lake Albacutya	2 3 4 5	Intact discontinuous anastomosing channel form noted as unique in Victoria Rocky stretches, transitioning to pools and runs Dense riparian vegetation in upper reaches Instream macrophytes provide food and habitat Complex instream woody habitat

⁶ Watering of Outlet Creek is dependent on Lake Hindmarsh spilling

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Asset Name	Basin	Asset Manager	Terminal lakes	Basin Plan Schedule 8 Criteria *	Asset characteristics
					Breeding and nursery habitat for platypus, Blackfish, Southern pygmy perch and obscure galaxias Glenelg spiny crayfish and Western swamp crayfish Inputs organic and inorganic sediment into terminal lakes Connectivity and pathways for dispersal Threatened species under EPBC Act, FFG Act EVCs include endangered Riverine Chenopod Woodland (EVC 103)
Bungalally Creek	Wimmera-Avon	Wimmera CMA	Lakes Hindmarsh, Lake Albacutya	3 4 5	Productive floodplain areas Threatened species under EPBC Act, FFG Act
Burnt Creek	Wimmera-Avon	Wimmera CMA	Lakes Hindmarsh, Lake Albacutya	3 4 5	Intact chain-of-ponds Productive floodplain areas Breeding and nursery habitat for Southern pygmy perch and obscure galaxias Western swamp crayfish Inputs organic and inorganic sediment into terminal lakes Threatened species under EPBC Act, FFG Act EVCs include endangered Riverine Chenopod Woodland (EVC 103)
Mt Cole Creek	Wimmera-Avon	Wimmera CMA	Lakes Hindmarsh, Lake Albacutya	3 4 5	Drought refuge supporting many important fish species including Southern Pygmy Perch, Obscure Galaxias and Flathead Gudgeon.
Wimmera-Mallee Pipeline (WMP) Wetlands					
Barbers Swamp	Wimmera-Avon/Avoca (pipeline)	Mallee CMA	-	2	Shallow freshwater marsh
Broom Tank Reserve				3	DIRWA listed (e.g. Creswick Swamp)
				4	Important drought refuge
Bull Swamp					Breeding and nursery habitat

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Asset Name	Basin	Asset Manager	Terminal lakes	Basin Plan Schedule 8 Criteria *	Asset characteristics
Chiprick Reserve					Pathways for dispersal
Clinton Shire Dam					Threatened species under EPBC Act, FFG Act
Cokum Bushland Reserve					High biodiversity
Considine					EVCs include the endangered Lunette Woodland (EVC 652) and Black-Box Wetland (EVC 369)
Coundon Wetland					A number of rare water dependent ecosystems are present in these wetlands including the rare Cane Grass field at Chirrup Swamp and FFG listed Marbled Marshwort at Jesse and Creswick swamps.
Cronomby Tanks Reserve					
D Smith					
Goulds Reserve					With over 22,000 dams and 17,500 kilometres of open channel being decommissioned in the region through the Wimmera-Mallee Pipeline Project (Draper et al., 2006), the Wimmera Mallee Pipeline Wetlands provide some of the only remaining refuges for water dependent fauna. The impacts of the dramatic loss of open water are not yet quantified however the provision of environmental water to connected sites will ensure that reliable open water remains in the landscape to support some of the regions environmental values.
Greens Wetland					
Homelea					
J Ferrier Wetland					The lack of open water in the landscape limits the opportunity for waterbird feeding and breeding in the region. The Wimmera Mallee Pipeline Wetlands therefore provide some opportunities for breeding (primarily opportunistic generalist species) and feeding (i.e. dabbling duck, grazing waterfowl).
John Ampt					
Kath Smith					
Lake Danaher Bushland Reserve					The Wimmera Mallee Pipeline Wetlands ensure that pockets of aquatic habitat remain in the landscape for the benefit of biodiversity.
Mahoods Corner					
Morton Plains Reserve					
Pam Juergens					The Wimmera Mallee Pipeline Wetlands support two water dependent EPBC listed species and three terrestrial EPBC listed species that have been recorded and require watering points in the landscape.
Part of Gap Reserve					
Paul Barclay					
Poyner					

Asset Name	Basin	Asset Manager	Terminal lakes	Basin Plan Schedule 8 Criteria *	Asset characteristics
R Ferrier					The Wimmera Mallee Pipeline Wetlands support seven water dependent EVCs, two of which are considered endangered and three vulnerable in the Wimmera Bioregion. A further two EVCs are not listed for the Wimmera bioregion but are considered endangered/ vulnerable in neighbouring bioregions. The Wimmera Mallee Pipeline Wetland supports two water dependent and three terrestrial FFG listed species.
Rickard Glenys					
Roselyn Wetland /Reids Dam					
Round Swamp Bushland Reserve (Newer Tank)					
Shannon's Wayside					
Tchum Lakes Reserve					
Tchum Lakes Swimming Pool					
Towma FFR (Lake Marlbed)					
Uttiwillock Wetland					
Cherrip Swamp	Wimmera-Avon/Avoca (pipeline)	North Central CMA	-		
Corack Lake					
Creswick Swamp					
Davis Dam					
Falla Dam					
Jeffcott Wildlife Reserve					
Jesse Swamp					

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Asset Name	Basin	Asset Manager	Terminal lakes	Basin Plan Schedule 8 Criteria *	Asset characteristics
Carapugna (Watchem Bushland Reserve)	Wimmera- Avon/Avoca (pipeline)	Wimmera CMA	-		
Challambra Swamp					
Crow Swamp					
Fieldings Dam					
Harcoans Swamp (Burrereo Bushland Reserve)					
Krong Swamp					
Mutton Swamp					
Opies Dam					
Pinedale					
Sawpit Swamp					
Schultz/Koschitzke					
Tarkedia					
Wal Wal Swamp					

3.1 Changes to priority environmental assets since the previous LTWP

All assets identified in the 2020 LTWP remain as priority environmental assets. One new asset is identified as below:

Asset	Changes since 2020 LTWP
Mt Cole Creek	New asset. Mt Cole Creek is a tributary in the upper Wimmera and an important drought refuge that is receiving trial environmental water management. Mt Cole Creek supports western swamp crayfish and rakali (water rats) as well as multiple fish species, including southern pygmy perch, obscure galaxias and flathead gudgeon. Wimmera CMA's environmental watering trials at this site will inform management into the future.

3.2 Representativeness

An objective of the Basin Plan is to protect and restore a subset of all water-dependent ecosystems of the Murray-Darling Basin, and to support biodiversity by ensuring representative populations, communities and species are protected, and where necessary restored.

The Australian National Aquatic Ecosystems (ANAE) classification framework defines the distinct waterway types and their location in the Basin (Brooks, 2017).⁷ There are 45 ANAE wetland classifications identified in the Wimmera Mallee water resource plan area and five riverine classifications. These are outlined in Table 3 and Table 4

Victoria has undertaken a representativeness assessment with the waterway type of each priority environmental asset in the Basin Plan area that are outlined in section 3. Each asset has been classified using the ANAE framework and compared to the total area of the relevant waterway type(s) at two different scales, for the entire Basin Plan area in northern Victoria and also for each water resource plan area. The ANAE mapping product was updated in 2021 (Brooks, 2021) with some minor changes and the representativeness assessment was updated for this LTWP update.

Twelve of the 45 Wimmera Mallee wetland types are represented in the priority environmental assets (Table 3). Area-wise, priority environmental assets in the Wimmera Mallee are dominated by the temporary lake category (Lt1.1). The over-representation of temporary lakes is mainly due to the presence of a few large temporary lakes such as Lake Hindmarsh and Lake Albacutya. Other main types represented in the priority environmental assets are temporary lake with aquatic bed (Lt.1.2) permanent grass marsh (Pp2.3.2), temporary shrub swamp (Pt1.8.2), temporary black box swamp (Pt1.2.2), and sedge/forb/grassland riparian zone or floodplain (F3.2).

By contrast with northern Victoria as a whole, the priority environmental assets within the Wimmera-Mallee water resource plan area represent a relatively small proportion of the wetland types present within the water resource plan area. Wetland types including clay pans, river red gum floodplains and mixed woodland floodplains are less well represented. Some of the sparsely represented types tend to be disconnected from water delivery channels or may occur at higher elevations and, as such, be difficult to water. Others (e.g. saltmarshes) would be damaged by addition of freshwater. While clay pans are not significantly represented, they are rarely a priority for environmental water given their lack of vegetation and ephemeral water regime. The inclusion of additional black box or river red gum woodland riparian zones in existing or new EWMPs is constrained by their position on floodplain and constraints on delivering water to these waterway types with existing infrastructure. The very flat landscape also makes watering difficult except in times of large flood.

⁷ While this provided the basis for assessing the waterway types across the Basin that have received CEWH environmental water e.g. (Hale, 2020), Victoria uses a broader prioritisation process to select priority management areas (including sites that receive environmental water) that includes community values, and can be used for the southern (non-Murray Darling Basin) parts of the state (refer to DEPI, 2013a).

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Based on length, riverine priority environmental assets within the Wimmera-Mallee are represented by three of five types present in the water resource plan area: Temporary lowland stream (RT1.4), temporary transitional zone stream (Rt1.2) and temporary high energy upland stream (Rt1.1) (Table 4). The latter two types are less represented due to the distance of most from infrastructure that can deliver water.

The wetland or riverine type of each priority environmental asset is listed in Appendix H.

Table 3 Representativeness of Wimmera-Mallee water resource plan area wetland priority environmental assets compared with ANAE wetland type.

ANAE Type	Wimmera-Mallee WRPA		Wimmera-Mallee PEA	
	Area (ha)	% of total WRPA in this ANAE type	Area (ha)	% of total PEA in this ANAE type
Lt1.1: Temporary lake	37,553.40	16.02	19,807.4	97.607
Lt1.2: Temporary lake with aquatic bed	8,300.10	3.5	199.1	0.981
Pt2.3.2: Freshwater meadow	5,832.20	2.5	127.6	0.629
Pt1.8.2: Temporary shrub swamp	5,883.90	2.5	50.1	0.247
Pt1.2.2: Temporary black box swamp	7,610.70	3.2	44.0	0.217
Pt3.1.2: Clay pan	17,931.00	7.6	17.1	0.084
Pt1.1.2: Temporary river red gum swamp	5,188.10	2.2	14.5	0.071
Pt1.7.2: Temporary lignum swamp	2,969.20	1.3	12.5	0.062
Pt1.6.2: Temporary woodland swamp	4,844.50	2.1	8.5	0.042
Rt1.4: Temporary lowland stream	15,157.50	6.5	5.9	0.029
F1.6: Black box forest riparian zone or floodplain	1,541.40	0.7	4.8	0.024
F1.12: Woodland riparian zone or floodplain	14,471.30	6.2	1.3	0.006
F1.8: Black box woodland riparian zone or floodplain	31,647.00	13.5	0.1	0
Lst1.1: Temporary saline lake	22,459.60	9.6	0	0
F1.4: River red gum woodland riparian zone or floodplain	12,541.90	5.4	0	0
F2.2: Lignum shrubland riparian zone or floodplain	9,379.60	4	0	0
Pst1.1: Temporary saline swamp	3,965.80	1.7	0	0
Pst4: Temporary saline wetland	3,931.70	1.7	0	0
F3.2: Sedge/forb/grassland riparian zone or floodplain	4,095.80	1.7	0	0
Pst2.2: Temporary salt marsh	3,565.10	1.5	0	0
Rt1.2: Temporary transitional zone stream	2,819.20	1.2	0	0
Pst3.2: Salt pan or salt flat	2,670.40	1.1	0	0
Lp1.1: Permanent lake	2,122.70	0.9	0	0
Lst1.2: Temporary saline lake with aquatic bed	2,000.30	0.9	0	0
F4: Unspecified riparian zone or floodplain	1,511.50	0.6	0	0
Pt4.2: Temporary wetland	766.9	0.3	0	0
F2.4: Shrubland riparian zone or floodplain	672.1	0.3	0	0
Pp4.2: Permanent wetland	594.5	0.3	0	0
Rp1.4: Permanent lowland stream	522.2	0.2	0	0
Rt1.1: Temporary high energy upland stream	519.2	0.2	0	0
Lsp1.1: Permanent saline lake	198	0.1	0	0
Lp1.2: Permanent lake with aquatic bed	191.7	0.1	0	0
Pt1.5.2: Temporary paperbark swamp	182.7	0.1	0	0
Psp2.1: Permanent salt marsh	146.2	0.1	0	0
F1.2: River red gum forest riparian zone or floodplain	145.8	0.1	0	0
Pt2.1.2: Temporary tall emergent marsh	122.5	0.1	0	0

ANAE Type	Wimmera-Mallee WRPA		Wimmera-Mallee PEA	
	Area (ha)	% of total WRPA in this ANAE type	Area (ha)	% of total PEA in this ANAE type
Psp4: Permanent saline wetland	111.3	0	0	0
Rt1: Temporary stream	53.4	0	0	0
Pu1: Unspecified wetland	33.7	0	0	0
Psp1.1: Saline paperbark swamp	31	0	0	0
Rp1.2: Permanent transitional zone stream	18.8	0	0	0
Rp1.1: Permanent high energy upland stream	3.7	0	0	0
Pp2.4.2: Permanent forb marsh	1.3	0	0	0
Rp1: Permanent stream	0.4	0	0	0
Pp2.3.2: Permanent grass marsh	87.8	0	0	0
total	234,397 ha		20,293 ha	

Note: 'stream' categories in this table represent the lateral flow of streams into the surrounding floodplain.

Table 4 Representativeness of Wimmera-Mallee riverine priority environmental assets compared with ANAE waterway type.

ANAE type	Wimmera-Mallee WRPA		Wimmera-Mallee PEAs	
	Length (km)	% Length within WRPA of this ANAE type	Length (km)	% Length within PEA of this ANAE type
Rt1.4: Temporary lowland stream	4,855.90	44.7	2,335.50	86.8
Rt1.2: Temporary transitional zone stream	5,299.20	48.8	340.6	12.7
Rt1.1: Temporary high energy upland stream	642.4	5.9	13.6	0.5
Rp1.4: Permanent lowland stream	62.7	0.6	0	0
Rt1.3: Temporary low energy upland stream	0.3	0	0	0
total	10,861 km		2,690 km	

3.3 Priority ecosystem functions in the Wimmera-Mallee water resource plan area

Five ecosystem functions are prioritised for the Wimmera-Mallee water resource plan area (Table 5), derived from those identified at the asset scale through EWMP objective setting for environmental watering. This is not a comprehensive list of all possible functions that may exist, either at the asset or the water resource plan area scale. These are function which CMAs can manage using held environmental water and which have specific watering objectives.

The priority ecosystem functions in Table 5 meet the criteria under Basin Plan schedule 9. The individual assets associated with these functions are listed in Table 8 of section 4.3.

Table 5. Priority ecosystem functions in the Wimmera-Mallee water resource plan area.

* refer to Appendix J

Ecosystem Function	Basin Plan Schedule 9 criteria*	Function characteristics
Longitudinal hydrological connectivity (between river reaches for fish movement)	1 2 3	Supports the creation and maintenance of vital habitats Supports the transportation and dilution of nutrients, organic matter and sediment Provides connections along a watercourse (longitudinal connections)
Surface water salinity (for growth and reproduction of aquatic vegetation)	1	Supports the creation and maintenance of vital habitats
Refuges (for native fish species)	1	Supports the creation and maintenance of vital habitats and populations
Geomorphic habitat	1	Supports the creation and maintenance of vital habitats
Water quality	1 2	Supports the creation and maintenance of vital habitats Supports the transportation and dilution of nutrients, organic matter and sediment

Longitudinal connectivity is identified as a priority ecosystem function for this LTWP, but lateral connectivity is less realistic. Many of the wetland or floodplain PEAs in the Wimmera Mallee water resource plan area are connected to environmental water delivery through infrastructure such as channels and pumps.

4 Objectives, targets and environmental watering requirements

This section outlines ecological objectives and targets, with watering requirements, for priority environmental assets and functions in the Wimmera Mallee water resource plan area.

4.1 Approach to developing objectives, targets and watering requirements

The objectives for this LTWP have been collated from EWMPs, environmental flow studies, seasonal watering proposals, or other watering guides prepared by CMAs or Traditional Owners for priority environmental assets and regions across the Wimmera-Mallee (refer to Appendix B for full list of relevant plans). LTWP objectives sit beneath overarching management goals (section 4.2) and align with Basin Plan objectives, Basin-wide environmental watering strategy expected environmental outcomes, and First Nations objectives (section 4.3, Table 7). Targets were developed for selected objectives.

Objectives may be set in terms of ecological outcomes (e.g. specific biota or ecological functions) or the hydrological requirements (e.g. flow, depth, timing) of specific biota or functions. Only when objectives have been set can an appropriate watering regime be developed.

The approach to developing LTWP objectives, targets and watering requirements is described in Appendix C. The approach builds on the asset-scale information from EWMPs, which include site-specific ecological objectives and watering requirements. These were categorised, analysed and regrouped to build a set of objectives suitable for the water resource plan area scale.

Targets developed for this LTWP are designed to be 'SMART': Specific, Measurable, Attainable, Relevant and Time-bound. Targets were only set for objectives which are sensitive to environmental water, had available indicators and were relevant to the water resource plan area. From there, targets were developed using a standard framework.

Watering requirements for the objectives and targets are explained in section 4.5. At the regional scale, this is done by linking the objectives and targets to the relevant flow components. The EWMPs, and Seasonal Watering Plans (developed each year by VEWH), provide further detail on the watering requirements at an asset scale. More detail on watering requirements is available in the EWMPs (see Appendix B).

This LTWP has been developed with objectives and targets aimed at a 10-year planning horizon. While aspirational statements can provide some indication of the long-term outcome for assets and resources, they do not provide a good basis for target setting in the short-term. Longer-term aspirational outcomes have been balanced with the more certain shorter-term in setting the objectives and targets in this LTWP, as illustrated in Figure 11. DEECA will work with CMAs over coming years to consider whether more aspirational objectives can be revised and targets set for the LTWP.

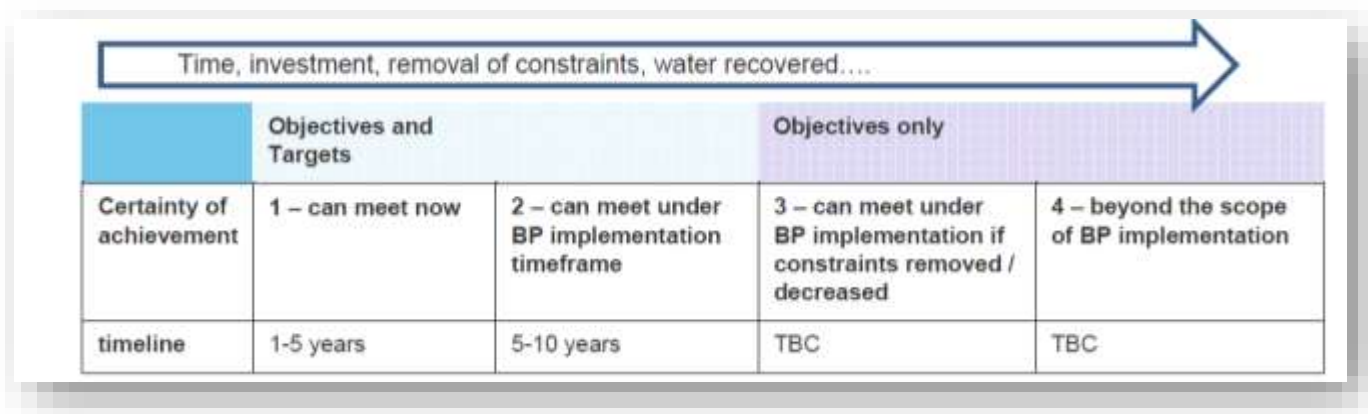


Figure 11. Certainty of achievement has been used in setting objectives and targets in this LTWP. Longer-term aspirational objectives have not had targets set, due to uncertainty in future conditions and ability for associated targets to be met.

4.2 Management goals for the Wimmera-Mallee water resource plan area

The Wimmera, North Central and Mallee CMAs developed site-specific environmental water management goals in consultation with communities through the EWMP process. During development of the Wimmera-Mallee LTWP, these were summarised into management goals for the Wimmera-Mallee water resource plan area (Table 6). Management goals for individual assets are presented in D.

These goals also help to support a range of valuable co-benefits such as improved health of culturally significant species and sites.

Table 6. Management goals for the Wimmera-Mallee water resource plan area.

Management goals
Use environmental water to: - Support diverse, abundant and resilient native fish and vegetation communities; - Support geomorphic diversity; sustainable platypus populations, and - Limit impacts due to poor water quality.
Maintain or improve the values and condition of ecologically healthy or representative rivers, including waterways that have formally recognised significance
Maintain or improve condition of wetlands of International, National or State significance
Improve connectivity and condition along priority wetland systems and riparian corridors
Retain water in isolated wetlands to sustain fauna, especially frogs, wetland and woodland birds
Sustain and where possible increase the abundance of wetland flora, especially threatened species

4.3 Ecological objectives for the Wimmera-Mallee water resource plan area

Eighteen environmental objectives have been developed for the Wimmera-Mallee water resource plan area and are set out in Table 7 and Table 8. There are five new objectives in this LTWP regarding:

- Water quality (WM5)
- Floodplain EVCs (WM7)
- Condition and extent of river red gum EVCs and lignum EVCs (WM10)

- Food resource and feeding opportunities for waterbirds (WM12)
- Diversity of macroinvertebrates (WM17).

These are either from objectives for new priority environmental assets, or updates made to existing asset objectives.

In both Table 7 and Table 8, the objectives are grouped into themes that correspond to those used in the BWS (MDBA, 2025a) plus an additional theme ('Other') that encompasses platypus, rakali, crayfish, turtles and frogs. The contribution of these LTWP objectives to Basin Plan objectives is shown in the cross-referencing with relevant objectives from the Basin Plan environmental watering plan (EWP), and the 2025 BWS's expected environmental outcomes (EEOs) and First Nations objectives. Refer to Appendix I for codes used (Table 29, Table 30 and Table 31).

The specific assets these objectives relate to are set out in Table 8. The objectives for each asset can be found in Appendix D.

Table 7. Ecological objectives for the Wimmera-Mallee water resource plan area.

Theme	No.	Objectives	EWP Objectives	2025 BWS EEOs	First Nations objectives (BWS)
Connectivity and Functions	WM1	Improve longitudinal connectivity (between river reaches) to facilitate movement of native fish	8.06,3(a) 8.06,3(b)(i) 8.06,3(f) 8.06,6(b) 8.07,6	FC1, FC6	2.1, 2.2, 2.3, 2.10
	WM2	Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation	8.06,2 8.07,5	FC1, FC6, V7, V8	2.1, 2.2, 2.6, 2.8, 2.10
	WM3	Maintain refuges for native fish species	8.06,6(b) 8.07,3	F1, F2, F4, F5, F6, F8, F17	2.1, 2.2, 2.3, 2.7
	WM4	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	8.06,3(a)	FC1, FC6	2.1, 2.5
	WM5	Maintain water quality to provide suitable conditions for water-dependent biota	8.06,2, 8.07,5	N/A	2.1, 2.2, 2.6, 2.8, 2.10
Vegetation	WM6	Improve the abundance and maintain the species richness and extent of aquatic vegetation	8.06,2 8.06,3(a) 8.06,6(a)	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10
	WM7	Improve the condition of riparian and floodplain EVCs	8.05,3(b) 8.06,3(b)(ii) 8.06,6(a) 8.06,6(b)	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10
	WM8	Improve the condition of wetland EVCs	8.06,3(b)(ii) 8.06,6(a) 8.06,6(b)	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10
	WM9	Maintain the condition of black box dominated EVCs	8.06,3(b)(ii) 8.06,6(a) 8.06,6(b)	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10

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Theme	No.	Objectives	EWP Objectives	2025 BWS EEOs	First Nations objectives (BWS)
Waterbirds	WM10	Improve condition and/or maintain extent of river red gum dominated EVCs and lignum dominated EVC	8.05,3(b), 8.06,3(b)(ii), 8.06,5, 8.06,6(a), 8.06,6(b), 8.06,7	V1 - V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10
	WM11	Improve breeding opportunities and habitat for waterbirds	8.06,6(a) 8.06,6(b)	B1 - B4	2.2, 2.9
	WM12	Improve food resources and feeding opportunities for waterbirds	8.06,6(a), 8.06,6(b)	B1, B2	2.2, 2.9
Fish	WM13	Improve the abundance of large-bodied fish	8.06,6(a) 8.06,6(b) 8.07,3	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7
	WM14	Improve habitat and movement and maintain species richness of native fish	8.06,3(b)(i) 8.06,3(b)(ii) 8.06,6(a) 8.06,6(b)	F1 - F9, F17	2.2, 2.5, 2.6, 2.7
Other	WM15	Improve habitat for Platypus and Rakali communities	8.06,6(b) 8.07,3	N/A	N/A
	WM16	Maintain habitat for crayfish, turtle and frog communities	8.06,6(b) 8.07,3	N/A	N/A
	WM17	Improve abundance and maintain diversity of macroinvertebrates	8.06,6(b), 8.07,3	N/A	N/A
	WM18	Maintain species richness of frog communities	8.06,6(b), 8.07,3	N/A	N/A

Note: EWP Objective codes are the Basin Plan Chapter 8 Environmental Watering Plan objectives (Appendix I Table 29). BWS EEO codes are the 2025 Basin-wide environmental watering strategy Expected Environmental Outcomes (Table 30). First Nations objectives codes are in Table 31.

Table 8. Objectives and priority environmental assets for the Wimmera-Mallee water resource plan area.

Theme	No.	Objective	Assets
Connectivity and Functions	WM1	Improve longitudinal connectivity (between river reaches) to facilitate fish movement	Wimmera River, Mount William Creek
	WM2	Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation	Wimmera River, Mount William Creek
	WM3	Maintain refuges for native fish species	Wimmera River, Mount William Creek, Wimmera-Mallee Pipeline wetlands (NCCMA)
	WM4	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	Bungalally Creek, Burnt Creek, Mt Cole Creek, Wimmera River, Mount William Creek, MacKenzie River
	WM5	Maintain water quality to provide suitable conditions for water-dependent biota	Mt Cole Creek
Vegetation	WM6	Improve the abundance and maintain the species richness and extent of aquatic vegetation	Dock Lake, Lake Albacutya; Lake Hindmarsh, Mackenzie River, Mount William Creek, Mt Cole Creek, Outlet Creek, Wimmera River, Wimmera-Mallee Pipeline wetlands (WCMA)

Theme	No.	Objective	Assets
	WM7	Improve the condition of riparian and floodplain EVCs	Bungalally Creek, Burnt Creek, Mackenzie River, Mount William Creek, Outlet Creek, Wimmera River, Mt Cole Creek
	WM8	Improve the condition of wetland EVCs	Dock Lake, Lake Albacutya, Lake Hindmarsh, Outlet Creek, Wimmera-Mallee Pipeline Wetlands (WCMA)
	WM9	Maintain the condition of black box dominated EVCs	Wimmera-Mallee Pipeline wetlands (MCMA), Wimmera-Mallee Pipeline Wetlands (WCMA), Yarriambiack Creek and Beulah Weir Pool
	WM10	Improve condition and/or maintain extent of river red gum dominated EVCs and lignum dominated EVC	Wimmera-Mallee Pipeline wetlands (MCMA), Wimmera-Mallee Pipeline wetlands (WCMA)
Waterbirds	WM11	Improve breeding opportunities and habitat for waterbirds	Dock Lake, Lake Albacutya Lake Hindmarsh, Mt Cole Creek, Outlet Creek, Wimmera-Mallee Pipeline wetlands (MCMA), Wimmera-Mallee Pipeline wetlands (WCMA),
	WM12	Improve food resources and feeding opportunities for waterbirds	Dock Lake, Lake Albacutya, Lake Hindmarsh, Mt Cole Creek, Outlet Creek, Wimmera-Mallee Pipeline wetlands (WCMA)
Fish	WM13	Improve abundance of large-bodied native fish	Wimmera River, Mount William Creek, Mt Cole Creek, Yarriambiack Creek and Beulah Weir Pool
	WM14	Improve habitat and movement and maintain species richness of native fish	Bungalally Creek, Burnt Creek, MacKenzie River, Mount William Creek, Wimmera River, Yarriambiack Creek and Beulah Weir Pool
Other values	WM15	Improve habitat for Platypus and Rakali communities	Mackenzie River, Mount William Creek, Mt Cole Creek, Wimmera River
	WM16	Maintain habitat for crayfish, turtle and frog communities	Burnt Creek, Dock Lake, Lake Albacutya, Lake Hindmarsh, Mount William Creek, Mt Cole Creek, Outlet Creek, Wimmera River, Wimmera- Mallee pipeline wetlands (MCMA), Wimmera- Mallee pipeline wetlands (NCCMA), Wimmera- Mallee pipeline wetlands (WCMA)
	WM17	Improve abundance and maintain diversity of macroinvertebrates	Bungalally Creek, Burnt Creek, Dock Lake, Lake Albacutya, Mackenzie River, Mount William Creek, Mt Cole Creek, Outlet Creek, Wimmera-Mallee Pipeline Wetlands (MCMA), Wimmera River,
	WM18	Maintain species richness of frog communities	Dock Lake, Mackenzie River, Wimmera-Mallee Pipeline Wetlands (MCMA), Wimmera-Mallee Pipeline Wetlands (WCMA)

4.4 Targets for environmental watering in the Wimmera-Mallee water resource plan area

Targets have been developed for a subset of the objectives developed for this water resource plan area (Table 9). The process for the development of the targets is set out in Appendix C. The targets aim to be measurable, unambiguous, time-bound and set clear thresholds for success.

The targets have been developed to measure progress towards the objectives. They are designed to enable reporting at a Basin level and as a consequence, while targets have been developed for only a selection of objectives, it is expected that water will be provided to meet all objectives set out in this LTWP. Like the development of ecological objectives, the targets have been developed based on a set of common terms and definitions. For the purpose of this LTWP:

- ‘Maintain’ means to prevent further decline (this does not discount an improvement as an acceptable outcome)
- ‘Improve’ is a general term based on the objectives in the EWMPs. The term refers to an increase in the nominated attributes of the target
- ‘Habitat’ refers to water-based/instream/riparian habitat

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- Waterbird guilds are based on feeding and habitat requirements. The main guilds in the Wimmera-Mallee water resource plan area are piscivores (e.g. pelicans and cormorants), waterfowl (e.g. ducks and coots), rallids (e.g. rails and crakes) and waders and shorebirds (e.g. spoonbills and ibis)
- EVC benchmarks have a list of 'typical' species and lifeforms (e.g. shrub, herb) found in each EVC in a particular bioregion. EVCs with trees (usually terrestrial and riparian EVCs) have standards for tree size and density, organic litter, recruitment and presence of large logs. The condition score for an EVC benchmark is the sum of the ratings for each component of the benchmark (large trees, tree canopy cover, understorey composition, weeds, recruitment, organic litter and large logs), as outlined in the Vegetation Quality Assessment Manual (DSE, 2004) for terrestrial vegetation. For wetland vegetation, the vegetation sub-index is used, as outlined in the Index of Wetland Condition assessment procedure (DELWP, 2022b).

Refinement of targets is an ongoing process and this will be reflected in future iterations of this LTWP. Monitoring of the Victorian Murray LTWP objectives and targets are discussed in section 9.

Table 9. Targets for the Wimmera-Mallee water resource plan area.

Theme	No.	Objective	Target	Assets
Connectivity	WM1	Improve longitudinal connectivity (between river reaches) to facilitate fish movement	<i>To be confirmed</i>	Wimmera River, Mount William Creek
	WM2	Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation	End-of-valley salinity targets for the Wimmera River at Horsham Weir of median 1,380 EC and eightieth percentile of 1,720 EC are met in every year	Wimmera River, Mount William Creek
	WM3	Maintain refuges for native fish species	<i>To be confirmed</i>	Wimmera River, Mount William Creek, MacKenzie River; Burnt Creek, Wimmera-Mallee Pipeline wetlands (NCCMA)
	WM4	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	<i>To be confirmed</i>	Bungally Creek, Burnt Creek, Mt Cole Creek, Wimmera River, Mount William Creek, MacKenzie River
	WM5	Maintain water quality to provide suitable conditions for water-dependent biota	<i>To be confirmed</i>	Mt Cole Creek
Vegetation	WM6	Improve the abundance and maintain the species richness and extent of aquatic vegetation	<i>To be confirmed</i>	Dock Lake, Lake Albacutya; Lake Hindmarsh, Mackenzie River, Mount William Creek, Mt Cole Creek, Outlet Creek, Wimmera River, Wimmera-Mallee Pipeline wetlands (WCMA)
	WM7	Improve the condition of riparian and floodplain EVCs	The condition or riparian EVCs in the asset is better at the end than at the start of a ten-year monitoring period as measured by the following sub-targets: - health of adult trees - recruitment and survival of juvenile trees - native species richness - native species cover/abundance - recruitment of understorey vegetation	Bungalally Creek, Burnt Creek,,, Mackenzie River, Mount William Creek, Outlet Creek, Wimmera River, Mt Cole Creek
	WM8	Improve the condition of wetland EVCs	<i>To be confirmed</i>	Dock Lake, Lake Albacutya, Lake Hindmarsh, Outlet Creek, Wimmera-Mallee Pipeline Wetlands (WCMA)
	WM9	Maintain the condition of black box dominated EVCs	<i>To be confirmed</i>	Wimmera-Mallee Pipeline wetlands (MCMA), Wimmera-Mallee Pipeline Wetlands (WCMA), Yarriambiack Creek and Beulah Weir Pool

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Theme	No.	Objective	Target	Assets
Waterbirds	WM10	Improve condition and/or maintain extent of river red gum dominated EVCs and lignum dominated EVC	<i>To be confirmed</i>	Wimmera-Mallee Pipeline wetlands (MCMA), Wimmera-Mallee Pipeline wetlands (WCMA)
	WM11	Improve breeding opportunities and habitat for waterbirds	Deliver water to support waterbird breeding events in terminal lakes	Lake Hindmarsh, Lake Albacutya, Mt Cole Creek, Outlet Creek, Dock Lake, Wimmera-Mallee Pipeline wetlands (MCMA), Wimmera-Mallee Pipeline wetlands (WCMA),
	WM12	Improve food resources and feeding opportunities for waterbirds	<i>To be confirmed</i>	Lake Albacutya, Lake Hindmarsh, Mt Cole Creek, Outlet Creek, Dock Lake, Wimmera-Mallee Pipeline wetlands (WCMA)
Fish	WM13	Improve abundance of large-bodied native fish	A) The mean number of sites where large-bodied native fish species are detected is the same or higher in the last five years than the first five years of a ten-year monitoring program B) For age classes up to five years, the number of cohorts is the same or higher in the last year than the first year of a ten-year monitoring program	Wimmera River, Mount William Creek, Mt Cole Creek, Yarriambiack Creek and Beulah Weir Pool
	WM14	Improve habitat and movement and maintain species richness of native fish	The ratio of fish species observed to expected (using pre-European Reference Condition - PERCH) is the same in the first three years as the last three years of a ten-year monitoring period	Wimmera River, Burnt Creek, Mount William Creek, MacKenzie River, Bungalally Creek, Yarriambiack Creek and Beulah Weir Pool
Other Values	WM15	Improve habitat for Platypus and Rakali communities	<i>To be confirmed</i>	Mackenzie River, Mount William Creek, Mt Cole Creek, Wimmera River
	WM16	Maintain habitat for crayfish, turtle and frog communities	<i>To be confirmed</i>	Lake Albacutya, Lake Hindmarsh, Mount William Creek, Mt Cole Creek, Outlet Creek, Wimmera River, Dock Lake, Burnt Creek, Wimmera-Mallee pipeline wetlands (WCMA)
	WM17	Improve abundance and maintain diversity of macroinvertebrates	<i>To be confirmed</i>	Bungalally Creek, Burnt Creek, Lake Albacutya, Mackenzie River, Mount William Creek, Mt Cole Creek, Outlet Creek, Wimmera-Mallee Pipeline Wetlands (MCMA), Wimmera River, Dock Lake, Wimmera-Mallee Pipeline Wetlands (WCMA)
	WM18	Maintain species richness of frog communities	<i>To be confirmed</i>	Mackenzie River, Wimmera-Mallee Pipeline Wetlands (MCMA), Dock Lake, Wimmera-Mallee Pipeline Wetlands (WCMA)

4.5 Watering requirements of the objectives

This section describes the key components of the flow regime needed to meet objectives. Asset specific watering requirements are documented in EWMPs, seasonal watering proposals, and the VEWH's seasonal watering plan. Each of these uses the seasonally adaptive approach (DSE, 2009), where priorities for environmental watering, works and complementary measures in any given year vary according to climatic conditions and water availability.

4.5.1 Watering requirements of rivers

Watering requirements for rivers are specified in terms of flow components – low flow, freshes, high flow and overbank flow (Figure 12). In regulated rivers, some of the flow components that are needed can be provided through held environmental water (see section 5.1.4) provided sufficient water is available, and via coordination with other sources of water such as system operating water (e.g. provision of passing flows) and alterations to the timing and rate of delivery or consumptive water. It is relatively straightforward to deliver baseflows and to return some of the small and medium-sized freshes that are critical in the life cycles of various native plants and animals. Baseflows provide the basic habitat for in-stream biota, while freshes can trigger fish migration and spawning, move sediment and nutrients through river systems, connect habitats and improve water quality.

However, availability of water for the environment is often less than the water needed to deliver the recommended flows. For example, most of the larger flow components (such as bankfull or overbank) cannot be delivered through regulated releases in most cases due to the physical restrictions of upstream dams and weirs. Other factors (such as prohibitive channel losses and risks around inundation of private land including legal liability) mean most of these releases are also not feasible. As a consequence, overbank flow recommendations can only be met by natural events. Although natural flows can be “topped up” to meet critical depth or duration requirements. Figure 12 graphically depicts the benefits of different environmental flow components in rivers.

Table 10 shows the flow components required for ecological objectives that apply to river assets. While the flow components apply across all assets, the detail (flow rate, timing, duration) will be asset specific. An example of the timing, magnitude, frequency and duration of flow components required to meet ecological objectives, watering requirements for reaches 2 and 3 of the Wimmera River are presented in Table 11 (Wimmera, 2024). The watering requirements for the remaining reaches of the Wimmera River and other priority assets are in individual EWMPs (see Appendix B).

In addition to EWMPs, the environmental watering requirements of priority ecosystem assets have been captured in:

- Victoria's EWMP objective and watering requirements database (DEECA, 2026), prepared for this LTWP update.
- MDBA's Environmental Assets and Functions Database (MDBA, 2021), prepared under Basin Plan. This has not been updated since 2021, therefore will not contain all priority assets listed in this LTWP, but is expected to be updated again in coming years (A. Meehan, *pers. comm.*, 21 October 2025)
- MDBA's Environmental Watering Requirements (EWR) Tool (MDBA, 2025b), which is a tool for evaluating LTWP requirements for Basin Plan implementation, including the Basin Plan Review and SDL Assessment.

The latter two contain objectives, targets and associated watering regimes for all priority environmental assets receiving environmental water across the Murray-Darling Basin. These are valuable resources for all environmental water delivery partners (i.e. CEWH, VEWH, state agencies and water corporations) and can be used to interrogate watering requirements at varying scales, from single environmental assets up to CMA and water resource plan scales.

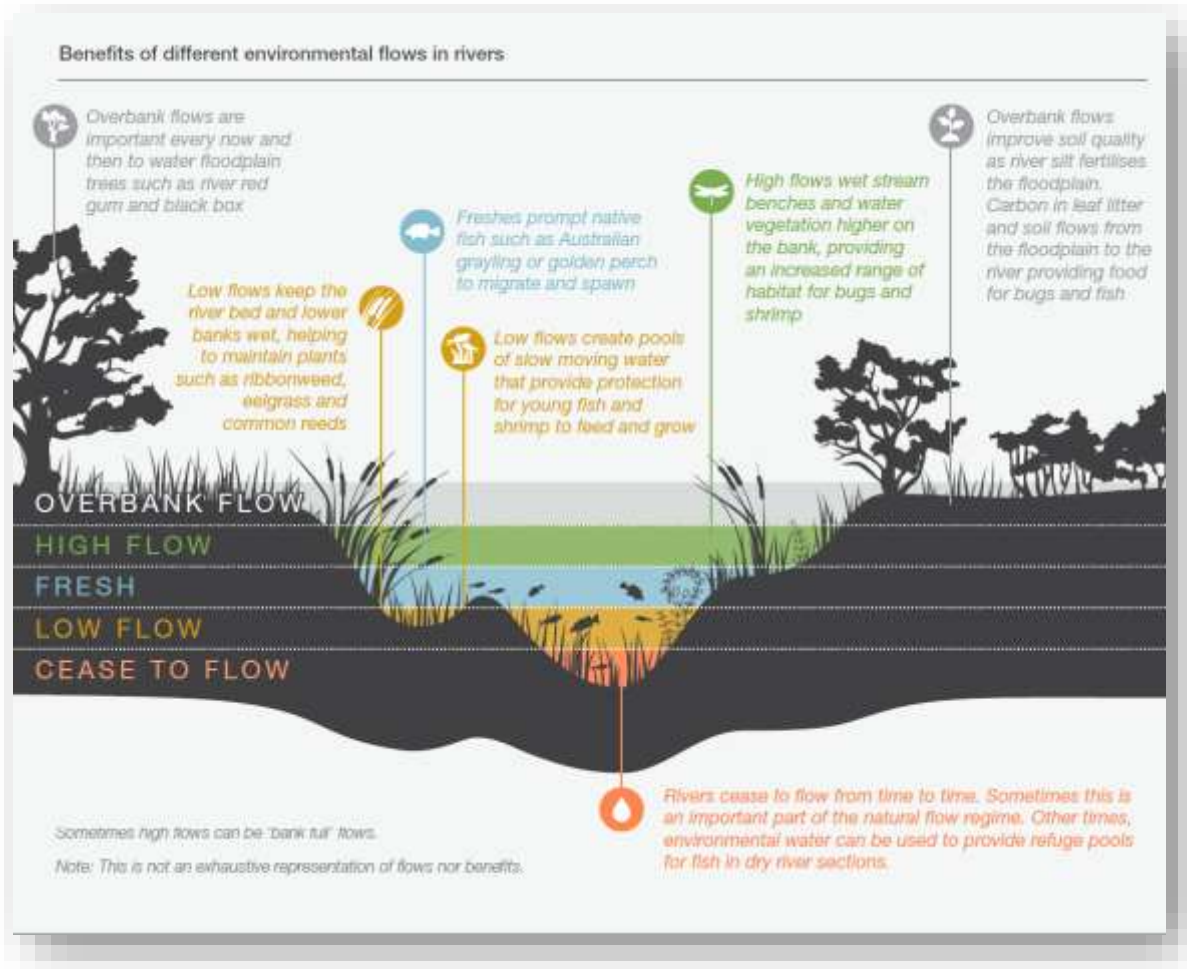


Figure 12. Benefits of different environmental flow components in rivers (VEWH, 2025c)

Table 10. Flow components required to meet native fish, vegetation, functions and 'other' objectives related to river-based assets.

Objective		Low flow	Freshes	High Flow	Bankfull	Overbank flow	Explanation (based on conceptual models)
Native fish	Improve abundance of large-bodied native fish	✓	✓	✓			Low flows to maintain refuge pools and water quality in dry periods, winter/spring fresh to maintain edge habitats and shallow-water habitat for endemic fish, high flows to signal spawning
	Improve habitat and movement and maintain species richness of native fish	✓	✓	✓			<u>Low flows to maintain refuge pools and water quality in dry periods.</u> Freshers provide variable flow during high flow season for fish movement and diversity of habitat. <u>high flows to signal spawning</u>
Vegetation	Improve the abundance and maintain the species richness and extent of aquatic vegetation	✓	✓	✓			<u>Low flows for habitat; summer fresh for dispersal of propagules into disturbed habitats; freshes and high flows to wet lower bank and benches to grow and maintain littoral vegetation</u>
	Improve the condition of riparian and floodplain EVCs			✓	✓	✓	<u>Bankfull inundation of riparian vegetation to maintain condition and facilitate recruitment, overbank flows to wet higher benches and facilitate recruitment</u>
	Maintain the condition of black box dominated EVCs			✓	✓	✓	Overbank flows to wet higher benches and facilitate recruitment, high flow and bank full to inundate riparian vegetation.
	Improve condition and/or maintain extent of river red gum dominated EVCs and lignum dominated EVC			✓	✓	✓	Overbank flows to inundate floodplain vegetation to maintain condition and facilitate recruitment of adult River Red Gums.
Functions	Improve longitudinal connectivity (between river reaches) to facilitate fish movement	✓	✓				Base flows maintain edge habitats in deeper pools and runs, and shallow water habitat availability for macroinvertebrates and endemic fish.

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Objective		Low flow	Freshes	High Flow	Bankfull	Overbank flow	Explanation (based on conceptual models)
	Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation	✓	✓				Providing low flows during seasonally dry and very dry conditions will maintain refuge habitat and ensure its water quality (salinity) remains within the tolerance range of the dependent fauna.
	Maintain refuges for native fish species	✓	✓				Low flows to maintain presence of water habitat; freshes to maintain water quality
	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	✓	✓	✓	✓	✓	Low flows and freshes Flush fine silt from the stream bed and hard substrate to improve the quality of the fish and waterbug habitat, bankfull and overbank flow to move organic debris in the channel to support waterbugs,
	Maintain water quality to provide suitable conditions for water-dependent biota	✓	✓	✓	✓		High flow and bankfulls to improve water quality and lower Temperatures, freshes to manage turbidity and salinity, low flows to maintain refuge pools with adequate turbidity, dissolved oxygen and salinity in dry periods
Other fauna	Improve habitat for Platypus and Rakali communities	✓	✓	✓			High flows to 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, low flow and freshes for habitat in dry periods
	Maintain habitat for crayfish, turtle and frog communities	✓	✓	✓	✓	✓	Low flows for habitat; freshes for habitat and increased foraging; spring high flows to soften banks for turtle nest digging; bankfull and unregulated overbank flows for connection to new habitats and move organic debris in the channel to support crayfish,
	Improve abundance and maintain diversity of macroinvertebrates	✓	✓	✓	✓	✓	Low flows through dry periods & winter/spring fresh to maintain edge habitats and shallow-water habitat for waterbugs. Bankfull and overbank flow to move organic debris in the channel to support waterbugs

Objective		Low flow	Freshes	High Flow	Bankfull	Overbank flow	Explanation (based on conceptual models)
	Maintain species richness of frog communities	✓	✓	✓	✓	✓	Low flows for habitat and feeding; freshes to trigger breeding and increase habitat; high flows for burrowing in river banks; bankfulls and unregulated overbank flows for dispersal to new habitats

Note: volume, timing, duration and frequency for each of these elements is asset specific.

Table 11. Environmental flow recommendations for the Wimmera River reaches 2 and 3 (Wimmera CMA, 2024a).

Flow component	Timing	Magnitude	Climatic scenario	Frequency	Duration	Overarching environmental objective*	Detailed environmental objective
Cease to flow	Dec-May	0 ML/d	Drought	As infrequently as possible	Less than 21 days in total	1,2,8,9	Limits cease to flow to ensure stress on environmental values is not exacerbated beyond the point of return.
			Dry				
			Average		Less than 7 days in total		
Baseflow	Dec-May	10 ML/d or natural	All	Continuous	Continuous	1,2,4,5,7,8,9	Maintain edge habitats in deeper pools and runs, and shallow water habitat availability for macroinvertebrates and endemic fish. Maintains near-permanent inundated stream channel for riparian vegetation and to prevent excessive in-stream terrestrial species growth.
	Jun-Nov	100 ML/d or natural	All	Continuous	Continuous	1,2,4,5,7,8,9	Prevent terrestrialisation of the lower banks from invasive phragmites and provide increased flow and variability to support fish movement and diversity of habitat.
Freshes	Dec-May	35-40 ML/d	Dry & drought	2 per period	3-7 days	1,4,5,6,7,8,9	Prevent terrestrialisation of the lower banks from invasive phragmites and provide increased flow and variability to support fish movement and diversity of habitat.

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Flow component	Timing	Magnitude	Climatic scenario	Frequency	Duration	Overarching environmental objective*	Detailed environmental objective
	Dec-May	100 ML/d	Average	2 per period	2-7 days	1,4,5,6,7,8,9	Provide variable flow during low flow season for macroinvertebrates (over wood debris to increase biofilm abundance as a food source), fish movement and to maintain water quality and diversity of habitat
			Wet	3 per period			
	Jun-Nov	400 ML/d	Drought	1 per period	1 day	1,4,5,6,7,8,9	Provide variable flow during high flow season for fish movement and to maintain water quality and diversity of habitat. Also flushes surface sediments from hard substrates for macroinvertebrates.
			Dry	3 per period	2 days		
			Average	5 per period	3 days		
			Wet	5 per period	4 days		
	Jun-Nov	1,300 ML/d	Dry	1 per period	1 day	1,4,5,6,7,8,9	Wets benches, entraining organic debris and promoting diversity of habitat.
			Average	2 per period	2 days		
			Wet	3 per period	3 days		
	Jun-Nov	2,600 ML/d	Average	1 per period	2 days	1,4,5,6,7,8,9	Disturbs algae/bacteria/organic biofilm present on rock or wood debris for macroinvertebrates. Wets higher benches entraining organic debris and promoting diversity of habitat.
			Wet	2 per period	3 days		
Bankfull	Any	4,000 ML/d	Average	1 per period or natural	2 days	3,4,8	Inundate riparian vegetation to maintain condition and facilitate recruitment. Entrain organic debris in the channel to support macroinvertebrates. Maintain structural integrity of channel.
			Wet	1 per period			
Overbank	Aug-Nov	8,000 ML/d	Wet	1 per period	1 day	3,4,8	Inundate floodplain to maintain condition of adult River Red Gums and facilitate recruitment. Entrain organic debris from the floodplain to support macroinvertebrates. Maintains floodplain geomorphic features.

*as per the EWMP

4.5.2 Watering requirements for wetlands

The wetland assets in the Wimmera-Mallee are either terminal lakes (e.g. Lake Hindmarsh) or Pipeline wetlands (e.g. Crow Swamp). As described previously, the terminal lakes only rarely fill, with upstream extraction and a drying climate reducing the frequency of these fill events. Pipeline wetlands historically relied on local catchment run-off to fill, prior to connection to the Wimmera-Mallee Pipeline. Catchment inflow can be episodic – typically occurring during wet winter/spring periods, although very heavy rainfall in summer/autumn can lead to substantial inflows into these wetlands. A handful are also able to be filled during flooding from local waterways.

Environmental water is used to reconnect these wetlands and introduce a more natural watering regime, including a wetting and drying cycle where appropriate.

In wetlands, phases of the managed watering regime include (Figure 13 and 14):

- Drying – declining water levels due to outflows, seepage and evaporation.
- Dry – no water in wetland
- Filling – inflow of water and increasing water levels; when occurring naturally, this can be a trigger for environmental watering to ‘top up’
- Full – the wetland is filled to the natural outflow or “sill” level and only evaporation and recharge to groundwater will subsequently reduce volume. May be topped up with environmental water to increase the duration of inundation
- Flooded – water level is higher than the natural sill; occurs during floods or environmental watering that targets the surrounding areas (e.g. fringing vegetation).

Table 12 describes phases of the wetting and drying cycle that contribute to achieving different ecological objectives for wetland assets. EWMPs describe the environmental watering objectives and regime for each priority environmental asset. Examples of the watering requirements for terminal lake assets is presented in Table 13. Examples of the watering requirements for Wimmera-Mallee Pipeline wetlands are presented in Table 14. The timing, duration and frequency of wetland watering is site specific and will vary year-to-year depending on antecedent conditions and the availability of environmental water.

An additional consideration when deciding which wetlands receive environmental water in any year is maintaining a mosaic of wetland habitat types across the region. This will increase habitat availability over time for waterbirds and allow other water dependent plants and animals to disperse across the landscape (Morris, 2012), increasing the sustainability of environmental assets. These factors are considered annually in the development of the VEWH's Seasonal Watering Plan.

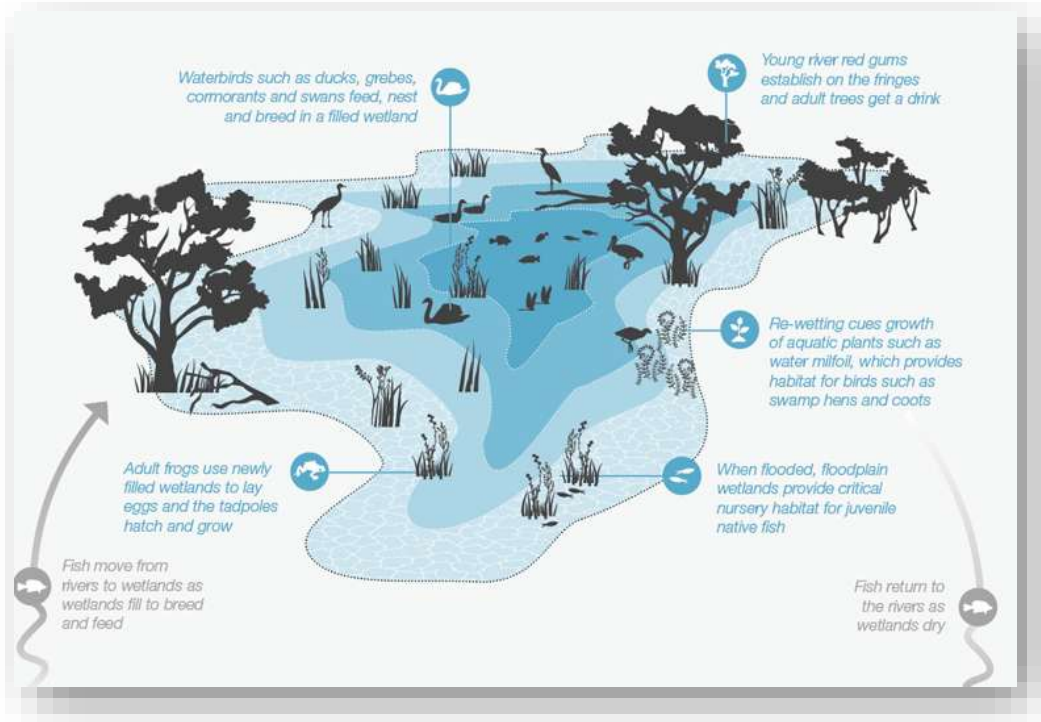


Figure 13. Benefits of wetting phases in wetlands (VEWH, 2025d)

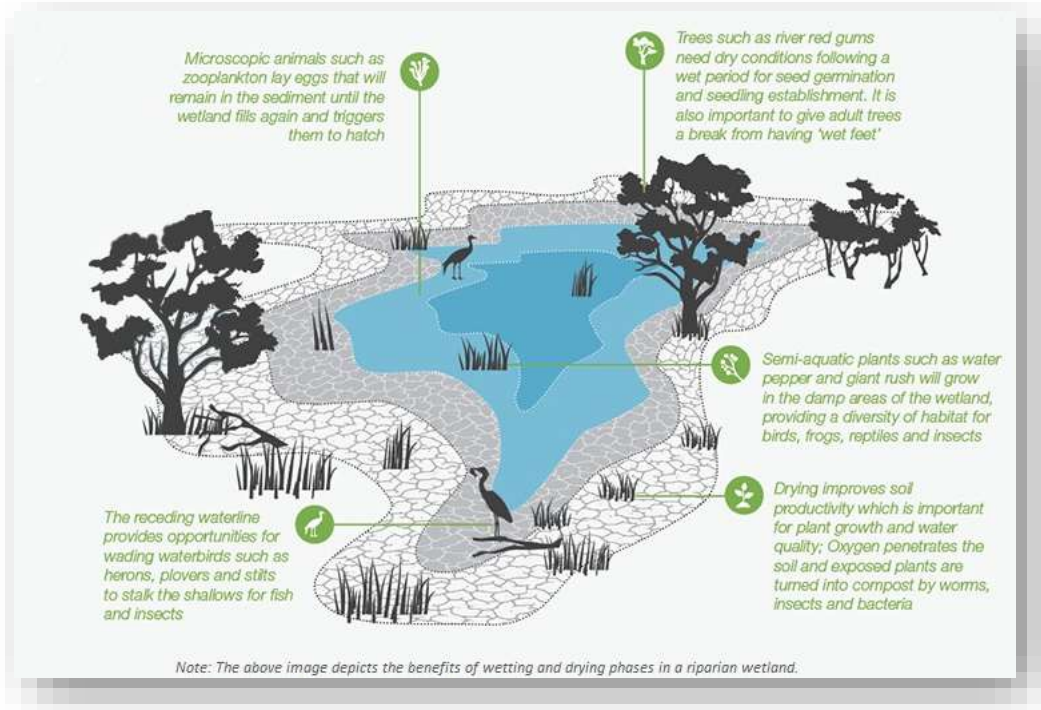


Figure 14. Benefits of drying phases in wetlands (VEWH, 2025e)

Table 12. Elements of the wetting/drying cycle required to meet waterbird, vegetation and other fauna objectives for wetland-based assets. Note: volume, timing, duration and frequency for each of these elements is asset specific.

Objective		Regional mosaic	Dry	Filling	Full	Flooded	Drying	Explanation (based on EWMP conceptual model)
Waterbirds	Improve breeding opportunities and habitat for waterbirds			✓	✓	✓		Timing of filling and full level determines duration of breeding events with long duration of flooded wetlands reducing predation of chicks
	Improve food resources and feeding opportunities for waterbirds	✓		✓	✓	✓		Partial fill for shallow feeding habitat; full for open water diving species; flooded for some grazing species; drying to expose mudflats for foraging; mosaics to increase feeding habitats
Vegetation	Improve the abundance and maintain the species richness and extent of aquatic vegetation		✓	✓	✓	✓	✓	Filling and natural drying promotes germination of different functional groups and diversity of habitats
	Improve the condition of wetland EVCs	✓	✓	✓	✓	✓	✓	Managed floodplain level represents the maximum extent of communities
	Maintain the condition of black box dominated EVCs	✓	✓	✓	✓	✓	✓	Flooding to manage wetland extent then reducing to full level will water adult trees, but prevent waterlogging
	Improve condition and/or maintain extent of river red gum dominated EVCs and lignum dominated EVC	✓	✓	✓	✓	✓	✓	Flooding to manage wetland extent then reducing to full level will water adult trees, but prevent waterlogging
Other fauna	Maintain habitat for frog communities	✓		✓	✓	✓		Mosaic provides different habitats across region; frog breeding triggered by filling; full level to allow time for metamorphosis

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Objective		Regional mosaic	Dry	Filling	Full	Flooded	Drying	Explanation (based on EWMP conceptual model)
	Maintain habitat for turtle communities	✓		✓	✓	✓	✓	Mosaic provides different habitats across region; full level provides maximum available habitat, flooded to allow for connection to new habitats, drying to expose mudflats for nesting
	Maintain habitat for crayfish communities				✓	✓		Full level provides maximum available habitat, flooded moves organic debris into wetland.

Note: volume, timing, duration and frequency for each of these elements is asset specific.

Table 13. Summary of the inundation frequencies required to support wetland EVCs at the terminal lakes and the volumes (rounded to the nearest GL) required to engage (reach the bottom of the extent) and to inundate (cover the whole of the extent) each of the EVCs (Wimmera CMA, 2024a).

Ecological zone (EVC)	Lake Hindmarsh	Outlet Creek (b/w Hindmarsh & Albacutya)	Lake Albacutya
Lake Bed (EVC 197 Lake Bed Herbland)	Inundate for <3 years in 10, for 1 month to >1 year then dry.	Flow when water is passing to Lake Albacutya. Dry for usually less than 10 consecutive years. Outlet Creek:0.95 GL Cumulative volume: 380 GL	Inundate for 1 month to >1 year every 5 -10 years.
	Lake specific: 0 – 120 GL		Lake specific: 0 – 41 GL
	Cumulative: 0 – 120 GL		Cumulative: 381 – 422 GL
Fringing Woodland (EVC 813 River Red Gum)	Inundate for <3 years in 10, for 1 month to >1 year then dry.		Inundate for 1 month to >1 year every 10-15 years.
	Lake specific: 28 - 380 GL		Lake specific: 20 – 175 GL
	Cumulative: 28 – 380 GL		Cumulative: 400 – 556 GL
Fringing Woodland (EVC 103 Black Box)	NA		Inundate for 1 month to >1 year every 10-15 years.
			Lake specific: 175 – 230 GL
			Cumulative: 556 – 611 GL

Table 14. Hydrological objectives and watering frequency and duration for the Mallee Pipeline wetlands (Mallee CMA, 2023).

Environmental objective	Wetlands	Frequency of events (10 years)			Duration of events (months)			Timing
		Min.	Opt.	Max.	Min.	Opt.	Max.	
	*Terrestrial environment water contained within the dam area							
Provide watering points for terrestrial fauna and woodland birds	Broom Tank, Chiprick BR, Clinton Shire Dam, Considine*, Coundon Wetland, Cronomby Tanks*, D Smith*, Greens Wetland, Homelea*, J Ferrier Wetland, John Ampt*, Kath Smith*, Mahoods Corner*, Pam Juergens*, Paul Barclay*, Poyner, R Ferrier*, Rickard Glenys*, Roselyn Wetland, Shannons Wayside*, Tchum Lakes Pool (Dam), Towma (Lake Marlbed) FFR, Uttiwillock*	-	10	-	-	12	12	For all four fill dams May to November (due to pipeline delivery constraints) in all climate scenarios, and allow natural drawdown through evaporation. For vegetation provide overbank flow into surrounding floodplain May to November during average to wet years only, and allow natural drawdown.
Provide foraging, refuge and breeding habitat for turtles and frogs	Cokum BR, Considine*, Cronomby Tanks*, Mahoods Corner*, Part of Gap Reserve, Rickard Glenys*, Roselyn Wetland, Towma (Lake Marlbed) FFR, Uttiwillock*	8	10	10	11	12	12	
Maintain the health of fringing Lignum and Black Box communities	Barbers Swamp, Broom Tank, Bull Swamp, Clinton Shire Dam, Cokum BR, Goulds Reserve, Greens Wetland, J Ferrier Wetland, Lake Danaher BR, Morton Plains Reserve, Part of Gap Reserve, Poyner, Roselyn Wetland, Round Swamp BR, Tchum Lakes Reserve (Wetland), Tchum Lakes Pool (Dam), Towma (Lake Marlbed) FFR, Uttiwillock*	1	2	3	2	4	4	

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Environmental objective	Wetlands	Frequency of events (10 years)			Duration of events (months)			Timing
Provide suitable feeding and breeding habitat for various waterbird guilds	Barbers Swamp, Bull Swamp, Cokum BR, Goulds Reserve, Mahoods Corner*, Morton Plains Reserve, R Ferrier*, Rickard Glenys*, Roselyn Wetland, Shannons Wayside*, Tchum Lakes Reserve (Wetland), Tchum Lakes Pool (Dam), Uttiwillock*	2	5	10	1	6	7	

5 Provision of environmental water

In Victoria, all water that is available for the preservation of the environmental values and health of water ecosystems is defined and protected as the Environmental Water Reserve (EWR) under the *Water Act* 1989 (Vic).

This section describes the provision of the EWR in Victoria's regulated and unregulated water systems, as well as held and planned environmental water under Basin Plan.

Across all Victorian water resource plan areas, ecological objectives are met through:

1. Environmental water entitlements (bulk entitlements and environmental entitlements) and water shares that are held or managed by the VEWH or CEWH.
2. Passing flow requirements specified for environmental purposes under bulk entitlements or water supply protection area water management plans.
3. Other water managed through water system management rules, including passing flows not specified as having an environmental purpose, and unregulated river diversion rules. This includes water which remains in the system after consumptive and environmental entitlements are taken out - referred to as 'above cap' water – and water used primarily for consumptive purposes, but which can also have a benefit for the environment.

5.1 Victoria's water management

The approach to meeting ecological objectives in Victoria's surface water systems depends on whether the water resources are unregulated or regulated.

5.1.1 Regulated systems

Regulated systems contain structures such as dams or major diversion weirs which exert significant control over the flow of water in the river, primarily for consumptive users. The impact of regulation on the environment will depend upon the size and number of storages and weirs, the level of consumptive use, and the overall volume of flow the river receives. The Wimmera-Mallee has a number of storages on the Wimmera River system, including Rocklands Reservoir, Lake Toolondo, Lake Bellfield and Lake Wartook (Figure 15). In Victoria, the infrastructure provided for the regulation of rivers is publicly owned and controlled by water corporations.

Regulation of river systems has a significant impact on the environmental values of the system. Storages capture water during naturally high flow periods and retain it, to be released to meet consumptive demands during drier times of the year. This creates unnaturally high flows during summer. Storages also create barriers to flow connectivity and biota migration, and cold water temperature in downstream releases. Environmental water can reduce the impact of river regulation and water extraction by providing flows at the right time of year for priority environmental assets and priority ecosystem functions.

In regulated systems in the Wimmera-Mallee, environmental water requirements can be met with held environmental water, and other water in the system also supports environmental water outcomes (see section 5.1.6). It includes passing flows requirements that meet multiple objectives, and delivery of water from reservoirs to downstream users, delivery of water from inter-valley trade accounts, or transfers from storages.

The Wimmera-Mallee headworks system enables water to be shifted between storages and interconnects the three major river basins of the Wimmera, Avoca and Glenelg.

There are four regulated systems in the Wimmera-Mallee water resource plan area (Table 15). A notable feature of these regulated systems is the profound change that has occurred following the completion of the Wimmera-Mallee Pipeline in 2010 and the cessation of the Wimmera Irrigation Area. These two factors have greatly reduced the consumptive water demand requirements from the Wimmera-Mallee headworks system.

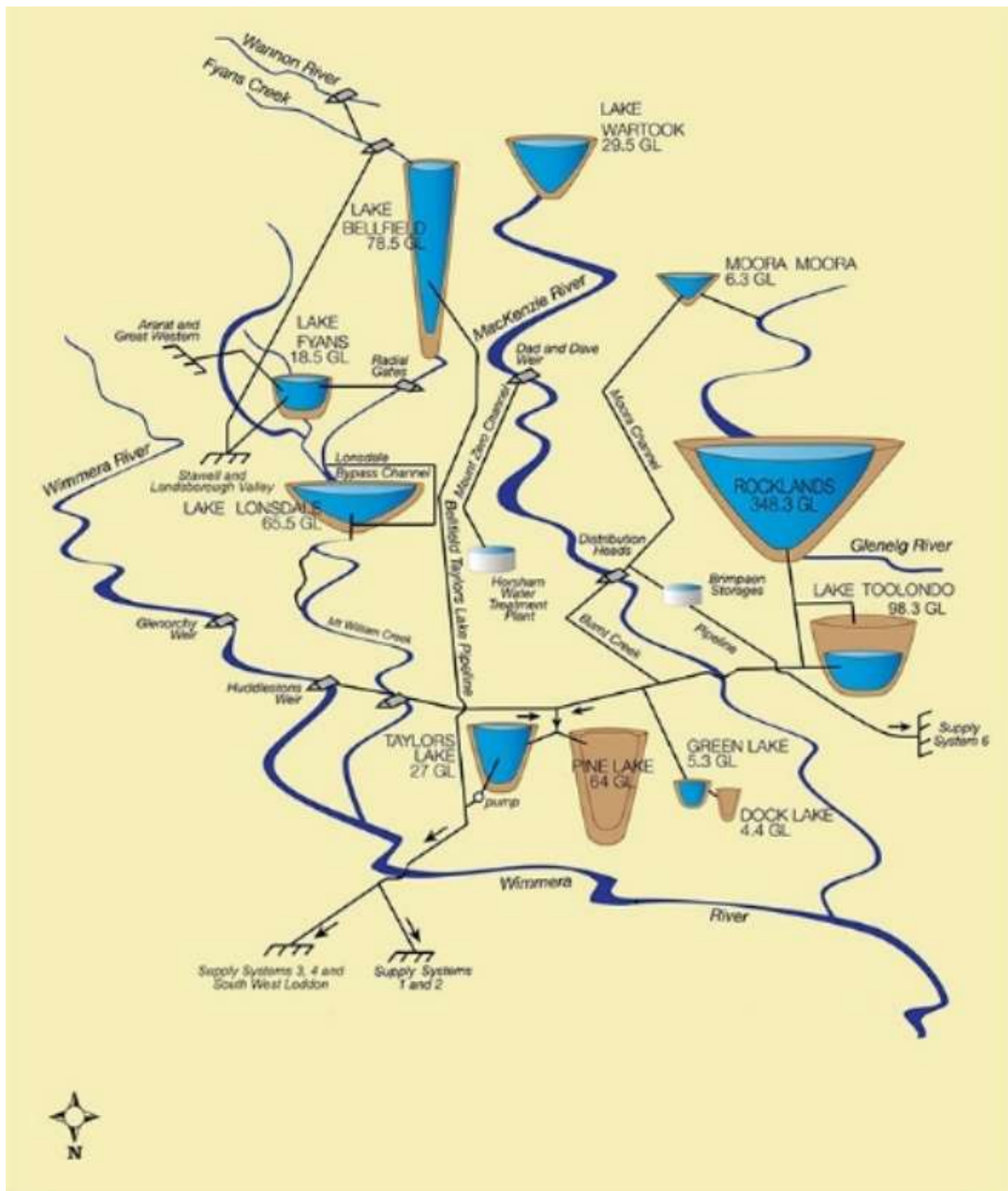


Figure 15. Storage and supply system in the Wimmera basin. (Source: Grampians Wimmera Mallee Water reservoir levels webpage).

Table 15. Regulated systems in the Wimmera-Mallee water resource plan area.

System	Description	Comments
Mt William	Water is diverted from the Wannon River system (in the Glenelg system) at First and Second Wannon Creek, to supplement flows in Fyans Creek in the upper catchment of the Mt William Creek system. Flows in Fyans Creek are then regulated by the Lake Bellfield, Lake Fyans and Lake Lonsdale storages in the upper Mt William Creek catchment. Downstream of Lake Lonsdale, flows in the Mt William Creek can be diverted into the Wimmera River via several flow paths, or diverted into storages downstream of the Wimmera Inlet Channel such as Taylors Lake	Lake Bellfield now provides the primary source of water for the Wimmera-Mallee Pipeline, with Rocklands Reservoir and Taylors Lake providing drought back-up capacity. The primary role of Lake Fyans is to provide a water supply to Stawell, Ararat and Great Western. Together with Rocklands Reservoir, when Lake Lonsdale contains water, it is an important source of held environmental water in the Wimmera-Mallee system.
Lower Wimmera	Flows in the Wimmera River downstream of Huddleston's Weir are affected by diversions from the river into the Wimmera Inlet Channel to supply storages such as Taylors Lake	The harvesting of flows from the Wimmera River at Huddleston's Weir forms an important component of the Wimmera-Mallee headworks system. Passing flow obligations limit the amount of water harvested at this location for consumptive use. Water can also be provided to the river from Taylor's Lake.
MacKenzie	Flows are regulated by Lake Wartook in the upper catchment of the MacKenzie River and affected by numerous diversions that supply water to Taylors Lake and Horsham Treatment Plant for consumptive use. Transfers from Moora Moora Reservoir (in the Glenelg system) can also contribute flows to the MacKenzie River downstream of Distribution Heads	Wartook Reservoir is now a primary source of water for the Wimmera-Mallee Pipeline sub-system located to the south and south-west of Horsham, and the main contributor to the water supply for Horsham.
Glenelg	Glenelg River flows are regulated by Rocklands Reservoir. Volumes of water are diverted from the Glenelg system into Moora Moora Reservoir, from various harvesting points along the Moora Channel system and from Rocklands Reservoirs. These diversions supply the Wimmera-Mallee system	Rocklands Reservoir on the Glenelg River is the largest storage in the Wimmera-Mallee Headworks system. It supplies water for both consumptive and environmental use in the Wimmera-Mallee and Glenelg systems.

5.1.2 Unregulated

An unregulated river system is one where no major dams or weir structures have been built to regulate the supply and release of water for consumptive use. In unregulated systems the holder of a water entitlement cannot order the release or delivery of water.

This does not mean that there are no storages in these systems. There are often large numbers of both on- and off-stream storages in unregulated systems. The key issue is that these storages are privately owned and controlled, and generally sized to store and manage the water entitlements for a single property. The absence of publicly owned storages means that there is no capacity to have held environmental water entitlements in unregulated systems.

Ecological objectives in unregulated systems exist to protect the existing conditions (habitat), rather than provide a specific flow to meet an ecological objective, for example, to trigger fish spawning or water a particular vegetation community.

In unregulated systems, the impact on the environment is managed by specifying limitations on the timing and the rate of take in bulk entitlements and take and use licences. The volume of water which can be extracted by consumptive users can be further limited by restricting or banning take during times of low flow for take and use licence holders. Domestic and stock take is still permitted even during bans which apply to irrigation and industry.

In the Wimmera-Mallee water resource plan area, major unregulated systems include the Avon-Richardson system, the Avoca system and the upper Wimmera River.

In unregulated systems, the overarching objectives of the Basin Plan are progressed by strengthening existing processes relating to trade and allocation of water entitlements and conditions on water entitlements, to ensure the availability of environmental water is maintained. These systems rely on operational rules or conditions in water management plans or local management rules. The Wimmera Catchment Local Management Plan (GWMWater, 2017) sets out the rules for these unregulated rivers and for groundwater.

No priority environmental assets or priority ecosystem functions have been identified in unregulated systems.

5.1.3 Groundwater systems

Groundwater in Victoria is managed through statutory Groundwater Management Plans and non-statutory local management plans. Such plans apply caps (or 'permissible consumptive volumes' (PCVs)) on extraction within a groundwater management area and, through licences that share water amongst users, ensure protection of environmental values. These plans particularly protect values associated with groundwater-dependent ecosystems (GDEs) that rely on groundwater for all or part of their water needs (e.g. river reaches that gain or lose groundwater, wetlands that rely on shallow aquifers, or terrestrial vegetation that relies on shallow or deeper aquifers).

In addition to planning processes for managing unregulated surface water entitlements, the Ministerial Guidelines for Groundwater Licensing and the Protection of Groundwater Dependent Ecosystems (DELWP, 2015b) oblige water corporations to undertake a structured assessment of the risks to GDEs associated with the issue or transfer of a groundwater licence. For medium or high-risk proposals, suitable risk mitigation treatments must be developed and incorporated in licence conditions; a licence application may be refused if suitable mitigations are not available. These guidelines support and complement the objectives of the surface water management processes in unregulated catchments to protect and enhance environmental conditions.

There are three main aquifers in the Wimmera Murray. These are extensive and continue north and west into South Australia:

- Pliocene Sands Aquifer (also referred to as the Parilla Sands Aquifer)
- Tertiary Limestone Aquifer (also referred to as the Murray Group Limestone Aquifer)
- Renmark Group Aquifer.

Groundwater dependency of priority environmental assets

The Wimmera-Mallee Water Resource Plan (DELWP, 2019a) and a study of the groundwater dependency of priority environmental assets in northern Victoria (Groundwater Logic, 2019) have been used to identify the groundwater-dependent priority environmental assets in the Wimmera-Mallee water resource plan area. Groundwater Logic (2019) also identified risks to ecosystem values associated with groundwater resource use and considered whether the priority environmental assets are sufficiently protected from such risks by the provisions of existing groundwater management plans.

Groundwater dependent river and wetland priority environmental assets within the Wimmera-Mallee water resource plan area are shown in Figure 16 and listed in Appendix G. All priority environmental assets in the Wimmera-Mallee water resource plan area were found to be either not groundwater dependent or at low risk. Whilst the confidence assigned to groundwater dependence varied from high to low, the level of risk posed

by groundwater resource use was assessed as low for each of the priority environmental assets (Groundwater Logic, 2019). In addition, the measures in place with existing groundwater management plans were considered sufficient to protect all the groundwater dependent priority environmental assets from excessive groundwater resource use.

The Wimmera River FLOWS study (Alluvium, 2013) assessed groundwater derived baseflow and groundwater derived recharge flow components. As the salinity of local groundwater is considered a threat to the Wimmera River, groundwater resource use is likely to pose a low risk to the environmental values associated with the river.

Within the Mallee CMA area, there are no major rivers or significant surface water features that receive groundwater discharge, so there is a low risk of impacts on key ecosystem function. The Mallee Waterway Management Strategy (Mallee CMA, 2014) identified saline lakes such as Lake Tyrrell and riverine wetlands (adjacent to the Murray River) at risk from rising saline groundwater levels. However, these have not been identified as priority environmental assets for the purpose of the Basin Plan.

Groundwater dependency of priority environmental assets and their risk from groundwater use are captured in Appendix G.

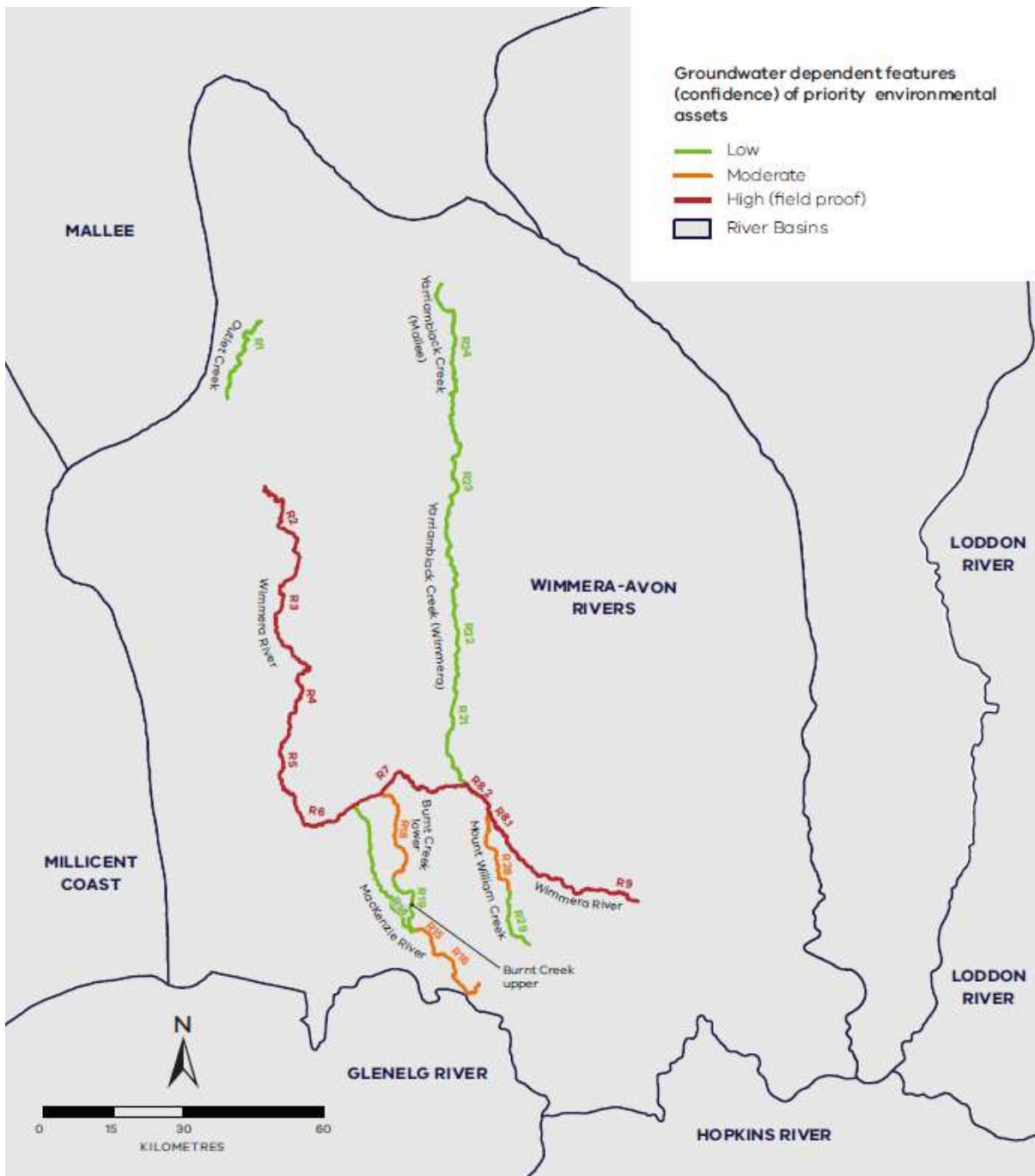


Figure 16. Groundwater dependent priority environmental assets in the Wimmera-Mallee water resource plan area

5.1.4 Held environmental water in Victoria

The *Water Act 2007* (Cth) identifies two types of environmental water: held and planned. Held environmental water (HEW) is defined under Section 4 of the *Water Act 2007* (Cth) as water available under a water access right, water delivery right or irrigation right for the purposes of achieving environmental outcomes, including water that is specified in a water access right to be for environmental use.

In the Victorian context, HEW is any water held under an entitlement for an environmental purpose. This water includes:

- Environmental entitlements or bulk entitlements issued to the VEWH to provide water to be used for environmental purposes.
- Entitlements such as take and use licences or water shares held by the VEWH or CEWH.
- A passing flow specifically allocated to the holder in an environmental entitlement for environmental benefit or purpose.

This water is considered HEW under the Commonwealth definition because it is water specifically committed to environmental purposes under a water access right.

HEW is protected by Victoria's water entitlement framework, which provides security to all entitlement holders, regardless of use, including:

- secure and enduring entitlements.
- limits on take through sustainable diversion limits and permissible consumptive volumes.
- clear consultative process for changing entitlements.
- an annual process to allocate water to entitlements.
- the ability to trade.
- Ministerial intervention only during extreme events to ensure supplies for critical human water needs.
- a regime for compliance and enforcement.

Victoria's entitlement framework is described in detail in [Victoria's Wimmera-Mallee Water Resource Plan](#) (DELWP, 2019a).

HEW can be equivalent to high-reliability entitlement or low-reliability entitlement, or it can be provisional and have reliability as described in the bulk or environmental entitlements.

All entitlements in Victoria are recorded on the [Victorian Water Register](#). Information about the holder of the entitlement, where the water may be taken and used, and the volumes authorised by the entitlement are described in this register.

Environmental watering objectives are achieved through the use of HEW and supported by other water not otherwise allocated in the system, including minimum passing flows for system water. Protection and rules for passing flows or minimum flow obligations are outlined in the respective bulk or environmental entitlement instrument for each system.

The use of HEW is often closely integrated with other types of water use. The VEWH works closely with catchment management authorities and storage managers and, where practical, seeks opportunities to adjust the timing and route for delivering consumptive water to achieve ecological objectives efficiently. This can include 'piggy-backing' delivery of environmental water on the delivery of consumptive water or passing flow obligations to maximise ecological outcomes.

HEW in the Wimmera-Mallee water resource plan area is summarised in Table 16.

Table 16. Held environmental water in the Wimmera-Mallee water resource plan area as of November 2025¹.

System	Entitlement	Volume (ML)	Class	Holder
Wimmera, Glenelg and Wimmera Mallee wetlands	Wimmera and Glenelg Environmental Entitlement 2010	40,560	High reliability	VEWH
		1,000	Low reliability	
	Bulk Entitlement (Wimmera and Glenelg Rivers – GWM Water) Order 2010 ²	28,000	Low reliability	CEWH

1. Sources: Victorian Water Accounts 2023-24 (DEECA, 2025a), VEWB water holdings at April 2025 (<https://www.vewb.vic.gov.au/watering-program/our-water-holdings>), CEWH water holdings at September 2025 (<https://www.dcccew.gov.au/cewh/manage-water/basin/water-holdings>)
2. This water is held through a Supply by Agreement between the Commonwealth of Australia and the Grampians Wimmera Mallee Water Corporation.

5.1.5 Planned environmental water in Victoria

Planned environmental water (PEW) is defined in Section 6 of the *Water Act 2007* (Cth) and has three components:

- Water committed or preserved by an instrument.
- Water committed or preserved for the purpose of achieving an environmental outcome or other environmental purposes as specified in an instrument.
- Water that cannot, to the extent it is committed or preserved, be taken for any other purpose.

In Victoria, these conditions are not met in most bulk entitlements and systems as:

- Minimum passing flows are generally not preserved exclusively for an environmental purpose or outcomes as specified in section 6 of the *Water Act 2007* (Cth). Passing flow requirements tend to serve multiple outcomes as shared benefits and are rarely identified as being solely for an environmental purpose.
- Where water is committed or preserved or required to exist within the system, such as a minimum passing flow for a specified environmental purpose or to meet a specific environmental outcome, the Commonwealth definition deems that committed or preserved water cannot be taken for any other purpose. In Victoria, this requirement cannot be met where a water user has a right to take water for domestic and stock purposes and it is not accounted for in measuring passing flows

Development of Victoria's water resource plans determined that there are only a few locations in northern Victoria where water management instruments meet the definition of planned environmental water under the Commonwealth definition. None of these are located in the Wimmera-Mallee water resource plan area.

5.1.6 Other water that contributes to environmental outcomes

The previous section (and Victoria's North and Murray Water Resource Plan (DELWP, 2019a)) explains what planned environmental water is and is not. Although there is other non-held water in Victoria's waterways that also contributes to ecological objectives for priority environmental assets and ecosystem functions, this water does not fall under the definition of PEW as it is not specifically committed for environmental purposes and provides shared benefits. For example, system operating water (the water released from storages to operate river and distribution systems) benefits the environment but also allows delivery of water to other users. Similarly, above-cap water (the water left over after the upper limits on diversions have been reached, including unregulated flows that cannot be kept in storage) provides significant benefits to the environment but also to recreational users of waterways. Cultural water can also provide significant environmental benefits - for example, Taungurung Land and Waters Council holds a water share on the King River, and each year, they have donated the majority of this water allocation to the environment (DELWP, 2022a).

Under the Basin Plan it was expected by the MDBA that a large portion of system water and/or above cap water would be identified as planned environmental water. Although all above cap or system water cannot be identified as planned environmental water under Victoria's framework, in Victoria this water is considered to have shared benefits. This can contribute to ecological objectives for priority environmental assets and ecosystem functions, and other environmental values in the water resource plan area.

Efficient and effective environmental outcomes

The VWMS (DEPI, 2013a) states that Victorian environmental water management will focus on making the most efficient and effective use of water available. Environmental water managers work with river operators to identify how all types of water can be best utilised to meet multiple objectives, including those for the environment. They coordinate the delivery of HEW with above cap and system water, as well as planned environmental water and consumptive water *en route*, to meet ecological objectives. Sometimes the timing and route for delivery of consumptive water can be altered to achieve ecological objectives without using environmental water.

Victoria's approach to achieving environmental outcomes is to integrate the management levers and activities to balance the values and uses of waterways and achieve waterway outcomes set through regional waterway strategies. Regional waterway strategies integrate environmental watering with other targeted management actions, like building fishways that allow fish to move past dams and weirs, or fencing to control stock access (see section 8). This approach effectively manages priority threats to improve the benefits of environmental watering.

Likewise, an integrated approach is taken to water recovery. Planning Our Basin Future Together (DEECA, 2024c) states that Victoria's approach to delivering on Basin Plan is to:

- Continue to find ways to deliver water recovery through approaches that minimise the volume of water taken from the consumptive pool, including through water infrastructure upgrades.
- Where any water is recovered from the consumptive pool, look for complementary water savings through a targeted approach, finding system savings to boost environmental outcomes without unnecessarily reducing the water available for productive use.
- Recover water through projects that result in a direct environmental outcome and can be delivered to where it is needed for targeted ecological requirements.
- Recover water in a way that has community support, including by working in partnership with Traditional Owners to deliver projects that can benefit cultural outcomes in specific regions.
- Look at ways to reduce the impacts of river regulation by thinking about how water recovery could open up opportunities to restore a large proportion of natural flow regimes (e.g. by creating entitlements to restore more natural components of flow regimes or removing barriers to flow and fish passage).
- Find water recovery approaches that actively reduce the long-term costs of water infrastructure for the community in Victoria, like rationalising irrigation delivery infrastructure or changing system operations to be more efficient.

Further initiatives to improve environmental outcomes in waterways are outlined in section 8 Complementary Actions.

6 Cooperative arrangements

Environmental water management involves a range of people and organisations. This section describes these partnerships and identifies the processes by which collaboration occurs between agencies and across regions.

6.1 Context

There are strong cooperative arrangements in place to support delivery of Victoria's environmental watering program, between environmental water holders (VEWH, CEWH, TLM), managers or owners of environmental assets for the delivery of environmental water (water corporations, CMAs, land management agencies) and community members. Environmental water holders, water corporations, CMAs and land management agencies also partner with Traditional Owner groups to deliver Victoria's environmental watering program.

The Victorian government has established these arrangements, in consultation with delivery partners and communities, and participates in inter-jurisdictional arrangements, through the Environmental Watering Committee (EWC, formed in 2021) and the Southern Connected Basin Environmental Watering Committee (SCBEWC). The arrangements are underpinned by a range of policy, regulatory and governance frameworks.

6.2 Responsible organisations

Public and private authorities collaborate to deliver environmental water in Victoria. These authorities, referred to as program partners, are listed in Appendix E along with their respective roles and responsibilities, which are summarised as follows:

- **Waterway managers (CMAs)** are responsible for identifying, planning and implementing regional priorities for environmental waterway management, this includes identifying objectives and assessment of water regimes needed for priority environmental values, cultural values and uses, social and recreational uses and values and economic values. They consult with local communities, develop proposals for environmental watering in rivers and wetlands in their region, order environmental water from storage managers, and monitor the outcomes.

In the Wimmera-Mallee water resource plan area, the responsible CMAs are Wimmera, Mallee, and North Central CMAs.

- **Storage managers** (water corporations) deliver water for all water users, including for waterway managers and environmental water holders. In the Wimmera-Mallee water resource plan area, Grampians Wimmera-Mallee Water is the responsible water corporation.
- **Environmental water holders** commit environmental water to different rivers and wetlands. They work together to ensure the coordinated delivery of water available under different environmental entitlements, and often have to prioritise across large regions or water resource plan areas. In the Wimmera-Mallee, the environmental water holders are VEWB and CEWH.
- **Public land managers** are closely involved in environmental water planning and delivery for public land such as state forests or national parks. They may have a variety of responsibilities including operating infrastructure (such as pumps, outlets, gates and channels) and ensuring appropriate public signage during an event. In the Wimmera-Mallee the public land managers are Parks Victoria, DEECA, local governments and Traditional Owner land management boards. Hindmarsh Shire and Horsham Rural City Council operate weirs on the Wimmera River. The Barengi Gadjin Land Council manage the Ranch Lagoon site.
- **Traditional Owner groups** in the Wimmera-Mallee water resource plan area include formally recognised Traditional Owner groups of the Barengi Gadjin Land Council Aboriginal Corporation, Dja Dja Wurrung Clans Aboriginal Corporation, First People of the Millewa-Mallee Aboriginal Corporation and Wamba Wemba Aboriginal Corporation. There are also First Nations groups without

formal recognition who hold cultural rights and have customary obligations to care for Country. These are Barapa Country Aboriginal Corporation Dadi Dadi Weki Weki Traditional Owners Latji Latji Mumthelang Aboriginal Corporation, Nyeri Nyeri Traditional Owners, Tati Tati Kaiejin, Tati Tati Land and Waters Indigenous Corporation, Waddi Waddi Traditional Owners, Wadi Wadi Land and Water Indigenous Council, Wadi Wadi Traditional Owners and Wiran Aboriginal Corporation.

Waterway managers, storage managers and environmental water holders seek to partner with Traditional Owners to support recognition of cultural values and uses in waterway management, noting the level of partnership is to be self-determined by each group (DEECA, 2024a). Water is Life (DELWP, 2022a) commits to the increased role of Traditional Owners in determining how environmental water is used for the purpose of healing Country. As part of this, Traditional Owners may submit seasonal watering proposals to VEWH independently or in partnership with waterway managers (CMAs).

- **Private land holders and other community members** are actively involved in environmental water planning, for example through involvement in seasonal watering proposal advisory boards. Many of the Wimmera-Mallee Pipeline wetlands are located on private land.

The Victorian environmental watering program involves a range of people and organisations. Relationships between local communities, waterway managers, storage managers, environmental water holders and land managers form the foundation of the program. Many public authorities collaborate to deliver the program. These authorities are referred to as program partners.

Traditional Owner connection to place in the Wimmera-Mallee

The Wotjobaluk Peoples are represented by Barengi Gadjin Land Council Aboriginal Corporation. Wotjobaluk Nations Country is in the heart of the Wimmera–Mallee water resource plan area. It includes the Wimmera River, Lakes Albacutya and Hindmarsh, and across to Lake Tyrrell, where the Wotjobaluk Peoples hold an Indigenous Land Use Agreement (ILUA) and RAP status on part of the lake.

The Djaara (Dja Dja Wurrung People) are represented by the Dja Dja Wurrung Clans Aboriginal Corporation. Waterways within Djandak (Dja Dja Wurrung Country) included in the Wimmera–Mallee water resource plan area include the Avoca and Avon–Richardson Rivers and Lake Buloke, among other wetlands.

The Ngintait and Latji Latji Peoples are represented by the First Peoples of the Millewa–Mallee Aboriginal Corporation. The Murrayville groundwater area of the Wimmera–Mallee water resource plan area is on the lands of the First Peoples of the Millewa–Mallee, who have identified highly significant songlines with associated watering points across both the Wimmera-Mallee and Northern Victoria water resource plan areas. Surface water in the First Peoples of the Millewa–Mallee’s proposed settlement area is mainly from the Murray River or connected sources and falls in the Victorian Murray Water Resource Plan.

The Wamba Wamba and Wemba Wemba peoples are represented by Wamba Wemba Aboriginal Corporation. Waterways of Kurrek (Wamba Wemba Country) within the Wimmera–Mallee water resource plan area include the area of the Avoca River, southwards towards Quambatook, and across to Lake Tyrrell, Lake Wahpool and Lake Tiboram in the northwest.

Other non-formally recognised Traditional Owner groups are represented in the Wimmera-Mallee water resource plan area through interest in areas of significant cultural importance.

6.3 Coordination processes

Coordination of environmental watering in the surface water system in the Wimmera-Mallee water resource plan area is done through cooperative arrangements between the VEWH, CEWH and the storage manager.

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The VEWH leads annual environmental water planning and coordination for Victorian waterways at a water resource plan area scale, in close consultation with catchment management authorities as the local environmental water managers, and Grampians Wimmera Mallee Water as the storage manager.

The VEWH represents the Victorian priorities and objectives at interstate and Commonwealth environmental watering coordination forums to help align and coordinate objectives and outcomes at the broader Murray-Darling Basin scale.

The VEWH works closely with the CEWH on use of the Commonwealth water holdings. The VEWH and CEWH have an agreement to collaborate and coordinate their activities (DELWP, 2019a).

Delivery of the Commonwealth's water is undertaken by the CEWH in line with its supply-by agreement. The Commonwealth collaborate with the VEWH and storage manager and catchment management authorities to ensure it is used in line with regional priorities.

The VEWH's Seasonal Watering Plan outlines the watering priorities of the entire state. The process for development of the Seasonal Watering Plan is shown in Figure 17.

This process works year-round as follows:

- **December - March:** CMA planning and consultation to begin preparation of seasonal watering proposals for the coming water year. These are informed by their Regional Waterway Strategies, Environmental Water Management Plans and technical information, e.g. environmental FLOWS studies. The proposals are developed in consultation with the community, Traditional Owners and other partners (e.g. storage managers).
- **April - May:** The VEWH prepares a Seasonal Watering Plan based on seasonal watering proposals. This involves consultation with the CEWH, MDBA and other jurisdictions (e.g. through SCBEWC) prior to the preceding season. The CEWH and SCBEWC also produce their respective annual plans, informed by Victorian site proposals.
- **June:** Release of Seasonal Watering Plan for the upcoming water year.
- **July - June (year-round):** Program partners coordinate delivery of environmental water. Throughout the season, the VEWH issues seasonal watering statements to waterway managers and the VEWH Office to authorise water use and to communicate environmental watering decisions.

Seasonal watering statements are available online at <http://www.vewh.vic.gov.au/news-and-publications/seasonalwateringstatements>.

Ongoing and regular communication between environmental water holders, storage managers and environmental water managers provides opportunities to discuss priorities, negotiate watering commitments, manage operational risks, review watering actions, report on outcomes and to integrate environmental watering into system operations to optimise outcomes, for example in planning to reuse return flows for watering at multiple sites. This is often achieved through Operational Advisory Groups that bring together site managers, river operators and environmental water holders to coordinate water use.

VEWH and CEWH enter into a partnership agreement in relation to planning and managing the transfer and delivery of environmental water in Victoria, with use of Commonwealth Environmental Water agreed by the VEWH and CEWH through a watering schedule. In the Wimmera system, Wimmera CMA is a signatory to the schedule.

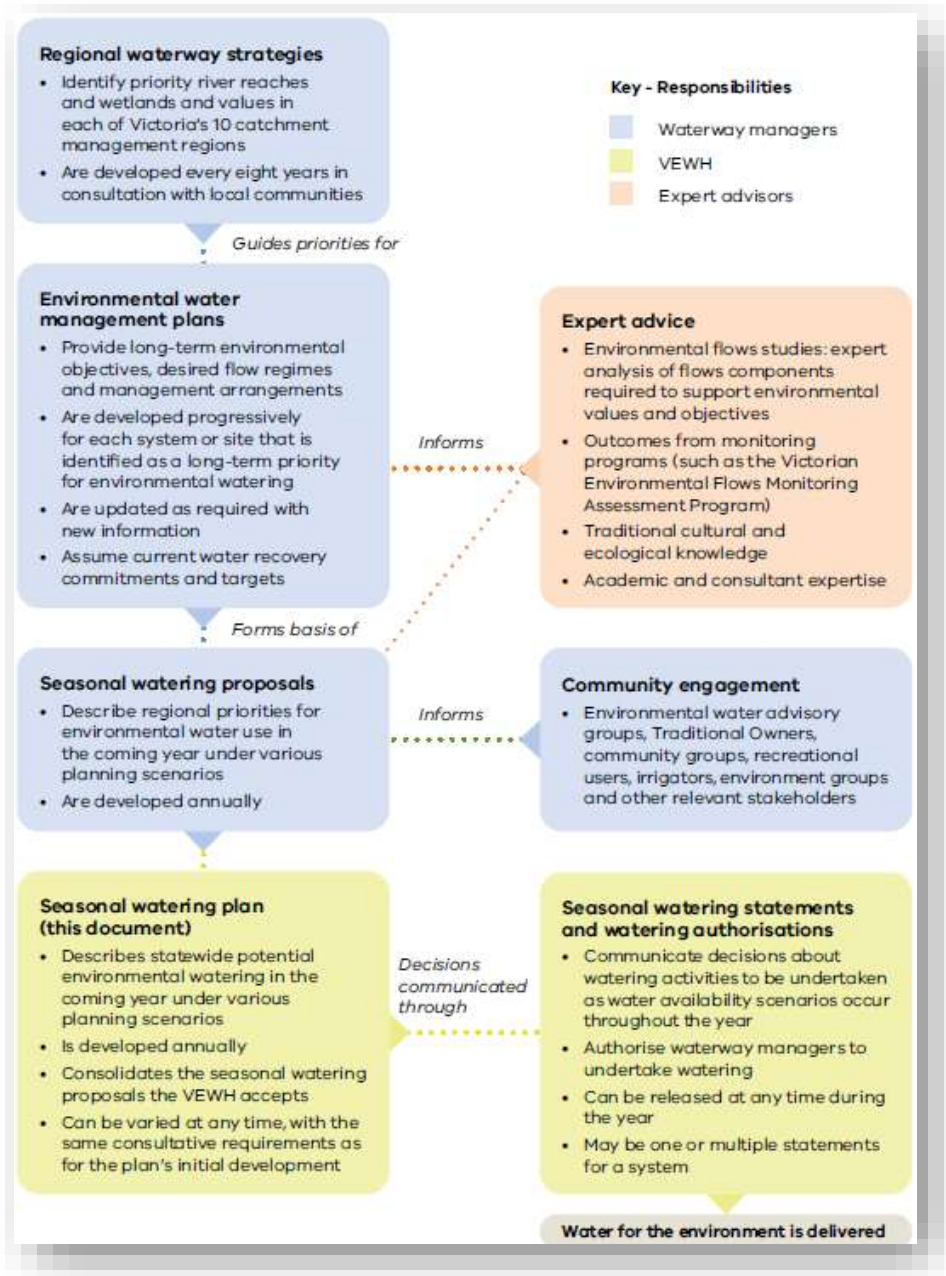


Figure 17. Victoria's annual environmental water planning process (VEWH, 2025a)

In Victoria's two other water resource plan areas, inter-jurisdictional cooperation occurs through the forum of the Southern Connected Basin Environmental Watering Committee (SCBEWC) and is described in the other LTWPs. However, this forum is not relevant in this LTWP as there is no connection between the priority environmental assets in the Wimmera-Mallee water resource plan area and the Murray River.

Two key opportunities for improving the provision of environmental water through better co-operative arrangements are:

- Ensuring that monitoring is taking place at the right places and
- Optimising watering opportunities through multi-site watering.

6.4 Consideration of other values in use of environmental water entitlements

In planning for and making environmental watering decisions, the primary purpose is to maximise environmental benefit. Where consistent with this objective, environmental water managers must also consider whether social and cultural benefits can be achieved. The use of environmental water to provide specific social benefits cannot be prioritised at the expense of achieving ecological objectives.

Water for Victoria (DELWP, 2016) sets out Victoria's position on optimising the use of limited water resources to meet some of the objectives of key groups in the community, such as Traditional Owners and recreational users. Under the *Water Act 1989*, the VEWH, water corporations and CMAs must consider opportunities to provide for Aboriginal cultural values and uses of waterways, as well as the social and recreational uses and values of waterways, when performing their legislated functions. This is consistent with directions in the Basin-wide Environmental Watering Strategy (MDBA, 2025a).

7 Constraints

Environmental water delivery is subject to physical or operational and management barriers that limit what flows can be delivered down rivers and what outcomes are achievable. This section identifies the key constraints in the Wimmera-Mallee water resource plan area and strategies to manage or overcome these.

Operational constraints are only one of the three types of constraints considered in the Basin Plan and MDBA's Constraints Management Strategy (CMS) 2013 to 2024 (MDBA, 2013). In particular, the Basin Plan makes the distinction between physical constraints and operational and management constraints (i.e. c7.08 (1a)), a distinction that is reaffirmed in the CMS. There is no clear distinction between operational and management constraints and the two words are used interchangeably. Definitions of these are given below.

Physical constraints are a natural formation or a physical structure, for example a pipe or channel, that limit the volume of water that can pass a given location (MDBA Basin Plan, p.8). Physical constraints also include things like roads, bridges and private land that would be inundated at higher flows, causing potential damage to crops or fences and affecting access.

Operational (or management) constraints arise from the operating practices employed to manage water resources across the Basin, such as channel sharing, water accounting and the ability to order water from specific locations. Policies may also limit environmental water delivery, such as not flooding private land through overbank flows without landholder consent. Unlike physical constraints, these constraints cannot simply be resolved through infrastructure works, but require policy and procedural changes with stakeholder support. An example of an operational constraint is where water accounting frameworks would not allow for crediting of return flows from environmental water use, constraining the ability to achieve multi-site watering from a single water release.

The Wimmera-Mallee water resource plan area falls outside the seven key focus areas of the CMS (i.e. where MDBA considered that relaxation of physical constraints would give the greatest return for the environment from a Basin-scale perspective of environmental outcomes). As such, the constraints to environmental watering in the Wimmera-Mallee water resource plan area have received much less attention than the other water resource plan areas in Victoria (i.e. Northern Victoria and Victorian Murray).

The EWMPs for the Wimmera River and the MacKenzie River systems provide the central resource for identifying multi-asset constraints in the Wimmera-Mallee water resource plan area and understanding their influence on achieving environmental watering objectives. The following information is taken from these EWMPs.

The Wimmera–Mallee Headworks System was designed to harvest and deliver water to the stock and domestic and irrigation channel systems, typically at modest volumes (35 ML/d - 400 ML/d) and constant rates for long periods (typically several months). The headworks infrastructure was not originally intended to deliver water to waterways (apart from when used as a conduit for water transfers). Some sites have undergone upgrades to improve their effectiveness in delivering environmental water. However there remain a number of sites where constraints on environmental water delivery remain.

Wimmera River

- In the Wimmera catchment upstream of reach 2, a 2011 study estimated there to be nearly 6,000 stock and domestic dams with a total volume of 12, 950 ML, reducing average annual streamflow by around 11,000 ML/year (SKM, 2011). Further streamflow reductions are estimated based on continuing development of farm dams. To address this, planning is underway for a southern Wimmera – northern Pyrenees water pipeline to service 300,000 hectares of land in the Northern Grampians, Pyrenees and Golden Plains shires. This will help mitigate environmental impacts by providing water for both environmental and stock and domestic supply.
- Infrastructure constraints will continue to prevent the delivery of larger recommended flow components (40 ML/d to 6,000 ML/d) from regulated releases alone, therefore unregulated and/or passing flows will be required to achieve this. The absence of major impoundments on the Wimmera River has meant that large flows cannot be released to meet recommended volumes at compliance points and if necessary, regulated releases from Lake Lonsdale and/or Taylor's Lake can be used to supplement shortfalls in the hydrograph. This will be determined on a case-by-case basis given increasing risks around unintended inundation of land at higher flows.

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- constant pool heights impact the riverbank, and in 2024, the Hindmarsh Shire Council listed the Jeparit Weir for repair and/or replacement to alleviate this. Wimmera CMA will continue to work with local government to seek upgrades of low-level crossings impacted by environmental water releases to work towards ensuring sufficient hydraulic capacity.
- several low-level crossings are in need of maintenance and/or upgrading to enable them to convey recommended environmental flows based on those made in the original Wimmera River system environmental flows study (SKM, 2008). In their current configuration they pass low flows, however at comparatively modest volumes they overtop and cause social impacts (i.e. access issues) and localised erosion.
- 2020 mapping of phragmites and typha from Horsham to Lake Hindmarsh revealed the Wimmera was impacted by high nutrient levels associated with historic treated wastewater from Horsham and irrigation drainage. It is expected to take decades to improve the water quality, with flows moving the high nutrients downstream through the annual growth/breakdown cycling of phragmites and typha.

Mt William Creek

- Investigations are required to determine the most appropriate actions to address constraints in delivery.
- Larger recommended flows (500 ML/d to 1,500 ML/d) are unable to be delivered by outlets from Lake Lonsdale..
- The Wimmera CMA's main priority for Mount William Creek is to address the low flows leaking into Sheepwash Creek due to Trudgeon's Weir still remaining after it was decommissioned. Leakage into the Wimmera Inlet Channel due to the high invert of Big Pipe is a lower priority.
- Developing ongoing management arrangements for weir operation at the former Trudgeon's Weir and Dadswell's Bridge are a high priority for Wimmera CMA. This will need to consider legal, environmental and safety issues.
- Passage of low to medium flows along the western branch of Mt William Creek requires further investigations to understand environmental values and watering requirements of the western branch.

Yarriambiack Creek

- Flows in the Wimmera River dictate flow in Yarriambiack Creek and there is no ability to directly release flow in the creek. A number of low-level crossings are identified as potential impediments to environmental water releases, slowing flows at such as at historic levees or in culverts that are partially blocked or of insufficient capacity, and.
- Town weirs also need appropriate management at Warracknabeal, Brim and Beulah for environmental flows to pass.

Dock Lake

- Water can be delivered to Dock Lake from Green Lake via a gravity-fed channel (capacity of approximately 100 ML/d) when there is sufficient water in Green Lake. The infrastructure is susceptible to silting and repairs would make this a more reliable for regular delivery of environmental water (Jacobs, 2015).

MacKenzie River

- Infrastructure constraints will continue to prevent the delivery of larger recommended flow components (400 ML/d to 6000 ML/d) from regulated releases alone, therefore unregulated and/or passing flows will be required to achieve this.
- Wimmera CMA is currently exploring the potential of current pipelines that source supply from lakes Wartook and Moora Moora to water high-value ecological sites in the MacKenzie River and tributaries when dry. The aim is to pursue water savings and better manage water in this tributary system, especially in the face of climate change. This will also assist in restoring the historic riparian connectivity between Gariwerd (Grampians National Park) and the broader region. This work is being explored through the report "Assessment of connecting current and potential drought refuge sites on the MacKenzie River and tributaries to the Wimmera Mallee Pipeline" (Wimmera CMA, 2024b).
- Automated flume gates have replaced drop board weirs, but delivery of the highest fresh (190 ML/d) is unfeasible due to instream losses. Remote operation of regulators has been problematic due to telecommunication issues and damage to sites from floods and vandalism.

- Swampy sections of the river restrict the ability to deliver higher recommended flows to Reaches 2 and 3 (130ML/d – 1,000 ML/d) (Earth Tech, 2006). These flows also present unacceptable risks in terms of flooding freehold land and so will not be delivered or supplemented by regulated releases.

Burnt Creek

- Infrastructure upgrades are needed to assist with automation of flows, and to ensure appropriate flow rates can be achieved.
- Low level road crossings are at risk from environmental flows, which could be improved by upgrades. Wimmera CMA has undertaken a series of trials where progressively larger volumes were released and the impacts on low level crossings was assessed.
- A significant number of extraction points are on the lower Burnt Creek, despite all diverters having access to reticulated water supplies. Reviewing and amending water licencing arrangements is needed to ensure flows reach the end of the waterway.

Bungalally Creek

- Accuracy and automation of the existing undershot weir could be improved by a magnetic flow meter.
- Low level crossings and informal weir structures hinder passage of environmental flows.

Wimmera Mallee Pipeline Wetlands

- The pipeline's physical delivery capacity restricts the volume of water that can be delivered to wetlands requiring larger watering volumes. Currently, 22 wetlands have identified watering requirements that exceed delivery capacity, with delivery times exceeding 90 days - falling outside a reasonable timeframe for supplying environmental water (VEWH, 2024).
- It is often not possible to achieve full inundation extents, with environmental watering typically limited to dams or smaller inundation areas within the broader wetland systems. The timing of delivery to these wetlands is constrained by the system, with water best delivered while system demand for stock and domestic use is low, generally May to November (Mallee CMA, 2023). This may impact ecological outcomes or needs
- Allocation against the WMP entitlement is highly variable and low reliability. Zero allocations have occurred in five of the 14 years since the entitlement was established, while full allocation (1,000 ML) has only occurred in four of the 14 years, during wet years. Due to this low reliability, the VEWB adopts a conservative approach to water use, including the strategic use of carryover, to ensure sufficient water is available to meet wetland demands in subsequent low or no allocation years (VEWH, 2024).
- Community members have expressed a strong desire for additional wetlands to be connected to the pipeline. Increasing the capacity of the pipeline would allow higher delivery rates, increased watering extent and potentially more sites. However, this needs to be weighed up with whether the entitlement volume is sufficient to support more sites (North Central CMA, 2016).

Recommendations addressing delivery constraints are listed in detail in the following reports;

- Assessing the Physical Constraints on Environmental Flow Delivery in the Wimmera Catchment (Earth Tech, 2005); and
- Wimmera and Glenelg Systems Environmental Metering Program (VEWH, 2014)
- Mt William Creek Streamflow Study (Alluvium, 2015)
- Dock Lake FLOWS study (Jacobs, 2015)
- Wimmera-Mallee wetlands – 2024-25 review of entitlement use (VEWH, 2024)

Furthermore, the following reports outline a comprehensive analysis of physical features (crossings, informal weirs, debris blockages etc.) that may prevent the effective delivery of environmental water releases;

- Assessing Influences on Environmental Water Releases in the Wimmera, Phase 1, Stages 1 and 2 (Earth Tech, 2006);

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- Assessing Influences on Environmental Water Releases in the Wimmera, Phase 2, Stages 1 and 2 (Earth Tech, 2007);
- Influences on Environmental Water Releases in the Wimmera River (SKM, 2008); and
- Wimmera Catchment Management Authority – Impediments to Environmental Water Releases Site Review (Catchment Health Engineering, 2015).

8 Complementary actions

Environmental water is only one component of the activities and works required to achieve environmental outcomes and address the various threats to waterway health, including those identified in the Long-term risks (section 10). Complementary actions implemented in a strategic, coordinated and integrated way continue to be vital to support priority environmental assets and functions, and to meet the ecological targets of this plan.

8.1 Overview

Victoria's catchment management framework helps us to achieve improvements in rivers, floodplains and catchment landscapes despite the modifications and impacts that have occurred because of the development of major towns, infrastructure, and agricultural industries. Together with Victorian communities, regionally focused, holistic, landscape-based strategies have been developed that co-ordinate efforts of local land, water and biodiversity managers. This includes sustainable water strategies, regional catchment strategies, regional waterway strategies, and land and water management plans in irrigation areas. CMAs strategically invest in integrated catchment management for effective environmental outcomes. Victorian investment in Basin environments is approaching \$1 billion statewide since 2004, with a focus on works like fishways, snags, in-stream vegetation and controlling pest plants and animals.

This chapter discusses a range of complementary actions essential to accompany the provision of environmental water in the Wimmera Mallee. Victoria has also developed a prospectus which provides rationale for a range of complementary measures across northern Victoria (DEECA, 2025b).

CMAs prioritise these actions to manage threats to waterway values, according to threat level, feasibility of success, contribution to local and broader outcomes, and resilience to a range of climate futures. Priorities are detailed in regional waterway strategies.

Victoria also has a [Flagship waterways](#) initiative that involves 19 large-scale, long term integrated waterway projects across the state with established vision, objectives as well as monitoring and evaluation processes. In the Wimmera-Mallee water resource plan area this includes the Wimmera CMA region's Upper and Lower Wimmera Flagship Waterway projects in to implement large-scale restoration.

8.2 Traditional Owners delivering healthy waterways

For countless generations, First Nations and Traditional Owners in Victoria have practised their law and lore, customs and languages, and nurtured Country through their spiritual, cultural, material and economic connections to land, water and resources.

The Victorian Government is committed to enabling self-determination for Traditional Owners and Aboriginal Victorians in the health of waterways through overarching policies and frameworks such as the Victorian Aboriginal Affairs Framework 2018 -2023 (Aboriginal Victoria, 2018), Chapter 6 of Water for Victoria (DELWP, 2016), [Pupangarli Marnmarnepu 'Owning Our Future' Aboriginal Self-Determination Reform Strategy 2020-2025](#), supporting Traditional Owners to make choices that best reflect them, their values and their connection to Country, and Water is Life outcome 5 - recognition of Traditional Owners as waterway managers for specific locations (DELWP, 2022a).

The *Traditional Owner Settlement Act 2010* enables the Victorian Government and Traditional Owners to make agreements that recognise Traditional Owners and their rights in managing Country, including establishing Recognition and Settlement Agreements. CMAs are also required under the *Water and Catchments Amendment Act 2019* to recognise Aboriginal cultural values and knowledge in water and catchment planning and management and to include Traditional Owners in these processes.

Since establishment of the Aboriginal Water Program through Water for Victoria (DEPI, 2016), the Victorian Government has committed resources to support Aboriginal participation in water management and improve outcomes for Aboriginal Victorians. The Aboriginal Water Program incorporates Aboriginal values and expertise into water management. The Aboriginal Water Program funds full-time Aboriginal Water Officers, and projects that bring Traditional Owners together to spend time engaging on Country, improve understanding of cultural values and uses, and share their expertise.

Traditional Owners are taking increased roles in waterway management, managing for both ecological and cultural outcomes. The Aboriginal Water Program has increased the roles of Traditional Owners involved in

areas such as protecting crown land water frontages, invasives species management, and restoring in-stream habitat. Working collaboratively with CMAs, Traditional Owners are leading actions or cultural projects that overlap with the actions.

An example of this in the Wimmera Mallee is the partnership between Barengi Gadjin, Wimmera CMA, ARI, DEECA, and the Australian Government to enhance cultural and environmental values at Ranch Billabong on the Wimmera River.

8.3 Waterway land management

Waterway land includes riparian land and the bed and banks of rivers, creeks and wetlands. The effectiveness of environmental watering programs is heavily reliant on complementary waterway land management, such as controlling livestock grazing and other activities that may impact on waterways. Where vegetation has been cleared and there is limited natural regeneration, revegetation with appropriate species may also be required.

The Victorian Government invests in collaborations between waterway managers, landholders and other partners to undertake on-ground management activities and encourage good riparian management practices across all waterways with a focus on priority areas identified by regional waterway strategies. This work is undertaken through agreements and cooperative partnerships. Since 2013, this has included 89,892 ha of local riparian vegetation improvements and 1,950 km of waterways fenced to control livestock access across the state. Often waterway managers and partners like Landcare groups can attract substantial additional support such as through volunteer work and funding from Commonwealth and local governments.

The VWMS (DEPI, 2013a) establishes a framework to maintain and improve public and private waterway land in priority management areas. This is done particularly through the reduction of livestock access to waterways, on both public and private land. Voluntary and cooperative partnerships are encouraged between landholders, other partners and the government, providing funding for programs to undertake activities including fencing to reduce livestock access to waterways, revegetation, weed management and installation of off-stream livestock watering infrastructure. DEECA will also continue to support and implement improved compliance approaches for Crown frontages (strips of public land along waterways) and require landholders managing licensed Crown frontages to meet minimum management standards.

The Victorian Government and CMAs have also developed and implemented a range of guidance and supporting information for fencing and management of riparian land. This guidance promotes accepted best practice and covers the following aspects:

- Livestock management on riparian land
- Impacts of floods and fire on riparian land
- Benefits of riparian land to landholders
- Controlled grazing on riparian land.

The EPA also has guidance on managing impacts of grazing on water quality (EPA, 2025).

CMAs also have statutory responsibilities for issuing permits and licences for works on waterways to mitigate risks to environmental outcomes such as increased erosion or creating barriers to fish passage. They also undertake compliance and enforcement activities to prevent inappropriate works taking place on waterways.

8.4 In-stream habitat

The VWMS (DEPI, 2013a) outlines the issues and management approach associated with the river channel and emphasises that high quality instream habitat is essential to support healthy populations of native fish, as well as for aquatic plants and other animals. While many aspects of instream habitat (e.g. channel form, instream vegetation) can be improved with the effective use of environmental water, other threats need to be mitigated.

Large wood in waterways is an important source of instream habitat as it provides shelter, food sources and breeding sites for a variety of waterway dependent animals and invertebrates. Victorian waterway policy states that large wood in waterways will not be removed unless it is demonstrated to pose a serious risk to public safety or public infrastructure. To improve habitat conditions, large wood may be moved to a suitable location and realigned parallel to direction of flow, or reinstated into rivers, for example sourced from trees felled due to storm events or infrastructure projects like road widening.

Instream barriers, such as weirs and dams, and road crossings such as fords and culverts, are a key threat to native fish. They prevent native fish from moving upstream for spawning and recruitment, and larvae from drifting downstream to new habitats. The loss of fish to irrigation channels is also a major issue, as diversions for irrigation flows lure fish into channels, removing them from rivers and creeks and losing them from the breeding population. Several threatened native fish species are affected including silver perch, flat-headed galaxias, trout cod, Macquarie perch and Murray cod.

Around the state, the Victorian government has invested in projects to enable fish movement and improve connectivity at priority sites. In the Wimmera, fish passage is not always desirable as it enables the spread of carp. There is also an absence of flow-dependent breeding fish species in the area.

8.4.1 Native fish

Taking advantage of improved instream habitat, the Victorian Fisheries Authority stocks waterways to recover threatened species and improve recreational fishing opportunities. Priority rivers for native fish releases (Murray cod, golden perch, Macquarie perch) have been the Ovens, Goulburn, Wimmera and Loddon rivers and Broken Creek (VFA, 2021).

Endangered native fish species are also translocated to new viable locations or habitats. For example, Wimmera CMA have translocated River Blackfish into the MacKenzie River, which receives environmental water and is historical habitat for this species (Wimmera CMA, 2024c).

8.5 Invasive species management

The Victorian Government has developed the Biosecurity Strategy (Agriculture Victoria, 2023) to protect our economy, natural environment, human health and cultural heritage from the impacts of plant and animal pests and diseases. The approach aligns with the Invasive Plant and Animals Policy Framework (Agriculture Victoria, 2010).

The VWMS states that regional waterway strategies will consider both current and potential future risks, where known, of invasive species that affect the environmental condition of waterways. and direct management priorities for weed and pest management where invasive species are identified as a key threat to regional outcomes. Examples of activities to manage invasive species include removal of weeds like willows and gorse from riparian areas or fumigating, baiting and ripping rabbit burrows adjacent to wetlands.

Victoria is also participating in the Commonwealth Government's [Carp Biological Control Program](#), which is investigating the potential use of *Cyprinid herpesvirus 3* (carp virus) to reduce carp numbers which are having major impacts on waterways. While investigations proceed, Victoria will continue to invest in and promote native fish recovery, ensuring conditions are suitable so that native fish species have a chance to outcompete carp.

The management of invasive species (plants or animals) is an occasional environmental watering objective recognised by CMAs in EWMPs. Appropriate hydrological regimes can be used to dry out, flush or flood a species (such as azolla) from a wetland or river, with varying degrees of success based on a range of factors. However, some exotic species (e.g. carp) also can benefit from environmental watering such as the creation of suitable breeding conditions when wetlands are inundated. Other specific management actions such as fish screens on water inlet structures on wetlands may be able to limit carp breeding by preventing them from entering.

Regional waterway strategies provide further information on management of invasive species e.g. the Wimmera Waterway Strategy (Wimmera CMA, 2014) outlines management actions to control invasive plant and animal species (e.g. rabbit, bridal creeper, boneseed, carp).

8.6 Environmental works and measures

In many cases, environmental works are the only way to get water to many of the sites that need it, such as fringing wetlands along the river and low-lying floodplains. This approach works when there is not enough water to flood wetlands naturally. Environmental works can enable ecological outcomes to be achieved in waterways with much smaller volumes of water than would be required to create a natural flood.

Works include pumps to supply water to disconnected wetlands, and regulators, channels and bunds to direct, retain or exclude flows. Other measures may also be needed, such as flood easements to allow for overbank flows or altering river operations to improve environmental outcomes. This approach ties closely in with constraints relaxation measures to improve overall environmental outcomes (section 7).

Typically, it is not possible to reinstate flooding to higher parts of the floodplain. This would require large volumes of water that often cannot be delivered from dams and channels due to limitations in flow rates and volumes available and could cause flooding that damages private land and public infrastructure, such as bridges and roads⁸.

8.7 Community wellbeing and waterways

Victoria has been at the forefront of community-driven environmental stewardship for over 30 years, exemplified by programs such as Landcare, WaterWatch and EstuaryWatch. The Victorian Government supports the pivotal role these programs play in nurturing communities' relationships with waterways.

The state's integrated catchment management program, Our Catchments Our Communities (DELWP, 2019 b), is also strongly grounded at the local scale. It recognises the community as a genuine partner in setting strategic directions and in the planning and delivery of place-based projects to improve catchment condition and resilience. A long-term outcome of the program is to build community members' capacity to act as catchment stewards, managing catchments to generate intergenerational benefits for the environment, people and place.

The Victorian Government developed the Recreational Values Program in 2016 to enhance the recreational values of water. In 2019, the *Water Act 1989* was amended to recognise the social and recreational values of water.

Current community and recreational programs that support environmental watering outcomes include:

- investment in facilities, like walking tracks and canoe launch sites at the Wimmera River in Dimboola, to help the community enjoy the waterway.
- improving awareness of the environment, and increasing nature-based tourism through the Victorian Government's strategy Protecting Victoria's Environment – Biodiversity 2037 (DELWP, 2017) and over \$106 million of investment in Victoria's Great Outdoors program.

8.8 Climate change adaptation policy

Global climate modelling indicates that Victoria is expected to continue to become hotter, have a drier cool season and experience more extreme rainfall events (DEECA, 2025c). Given these long-term trends, waterway management must continue to be innovative and adaptable. Victoria's Climate Change Adaptation Action Plans 2022-2026 have been prepared by the Victorian Government under the Victorian *Climate Change Act 2018* for systems that are vulnerable to climate change, or essential to resilience. Climate Change Adaptation Plans for the Natural Environment (DELWP, 2022c) and the Water Cycle Climate Change Adaptation Action Plan 2022-2026 (DELWP, 2022d) state that the natural environment, including waterways and biodiversity, will continue to be managed to be resistant, resilient or in transition.

When setting management actions and outcomes for new regional waterway strategies, waterway managers must consider impacts of current and forecast future climate change, and appropriate approaches to adapt - resilience, transition or transformation (DEECA, 2025d):

1. **Resilience** – the ecosystem/value will be impacted but has the capacity to recover to its previous state. Management approaches may alter but not objectives.
2. **Transition** – the ecosystem/value will be impacted but will not recover to its previous state and could change in structure or composition. Management objectives, including for environmental watering, will change. Management involves supporting existing waterway systems/values to incrementally move to a new state.
3. **Transformation** – the ecosystem/value will be impacted when a step change or tipping point is reached and will not recover to its previous state. This may result in new waterway values and new management outcomes.

⁸ Environmental watering risks are managed under policy in the Victorian Waterway Management Strategy (DEPI, 2013a)

9 Monitoring and Evaluation

Victoria's environmental water monitoring supports the evaluation and reporting component of the adaptive management cycle of the Victorian Waterway Management Program.

9.1 Environmental Water Monitoring and Evaluation Program

Victoria established the Environmental Water Monitoring and Evaluation Program (EWMEP) in 2025. EWMEP has been established to consolidate evidence across rivers and wetlands to evaluate the outcomes of environmental water management. The aim of the program is to ensure fit-for-purpose evaluation occurs that:

- informs adaptive management of environmental water planning and operations by CMAs
- supports reporting associated with CMA-led regional waterway strategies.
- contributes to DEECA and VEWH legislated reporting obligations.

EWMEP will support monitoring to evaluate watering objectives selected by CMAs, coupled with hydrological analysis to understand: (1) how hydrology is supporting SMART objectives, and (2) the contribution of environmental water to changes in hydrology.

CMAs will inform the priority objectives for EWMEP from their EWMPs and refine these as required to ensure they are suitable to support the development of key evaluation questions (KEQs). Any objectives that are updated to support evaluation through EWMEP will be incorporated into future EWMP updates. Evidence required to evaluate the KEQs will be identified and supported.

DEECA have established a strategic advisory group consisting of members from DEECA, CMAs and VEWH to ensure EWMEP meets the needs of stakeholders and partners

9.2 Basin Plan reporting on environmental outcomes

Schedule 12, of the Murray-Darling Basin Plan requires Basin states (Queensland, New South Wales, Victoria, South Australia, and the ACT) to conduct 5-yearly reporting on a range of different matters from environmental watering (Matter 8) and water quality (Matter 12), to water trading and water resource planning (Matter 18).

Information gathered through EWMEP will contribute to meeting Basin Plan obligations to report on Schedule 12 Matter 8, the 'achievement of environmental outcomes at an asset scale'. Additional monitoring may be required to support Matter 8 reporting, measuring status and trend of ecological attributes (types of environmental responses) at a broader range of assets than those included in EWMEP.

Other programs with monitoring relevant to Basin Plan outcomes include TLM, Victoria's Native Fish Report Card, and the CEWH's Monitoring, Evaluation and Research Program (Flow-MER that replaced the Long-Term Intervention Monitoring program in 2020. Note that as of 2025 the only site in Victoria covered through Flow-MER is the Goulburn River). Various parameters are measured under TLM at icon sites of Hattah Lakes, Lindsay, Mulcra and Wallpolla Islands, Gunbower Forest, and Barmah-Millewa Forest (in the Victorian Murray water resource plan area). TLM contains an annual condition monitoring component, as well as intervention projects which address certain questions around responses to environmental water, addressing risk or undertaking statutory functions.

10 Long-term risks

This section describes the long-term risks associated with providing for the ecological objective and watering requirements outlined in section 3 and 4. These risks fall into two broad categories: failure to achieve (or demonstrate achievement of) ecological objectives and adverse impacts stemming from environmental water.

10.1 Processes for identifying risks

Environmental risk is commonly assessed as the product of the *likelihood* of a threat or threatening process occurring and the *consequence* in terms of the impact of a threat (or threats) on asset values, condition or environmental outcomes. Victoria has annual and longer-term processes in place for identifying and managing risks associated with environmental watering events. Victoria's policy for managing risks associated with environmental watering is also outlined in section 8.6 of the VWMS (DEPI, 2013a).

Annual

The Victorian Environmental Watering Program has a Risk Management Framework (VEWH, 2024) that articulates how partners in the Victorian environmental watering program will work together to manage risks associated with environmental water in Victoria. This framework is consistent with the Victorian Government Risk Management Framework, which adopts the Australian and international standard AS ISO 31000:2018 Risk Management Principles and Guidelines.

In the lead up to the development of the seasonal watering proposals each year, the VEWB coordinates annual shared risk identification and assessment workshops across Victoria held in mid-late February. The workshops are attended by relevant program partners such as water holders, water corporations, Traditional Owners and public land managers. Partners jointly assess risks and commit to mitigation actions.

Long-term

CMAs across Victoria, in collaboration with communities and agencies, identify key risks that may impact on the ability to achieve environmental watering objectives in preparing EWMPs for priority environmental assets, and as part of regional waterway strategies. Key risks are documented in the CMA's EWMPs, along with management measures.

In developing Victoria's Wimmera-Mallee water resource plan (DELWP, 2019a), a risk assessment was completed at the water resource plan scale by the Department to meet requirements for priority environmental assets and priority ecosystem functions identified in this LTWP, and the health of water-dependent ecosystems. This process is outlined in detail in the water resource plan chapter 7. Nearly 45 percent of the highest risks identified by the risk assessment were found to be associated with:

- The causes of climate change and failure to invest in best practice management, creating 13 very high risks across outcome categories, including environmental outcomes
- The causes of extreme drought, bushfires, extreme wet, earth resources development, increasing farm dams, land use change, pest and weeds, and non-compliance with the *Water Act 1989*, creating 21 high risks and 42 medium risks across the outcome categories, including environmental outcomes.

The above long-term processes have been drawn upon to identify risks to include in this LTWP, considering the spatial and temporal scale of the plan.

10.2 Types of risks

The types of risks associated with providing for environmental water requirements under this LTWP fall into two broad categories:

- Failure to achieve the intended ecological objectives (or demonstrate their achievement)
- Adverse impacts in the provision of environmental water.

The risks associated with a failure to achieve the intended objectives are described in terms of the process by which they are generated and have been grouped into themes that reflect the consequence of the risk. The risks of adverse impacts arising from the provision of environmental water have been grouped by their impact on environmental, social and economic values. Management measures to address the risks identified in Figure 18 are presented in Appendix F. It should be noted that failure to provide sufficient water through the bulk entitlement process was addressed in the Wimmera-Mallee Water Resource Plan (DELWP, 2019a), as per Basin Plan clause 10.41.

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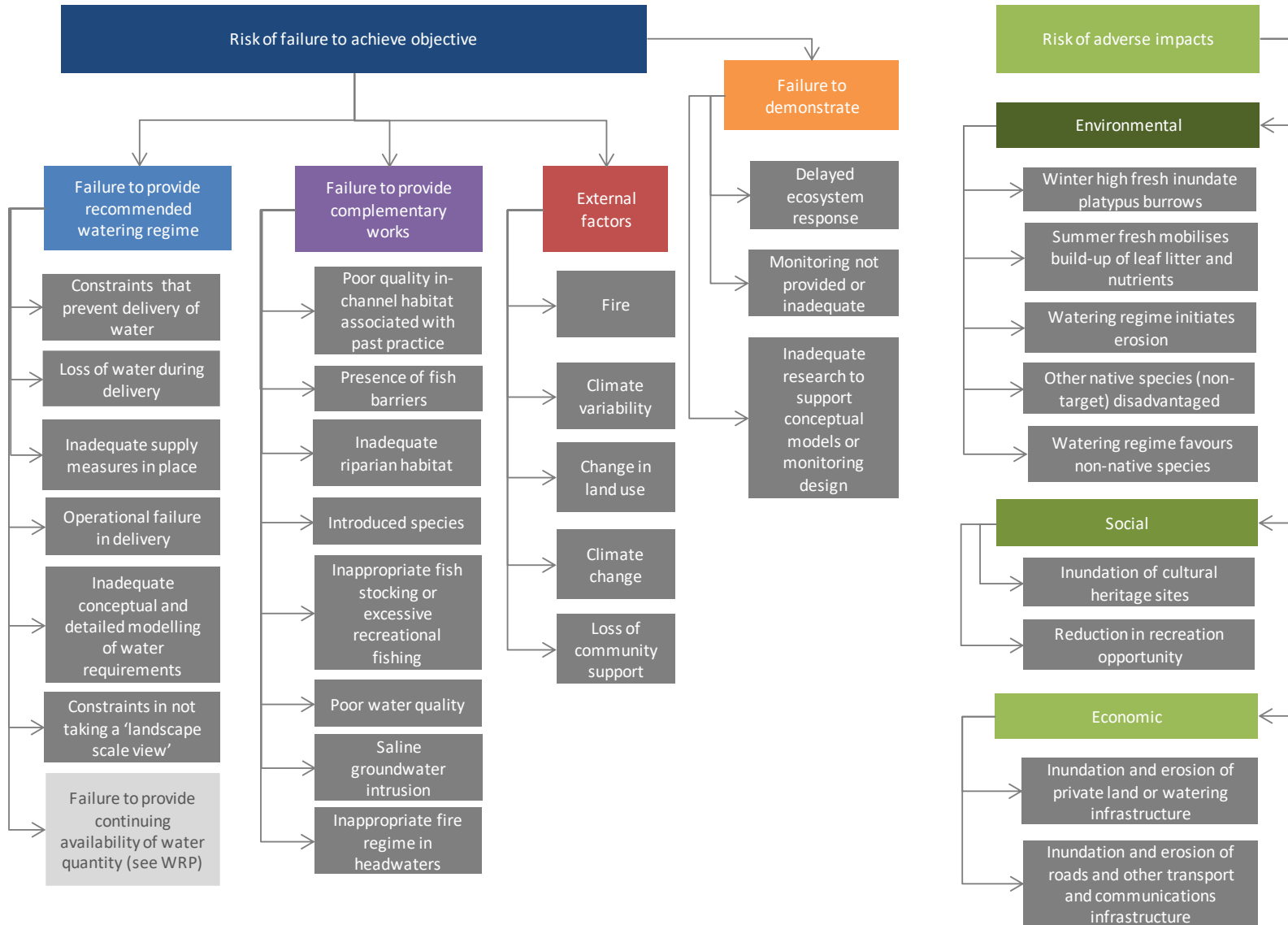


Figure 18. Risk types identified for this LTWP

Note future updates to the Water Resource Plan Risk Assessment (DELWP, 2019a) will separate cultural heritage impacts into a separate Cultural category.

10.3 Risk identification and assessment approach

While the characterisation of risk in Figure 18 and the management measures identified in Appendix F describe the suite of risks that may affect the benefits associated with environmental water management, they do not identify the relative importance of the risks or priorities for management. This has been addressed in the Wimmera-Mallee Water Resource Plan (DELWP, 2019a), which assigned levels of risk to events and their consequences in a manner consistent with AS/NZS ISO 31000:2009 Risk Management principles. This risk assessment was also undertaken in accordance with the provisions of the Basin Plan, which required that:

- risks be examined in a consistent, structured and transparent way
- risk levels, ranging from very low to very high, be determined as a product of likelihood and the consequence of a risk occurring
- likelihood be assessed in terms of how each cause impacts on each threat, and consequence be assessed in terms of how each threat impacts on each beneficial use. The overall risk therefore represents how each cause will impact on each threat, and how that threat will in turn impact on each beneficial use.

The approach adopted in Victoria's Wimmera-Mallee Water Resource Plan was based on the linkage of causal factors, and their manifestation as threats, in terms of limitations on the use and beneficial outcomes associated with the asset being considered (Figure 19). Threats were then ranked from very low to very high risk based on assessment rubrics of consequence and likelihood (Figure 20):

- 5 Very high risk
- 4 High risk
- 3 Medium risk
- 2 Low risk
- 1 Very low risk
- 0 Not plausible.

The assessment of risks was considered on a water resource plan scale, rather than on a local scale, and was applied to the following risk categories (DELWP, 2019a) (Table 17):

- Water availability
- Structural form (i.e. in relation to longitudinal and/or lateral connectivity, instream physical habitat)
- Water condition.

It should be noted that this consideration of risk at the water resource plan scale is not intended to replace the site-specific risk assessments that are included in EWMPs or Seasonal Water Proposals.

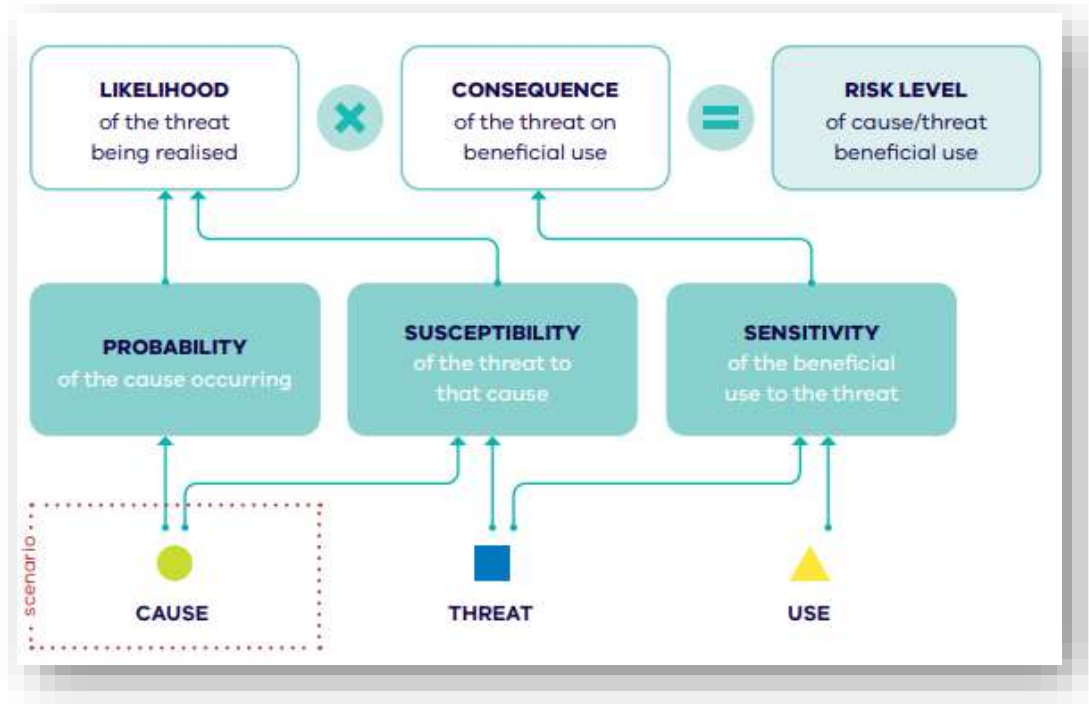


Figure 19. Overview of the risk assessment matrix, including cause-threat-use relationships for the Wimmera-Mallee water resource plan area (from DELWP 2019a).

		Likelihood (of the threat occurring)					
		Very high	High	Moderate	Low	Very low	Not plausible
Consequence (sensitivity of the beneficial use to the threat)	Very high	Very high	Very high	High	Medium	Medium	Not plausible
	High	Very high	High	Medium	Medium	Low	Not plausible
	Moderate	High	Medium	Medium	Low	Very low	Not plausible
	Low	Medium	Medium	Low	Very low	Very low	Not plausible
	Very low	Medium	Low	Very low	Very low	Very low	Not plausible
	Not plausible	Not plausible	Not plausible	Not plausible	Not plausible	Not plausible	Not plausible

Figure 20. Risk matrix comprising the combination of likelihood and consequence (Alluvium 2016).

The high priority risks to address (i.e. causes and associated threats listed as 'very high' and 'high' risk to the environment in Table 18) include:

- Climate change
- Extreme events
 - Extreme drought
- Land use and interception
 - Failure to continue to invest in best practice management
 - Pests and weeds.

10.4 Strategies for management

Management actions to address the high priority risks listed above are presented in Table 18. These actions also relate to issues discussed elsewhere in this LTWP (namely, the provision of environmental water (section 5), constraints management (section 7), complementary actions (section 8) and monitoring and evaluation (section 9)).

While risk management will initially focus on preventing or mitigating the effects of the high priority cause(s)/threats, a 'watching brief' will be kept on causes and threats with a medium (or lower) level of risk. This will allow scope for opportunistic management of medium level cause(s)/threats and prevent them from progressing to being high level risks. Action on medium level risks to environmental watering outcomes, such as the effects of bushfires and extreme wet periods, can also provide mutual benefits by addressing threats that are high level risks to consumptive, recreational and Traditional Owner values of water. For example, the

effects of bushfires could be mitigated by implementing measures to intercept excessive sediment and contaminants in runoff from fire-affected catchments before it reaches waterways and consumptive water supplies.

10.5 Updates to climate risk

The risk assessment for the water resource plan was undertaken in 2018. Since then, new climate analyses have been undertaken which provide a more up-to-date picture of climate threats to water resources, including the environmental entitlements.

The Victorian Water and Climate Initiative (WaCI) is an ongoing partnership with the Bureau of Meteorology (BoM) and CSIRO to understand changes to climate and water resources across the state. The most recent phase of research (DEECA, 2025c) found that:

- Victoria's rainfall is variable but has decreased in the cool season, with a more rapid decline in recent decades
- Since the end of the Millennium Drought, streamflow has remained significantly lower than average in many central and western catchments
- Victoria's average temperature will continue to increase over future decades and average cool season rainfall will continue to decline
- Future annual runoff in Victoria is projected to decline.

Regarding held environmental entitlement reliability, HARC (2025) found that:

- the potential impacts of climate change on achieving environmental watering objectives are more significant in west and central Victoria (Wimmera, Campaspe and Loddon systems) compared to other systems
- in other systems, impacts may be greater in winter and spring and for high flows (e.g. freshes)
- early season allocations are more sensitive to changes in runoff
- end-of-season high reliability water share allocation in the Victorian Murray and Goulburn are not sensitive to small changes in runoff (~10%) but decrease significantly if the runoff reduction is more than 25%
- delivery of freshes is more vulnerable to changes in runoff than low flow targets.

Figure 21 indicates modelled changes to environmental entitlement allocation.

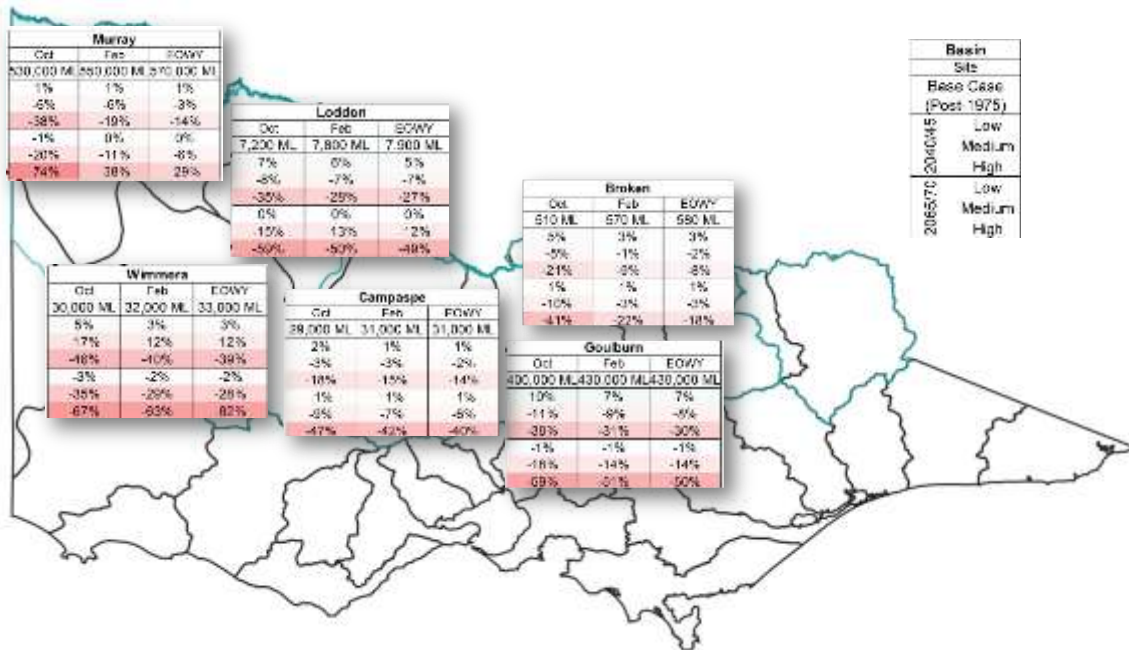


Figure 21. Percentage change in average allocation of environmental entitlements under climate change – inflows and seasonal determination for high and low reliability water shares (adapted from HARC, 2025)

Strategies for management

In line with Basin Plan s.4.03 - strategies to manage, or address, identified risks - the following are being used to manage climate risks to environmental watering and meeting the ecological objectives identified in this LTWP:

- *Water Act 1989* (Vic) and instruments - arrangements for water sharing including
- long-term water resource assessments (LTWRA) every 15 years
- sustainable water strategies
- licensing framework in unregulated systems to manage extractions - rosters and restrictions that come into effect as water availability declines
- Basin Plan implementation, including water resource plans and contributing to SDL assessments
- Victoria's Natural Environment Climate Adaptation Action Plan (DELWP, 2022c)
- Climate change adaptation policy (outlined in section 8.8) in addition to the seasonally adaptive approach (outlined in section 1.6.6)
- use of alternative water sources e.g. recycled water for environmental benefit
- use of infrastructure to inundate specific floodplains and wetlands rather than use large water volumes to inundate broad areas
- provide other assistance as possible e.g. remove barriers to fish movement, pest plant and animal management programs (refer to section 8 Complementary Actions)
- Adaptive long-term and annual objective setting by CMAs – in regional waterway strategies (currently being updated), EWMPs and seasonal watering priorities
- Managing annual risks of environmental watering through VEW's risk framework (RMCG and Lloyd Environmental, 2014)
- Coordinating flows to optimise outcomes – refer to section 6 on Cooperative Arrangements
- Improved knowledge – e.g. continuation of the Victorian Water and Climate Initiative with BoM and CSIRO, and the northern LTWRA, and improved sharing of Traditional Ecological Knowledge

- Monitoring and evaluation to assist with adaptive management – e.g. the Victorian EWMEP and Flow-MER in the Goulburn River (section 9).

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Table 17. Summary risk levels for the Wimmera-Mallee water resource plan area (DELWP, 2019a).

Note: Rankings: 5 = very high risk, 4 = high risk, 3 = medium risk, 2 = low risk, 1 = very low risk, 0 = not plausible

Cause category	Cause	Water Availability				Structural Form		Condition			
		Environment	Consumptive	Recreational	Aboriginal	Environment	Aboriginal	Environment	Consumptive	Recreational	Aboriginal
Climate change	Climate change	5	5	5	5	5	5	5	5	5	5
Extreme events	Bushfires	3	3	0	4	0	0	0	3	0	4
	Extreme drought	4	4	4	4	4	4	4	4	3	4
	Extreme wet period	2	2	1	3	3	3	3	4	2	4
	Flooding and overbank inundation	0	0	0	0	3	3	1	2	1	3
	Major asset failure	3	3	3	3	1	1	2	3	2	3
	Point source discharges	0	0	0	0	0	0	1	2	2	3
	Land use and interception	0	0	0	0	0	0	2	3	3	4
Land use and interception	Failure to continue to invest in best practice management	0	0	0	0	3	3	5	5	3	5
	Increase in farm dams	3	3	3	4	2	2	3	3	2	4
	Land use changes (affecting water availability)	3	3	3	3	0	0	0	0	0	0
	Land use changes (affecting water condition)	0	0	0	0	1	1	2	3	1	4
	Pests and weeds	0	0	0	0	3	0	4	4	3	4
	Non-compliance	2	2	1	3	1	1	3	3	2	4
	Water access, take, utilization and location	0	0	0	0	0	0	0	0	0	0
Non-compliance	Non-compliance with the Victoria Water Act	2	2	1	3	1	1	3	3	2	4
	Increase in the number of rights and volume of entitlements	0	0	0	0	0	0	0	0	0	0
Water access, take, utilization and location	Increased utilization of water access rights	2	2	1	3	0	0	3	3	1	3
	Timing and location of demand	0	0	0	0	0	0	0	0	0	0

Table 18. Summary of high and very high risks to environmental uses and to the priority environmental asset and ecosystem function environmental watering requirements, and related management measures (adapted from DELWP, 2019a).

Risk level	Risk cause	Risk threat	Risk impact on beneficial uses	Potential management actions
There is a high risk	That climate change	Leads to a reduction in the volume of water available	Which results in adverse impacts on high-reliability bulk entitlement water uses/users	• Deliver long-term watering plans, including: – Monitoring watering regime and ecological response – Liaison with water authorities, land holders, other stakeholders and the broader community – Delivery of priority environmental water requirements based on seasonal conditions and within constraints – Develop and implement programs to alleviate physical constraints to water delivery • Environmental water management in a changing climate (refer section 10.5) • Implement Ministerial Guidelines for groundwater licensing and protection of high-value groundwater-dependent ecosystems • Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits • Improving understanding of climate science and how it applies to water management • Preparing for and responding to extreme events • Improving public reporting on water availability and use: user-focused information and reporting • Improving rural water supply planning • Improving statewide water resource planning and risk assessment
There is a very high risk	That climate change	Leads to a reduction in the volume of water available	Which results in adverse impacts on low-reliability bulk entitlement water uses/users.	
There is a very high risk	That climate change	Leads to changes to the seasonal pattern of water available	Which results in adverse impacts on uncontrolled water (above cap water) water uses/users	
There is a very high risk	That climate change	Leads to a reduction in volume of water available	Which results in adverse impacts on uncontrolled water (above cap water) water uses/users	
There is a very high risk	That climate change	Leads to a reduction in the volume of water available	Which results in adverse impacts on uncontrolled water (above cap water) water uses/users	
There is a high risk	That climate change	Leads to other water quality impacts (water temperature, pH and/or dissolved oxygen)	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	
There is a high risk	That climate change	Leads to elevated levels of salinity	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	
There is a high risk	That climate change	Leads to elevated levels of suspended sediment and/or nutrients	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	
There is a very high risk	That climate change	Leads to elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	
There is a high risk	That extreme drought	Leads to a reduction in the volume of water available	Which results in adverse impacts on uncontrolled water (above cap water) water uses/users	
There is a high risk	That extreme drought	Leads to a reduction in the volume of water available	Which results in adverse impacts on low-reliability bulk entitlement water uses/users.	
There is a high risk	That extreme drought	Leads to changes to inter-annual patterns of water available	Which results in adverse impacts on uncontrolled water (above cap water) water uses/users	

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Risk level	Risk cause	Risk threat	Risk impact on beneficial uses	Potential management actions
There is a high risk	That extreme drought	Leads to elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	- Leading climate change adaptation across Victoria's water system - Maximising the effectiveness of the grid and markets across the State
There is a very high risk	That failure to continue to invest in best practice land use initiatives	Lead to elevated levels of salinity	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	Managing groundwater related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks
There is a high risk	That failure to continue to invest in best practice land use initiatives	Leads to elevated levels of suspended sediment and/or nutrients	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	Managing salinity, waterlogging and water quality including issues arising from an extreme wet period
There is a high risk	That pests and weeds	Lead to elevated levels of suspended sediment and/or nutrients	Which results in adverse impacts on environmental values/aquatic ecosystems of Wimmera–Mallee water uses/users	Managing water quality events
There is a high risk	That climate change	Leads to a loss or decline in lateral connectivity	Which results in adverse impacts on river water uses/users	Protecting water quality- compliance with Environment Protection Act and regulations
There is a very high risk	That climate change	Leads to a loss or decline in instream physical habitat	Which results in adverse impacts on river water uses/users	Managing invasive species in waterways
There is a very high risk	That climate change	Leads to a loss or decline in longitudinal connectivity	Which results in adverse impacts on river water uses/users	Monitoring and reporting on the benefits of environmental watering
There is a high risk	That climate change	Leads to a loss or decline in longitudinal connectivity	Which results in adverse impacts on wetland water uses/users	Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria
There is a very high risk	That climate change	Leads to a loss or decline in instream physical habitat	Which results in adverse impacts on wetland water uses/users	Provide long-term investment to improve waterway health
There is a very high risk	That climate change	Leads to a loss or decline in lateral connectivity	Which results in adverse impacts on wetland water uses/users	- Recognising and managing for Aboriginal values - Water resource information supports planning and decisions

11 Consultation

Preparation of this long-term watering plan has involved consultation with environmental water holders and managers, river operators, local communities and those materially affected by the management of environmental water.

Consultation for the LTWP is described below including additional consultation carried out for the review and update of this LTWP over 2019-21 and 2025-26.

Consultation occurred through a three-part devolved approach. It aimed to:

- *involve* local communities and Traditional Owners, who have worked directly with CMAs to ensure information and concerns were understood and considered in the development and delivery of EWMPs (Section 11.1)
- *collaborate* with the VEWH and CMAs, who have provided material and guidance for the LTWP (section 11.2)
- *consult* with the Traditional Owners, water corporations, land managers, the MDBA, CEWH, and upstream and downstream states, who provided information where relevant and feedback on the content (section 11.3).

11.1 Local engagement

During the development of the EWMPs that inform this LTWP, CMAs worked with local communities, Traditional Owners and stakeholders in order to gain input and feedback on all or a selection of the following: identification of the asset's ecological values; the long-term management goal for environmental watering of the asset; the ecological objectives for environmental watering; and the environmental watering requirements.

CMAs have a well-established network of stakeholders across Traditional Owners, local communities and peak bodies that are engaged on a range of issues. These networks are an effective mechanism to engage with local communities. CMAs have established specific environmental watering advisory groups (EWAGs) with community representatives, and water planning forums with Traditional Owners, to gain local contribution to seasonal watering proposals each year.

CMAs also conduct engagement on an 'as-needs' basis. Examples of those involved include: local landholders, local Landcare or environment groups, interest groups (e.g. Field and Game, Birds Australia), local shires, local land managers, local representatives of water corporations and government agencies that manage relevant assets/infrastructure (such as roads, culverts, pipelines, and weirs), waterways and the environment, and representatives of CEWH and VEWH. Lists of those consulted can be found in individual EWMPs (see Appendix B for links).

Examples of forums used in this tier include telephone interviews, site visits, workshops on water-dependent ecological values and review of the draft EWMP.

11.2 Working Group for the long-term watering plan

During the development of the original LTWPs (2015), DELWP (now DEECA) convened a working group to collaborate with key environmental water delivery partners. This working group assists with updates of the LTWP as needed. Members of the working group include the VEWH, Wimmera CMA, Mallee CMA, North Central CMA, Goulburn Broken CMA and North East CMA. Some of the working group members authored or coordinated the EWMPs relevant to this LTWP and gave priority environmental asset management and technical input to the LTWP. Advice and input were particularly sought on development of the ecological objectives and targets in this plan.

11.3 Stakeholder review

The working group and other key environmental water stakeholders provided input to the LTWP's original development and via review of its updates. The original LTWP was reviewed by representatives from the VEWH, Wimmera CMA, North Central CMA, Mallee CMA, Grampians Wimmera-Mallee Water, Lower Murray Water and Parks Victoria. Drafts were also provided to the CEWH, MDBA, NSW and SA Environmental Water Working Group members and MLDRIN.

MDBA provided feedback which was incorporated into the 2015 and 2020 iterations. DELWP also commissioned a review of Victoria's LTWPs in 2019, and many of those recommendations were incorporated into the 2020 iteration.

The 2026 update has worked with and/or involved CMAs, VEWH, Traditional Owners, MDBA, NSW DCCEEW, SA DEW, CEWH, Parks Victoria, and water corporations. CMAs and VEWH provided updated content for this LTWP. Other stakeholders provided feedback on the draft LTWP which was distributed on 18 February 2026.

11.4 Traditional Owners

Water is Life acknowledges the truth of the historic and ongoing harms of colonisation and the dispossession of land and water rights from Traditional Owners, and that since the colonisation of land and waters, Australia's First Nations peoples have been treated as bystanders in the management, allocation, and ownership of water and water landscapes. Given this history of dispossession, the Victorian Government has made a commitment – on behalf of the people of Victoria – to work in partnership with Traditional Owners and First Nations to support their right to self-determination.

Water Resource Plans

As part of developing Victoria's Wimmera-Mallee water resource plan (DELWP, 2019a), the Basin Plan required Basin states to engage with local Traditional Owner groups to document their water-related aspirations. Groups consulted with an interest in this LTWP area included Barapa Barapa, Dja Dja Wurrung, First People of Millewa Mallee (Nations of the Nyeri Nyeri, Ngintait and Latje Latje), Martang Pty Ltd, Tati Tati Wadi Wadi, Wadi Wadi, Wamba Wemba, Weki Weki and Wotjobaluk (represented by Barengi Gadjin Land Council)⁹.

Engagement aimed to identify objectives and desired outcomes for water resources, support celebrating and sharing culture and traditional practices within Traditional Owner groups, discuss economic development opportunities and build relationships and Traditional Owner organisational and community capacity. The engagement process and feedback from Traditional Owners is documented in Chapter 8 and Appendix D of the Victoria's North and Murray Water Resource Plan (DELWP, 2019a).

Long-term watering plans

Traditional Owners were invited to participate in the LTWP update. Several Traditional Owner groups expressed interest to DEECA in learning about Basin Plan and the role of LTWPs. However, no groups were able to review the Wimmera Mallee LTWP draft.

Traditional Owners contribute to long-term waterway health planning through regional waterway strategies (currently under review and due 2027), long-term environmental water planning through EWMPs (as updated), and annual environmental water planning via seasonal watering proposals.

Traditional Owners will continue to be engaged throughout Basin Plan implementation by Victorian and Commonwealth agencies.

⁹ Traditional Owner Corporations and organisations evolve over time; the groups listed may represent multiple Nations that now work separately, or that have now merged.

12 Next Steps

This LTWP is one of many steps towards full implementation of Basin Plan. Monitoring and evaluation of the ecological objectives and targets in this LTWP is required to report on achievement of environmental outcomes at the asset scale (Basin Plan Matter 8). This requires implementing relevant monitoring programs, as well as research and innovation programs to better understand environmental flow needs of rivers and wetlands, even as our climate changes.

The next LTWP will be informed by the following:

- Outcomes of the 2026 Basin Plan Review
- The next update to the Basin-wide environmental watering strategy
- New environmental watering sites (priority environmental assets)
- Updates to EWMPs
- New Victorian Waterway Management Strategy
- New Regional Waterway Strategies
- New evidence and knowledge generated from programs such as Victoria's Environmental Water Monitoring and Evaluation Program (EWMEP).

A range of Next Steps were flagged in the 2021 LTWP. Each are addressed below:

Landscape scale (top down) approaches that can be integrated with the asset scale (bottom-up) approach taken in this LTWP iteration.

VEWH and CSIRO have undertaken research centred on colonial waterbirds. Research has considered wetlands where environmental watering or other management interventions could improve the recruitment of juvenile Royal Spoonbills, to stabilise and increase the population across northern Victoria and beyond. CSIRO are now undertaking broader Basin-wide research into waterbirds for the CEWH.

Regional waterway strategies (RWS) are currently being updated by all Victorian CMAs. Guidelines (DEECA, 2024a) state that long and medium-term outcomes for the RWS will be set at appropriate scales (e.g. whole of-Country, river reach, cross-regional) considering connectivity between waterways and systems and surrounding land use impacts; catchment-based activities if that is the most effective way to reduce threats to waterway values; and coordination of management activities with other regions (CMAs) to enable achievement of outcomes at meaningful scales, including whole-of-Country where relevant.

Further asset-based technical work through development of EWMPs for new assets, EWMP reviews and EWMP updates where needed (in line with the revised EWMP guidelines). For example, updates to all Mallee EWMP environmental objectives were carried out in 2020 to improve their adherence to SMART criteria and alignment with Basin Plan.

In 2022, DEECA updated EWMP guidelines to better align environmental objectives at the asset level with Basin Plan, to improve their adherence to SMART criteria and to guide partnership with Traditional Owner groups.

29 EWMPs have been updated by CMAs between 2021 and the 2025 drafting of this update, 10 of these in the Wimmera Mallee. Updates include revision of ecological objectives to better align with Basin Plan.

In addition to EWMP updates, all northern CMAs have worked with the MDBA on information for the Basin Plan Evaluation (MDBA, 2025c) and Review, providing input to their EWR Tool (MDBA, 2025b). Through this process, a number of environmental watering requirements were updated, but have not yet been included in EWMPs.

Use of the ANAE aquatic ecosystem classification V3 to refine the aquatic ecosystem types assigned to priority environmental assets.

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This 2026 update has renewed classifications of all priority environmental assets under the latest ANAE V3.

Further incorporation of Basin Plan principles and objectives in the VWMS renewal (due 2023).

The new VWMS is currently in draft. In all existing policy, Victoria remains committed to the objectives of the Murray-Darling Basin Plan. Victorian agencies are working closely with the Murray-Darling Basin Authority, other jurisdictions and the CEWH to implement the Plan. Guidance for CMAs to develop regional waterway strategies states that CMAs are expected to consider Basin-wide Environmental Watering Strategy outcomes when developing their regional outcomes.

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Appendix A Basin Plan obligation compliance

(a) Basin Plan Chapter 8 (environmental watering plan) obligations

Table 19 presents the details of each of the Basin Plan obligations related to long-term watering plans and how each of these obligations has been addressed within this plan.

Table 19. Basin Plan obligation compliance

Topic	Basin Plan obligations	Clause	Relevant sections of LTWP
Identification of environmental watering requirements	A long-term watering plan must identify • priority environmental assets in the water resource plan area; and • ecological objectives and ecological targets for those assets; and • environmental watering requirements needed to meet those targets in order to achieve those objectives; • using the method in section 8.49 A long-term watering plan must identify • priority ecosystem functions in the water resource plan area; and • ecological objectives and ecological targets for those functions; and • environmental watering requirements needed to meet those targets in order to achieve those objectives; using the method in section 8.50 If the Basin-wide environmental watering strategy has identified particular assets or functions, and their requirements under subparagraph 8.14(2)(a)(i), a long-term watering plan must be consistent with that part of the Basin-wide environmental watering strategy.	8.19 (1) 8.19 (2) 8.19 (3)	section 3 Also refer to EWMPs listed in Appendix B.
Identification of possible co-operative arrangements	A long-term watering plan must identify: • possible co-operative arrangements (for example, possible co-operative watering regimes) between holders of held environmental water, managers of planned environmental water, and owners or managers of environmental assets for the delivery of environmental water: • within the water resource plan area; and • between that area and upstream and downstream water resource plan areas; that will ensure that environmental water meets the environmental watering requirements identified above.	8.19 (4)	Section 6

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Topic	Basin Plan obligations	Clause	Relevant sections of LTWP
Identification of long-term risks	A long-term watering plan must identify: • long-term risks to providing for the environmental watering requirements of priority environmental assets and priority ecosystem functions; and • the strategies to manage those risks having regard to the strategies in Chapter 4¹⁰.	8.19 (5)	Section 10
Operational constraints	A long-term watering plan must: (a) identify any operational constraints in relation to environmental watering in the water resource plan area; and (b) include strategies to manage or overcome those constraints.	8.19 (6)	Section 7
Supporting Information	A long-term watering plan must include references to the information that informed its preparation.	8.19 (7)	Throughout & References Section
Consultation	A Basin State must prepare a long-term watering plan in consultation with: • holders of held environmental water; and • managers of planned environmental water; and • river operators; and • local communities, including bodies established by a Basin State that express community views in relation to environmental watering; and • persons materially affected by the management of environmental water. Note: Under paragraphs (a) and (b), a Basin State may consult with any holder or manager whose environmental water could contribute to environmental watering in the water resource plan area, regardless of the location of the holder or manager, or of the location of the water.	8.20 (1)	Section 11
Matters to which Basin State is to have regard	When preparing a long-term watering plan, a Basin State must have regard to the Basin-wide environmental watering strategy (Division 2). A long-term watering plan must be developed consistently with the principles to be applied in environmental watering (Division 6).	8.20 (2)	Sections 2-3 Appendix A, I Throughout See Table 20
Consistency with international agreements	A long-term watering plan must not be inconsistent with relevant international agreements.	8.20 (5)	Sections 2, 3 and 4

¹⁰ Strategies listed in Chapter 4 of Basin Plan: (1) the environmental watering plan; (2) water quality and salinity management plan; (3) water trading rules; (4) water resources planning

(b) Basin Plan environmental watering plan Division 6 principles

Table 20 presents the details of each of the Division 6 principles of the environmental water plan (Chapter 8 of Basin Plan) and where they are addressed in this LTWP or elsewhere.

Table 20. Basin Plan Environmental Watering Plan Division 6 Principles

Principle	Where addressed in LTWP or elsewhere	Comment
Principle 1—Basin annual environmental watering priorities Environmental watering is to be undertaken having regard to the Basin annual environmental watering priorities. Note: There may be reasons why it is not possible in particular circumstances to undertake watering in accordance with these priorities. Section 8.44 then applies.	Annual watering priorities are established via seasonal watering proposals for individual assets, which in turn are prioritised through the annual VEWH Seasonal Watering Plan (see section 1.6.5).	Basin annual watering priorities are increasingly a consideration for asset managers when planning environmental water delivery to individual assets in accordance with EWMPs.
Principle 2—Consistency with the objectives in Part 2 Environmental watering is to be undertaken consistently with the objectives in Part 2.	Ecological objectives for Wimmera-Mallee assets, including their alignment with Basin Plan Chapter 8 objectives, are presented in section 4.3.	The 3 overarching Basin Plan Objectives are: (a) to protect and restore water-dependent ecosystems of the Murray-Darling Basin; and (b) to protect and restore the ecosystem functions of water-dependent ecosystems; and (c) to ensure that water-dependent ecosystems are resilient to climate change and other risks and threats.
Principle 3—Maximising environmental benefits Subject to the principles in sections 8.33 and 8.34, environmental watering is to be undertaken in a way that: (b) maximises its benefits and effectiveness by: (i) co-ordinating environmental watering between all holders of held environmental water and managers of planned environmental water; and (ii) co-ordinating environmental watering with flows regulated for consumptive use; and (iii) utilising local knowledge and experience; and (iv) having regard to Indigenous values; and (v) having regard to social and economic outcomes; and	Described in detail as part of the environmental watering framework (see section 1.6.4). Opportunities to achieve shared benefits from environmental watering will be considered, including contributions to social, cultural, recreational and economic benefits. However, the use of environmental water to provide shared benefits cannot be prioritised at the expense of achieving ecological objectives (see section 1.6.8). See also the response to Principles 10 and 11.	Other environmental water co-ordination mechanisms to which DEECA is a party includes: • Southern Connected Basin Environmental Water Committee (SCBEWC)

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Principle	Where addressed in LTWP or elsewhere	Comment
(c) enhances existing flow events, where possible, so as to ensure improvement in the delivery of a full range of flow conditions, including high flow events; and	Annual watering priorities are established via seasonal watering proposals for individual assets, which in turn are prioritised through the annual VEWH Seasonal Watering Plan (see section 1.6.5). Delivery of a full range of flow conditions can require cooperative arrangements in the delivery of both environmental and consumptive water. Cooperative arrangements between water delivery partners are presented in section 6.	Other environmental water co-ordination mechanisms to which DEECA is a party includes: • Southern Connected Basin Environmental Water Committee (SCBEWC)
(d) takes into consideration the relative ecological benefits of applying environmental water to achieve one environmental outcome over another environmental outcome; and	At the asset scale, this occurs through EWMPs and seasonal watering proposals by CMAs, and at a broader scale through the VEWH's Seasonal watering plan (refer section 1.6). See also Principle 3c (above) on coordination and prioritisation with other jurisdictions and water holders (section 6).	
(e) takes into consideration the variability of the natural flow regime, for example, by mitigating or avoiding seasonal inversion of flows; and	Addressed in EWMPs and seasonal watering proposals for individual assets (see Appendix B).	
(f) incorporates strategies to deal with a variable and changing climate; and	Addressed in the Long-term Risks section (section 10) and Complementary actions section regarding climate change adaptation policy (section 8.9). CMAs also address climate adaptation for their regions and assets in the regional waterway strategies (see section 1.6.3).	Risk characterisation and management actions have been aligned to that presented in the Wimmera-Mallee Water Resource Plan.

Principle	Where addressed in LTWP or elsewhere	Comment
(g) enables information to be shared between the Authority, the Commonwealth, Basin States, holders of held environmental water and managers of planned environmental water to ensure efficient and effective use of environmental water.	Information is shared in planning and delivery stages of environmental water management (see sections 1.6.5 and 6). Information is also shared through Victoria's Basin Plan reporting, with 5 yearly outcomes (mater 8 reporting) based on Victoria's environmental water monitoring (see section 9). EWMEP and past monitoring programs relate to the objectives and targets outlined in Victoria's long-term watering plans, which have direct links to objectives outlined in the EWMPs, as well as the objectives listed in both the Basin-wide environmental water strategy and in the Murray-Darling Basin Plan in Chapters 5 and 8, Schedules 7 and 8.	EWMEP and programs such as The Living Murray, contribute to Victoria's Schedule 12 Matter 8 reporting.
Principle 4—Risks Environmental watering is to be undertaken having regard to: (a) potential risks, including downstream risks, that may result from applying environmental water and measures that may be taken to minimise the risks; and (b) risks arising from impediments to the delivery of water to water-dependent ecosystems, including risks of extraction of that water for other uses, and inadequate accounting of water flows.	Annual and long-term risk processes are explained in the Long-term Risks section (section 10).	Risk characterisation and management actions have been aligned to that presented in the Wimmera-Mallee Water Resource Plan.
Principle 5—Cost of environmental watering Environmental watering is to be undertaken having regard to the quantity of water and other resources required relative to the expected environmental benefits.	Addressed in: - the VEWH seasonal watering plan and its criteria for prioritising environmental watering actions (see section 1.6.5). - <i>Water for Victoria</i> (DELWP, 2016) – Environmental water charging arrangements will be clear, transparent and equitable and in line with the following principles: • Prices for services to EWHs will reflect costs • Prices to reflect level of service received • Prices to provide signals for efficient and sustainable use of water infrastructure, and • Prices will not deter environmental watering.	Likely environmental benefits compared against: • Cost to deliver and manage water • Costs of interventions to manage external threats and risks

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Principle	Where addressed in LTWP or elsewhere	Comment
Principle 6—Apply the precautionary principle A lack of full scientific certainty as to whether there are threats of serious or irreversible environmental damage should not be used as a reason for postponing measures to prevent environmental degradation.	This principle is dealt with in Victoria's Waterway Management Strategy (DEPI 2013a), Principle 3g (sharing of information) and Principle 4 (assessment and management of risks) (above). It is also addressed in Principle 8 (adaptive management) and Principle 9 (international agreements).	Refer chapter 3 of the Victorian Waterway Management Strategy (DEPI, 2013a)
Principle 7—Working effectively with local communities Environmental watering should be undertaken having regard to the views of: (a) local communities, including bodies established by a Basin State that express community views in relation to environmental watering; and (b) persons materially affected by the management of environmental water.	Community engagement, including with First Nations, is addressed in section 11.	
Principle 8—Adaptive management Adaptive management should be applied in the planning, prioritisation and use of environmental water.	Adaptive management is a key principle of waterway management outlined in chapter 3 of the Victorian Waterway Management Strategy (DEPI, 2013a) and sections 1.6.3 and 1.6.4 of this LTWP.	
Principle 9—Relevant international agreements Environmental watering should be undertaken in a way that is not inconsistent with relevant international agreements. Note: A purpose of the Basin Plan, including Chapter 8, is to give effect to relevant international agreements (see paragraph 20(a) and subsections 21(1), (2) and (3) of the Act). This provision is a further check to ensure that this purpose is achieved.	A management goal for the LTWP is to 'Maintain or improve wetlands of International, National or State significance' (see section 4.2). International agreements are considered further as Ramsar-listed wetlands are included as priority environmental assets (see section 3).	

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Principle	Where addressed in LTWP or elsewhere	Comment
Principle 10—Other management and operational practices River management and operational practices should be reviewed, and if necessary altered, to ensure that rivers can be managed to achieve multiple objectives, including the objectives in Part 2.	Under the Victorian <i>Water Act 1989</i>, held environmental water is managed as part of Bulk Entitlements, which specify the water available to users, including consumptive users and the environment (see section 1.6.2). Water management to achieve multiple outcomes are also included in policies in the Victorian Waterway Management Strategy (DEPI 2013a).and implemented through CMA regional catchment strategies and regional waterway strategies. The delivery of consumptive and environmental water is also being managed in a cooperative manner through such forums as the Southern Connected Basin Environmental Water Committee (SCBEWC) and the Water Liaison Working Group (WLWG) - Victoria is party to each group.	
Principle 11—Management of water for consumptive use Management of water for consumptive use should, where possible, be undertaken in a way that is consistent with achieving the objectives in Part 2.	See Principle 10 (above).	

Appendix B Environmental Water Management Plans

Environmental Water Management Plans (EWMPs) are developed to capture the long-term environmental watering requirements of priority Victorian wetlands and rivers that

- have environmental values at risk from altered water regimes, and
- can receive environmental water (DEPI, 2013a).

EWMPs have been completed across Victoria. EWMPs provide information to assist development of the Victorian Environmental Water Holder's (VEWH) Seasonal Watering Plan, as well as the Annual Watering Priorities and long-term watering plans for the Basin Plan.

An EWMP is a scientifically based management plan that documents:

- the natural versus developed hydrology of the site, indicating what changes have occurred, leading to why environmental water is needed
- priority environmental values (those that rely on flows or inundation for all or part of their life cycle) associated with the wetland or river
- the condition of the wetland or river and its environmental values, indicating why the wetland or river requires environmental watering action
- an overarching environmental water management goal for the wetland or river, relating to the important ecological values, that can be advanced through environmental watering
- long-term ecological objectives that help meet the management goal
- the watering requirements for each objective
- a watering regime that considers all watering requirements needed to meet the objectives
- constraints to watering at the site
- risks to meeting the objectives
- monitoring required to demonstrate whether the objectives have been met
- outcomes of community consultation that has occurred during development of the EWMP.

The watering requirements to meet the ecological objectives are based on established technical information including FLOWS studies (for Victorian rivers). The expected ecological benefits of managed watering and drying (Alluvium, 2016) underpin the watering requirements of the EWMP.

The use of expert advice in developing the hydrological regime is an important component to the development of EWMPs. Where known, the hydrological tolerances of the ecological objectives are included to help establish thresholds for watering/not watering.

The EWMP process, as undertaken by CMAs with external expert advice, assists in creating a robust and scientifically defensible management plan, which effectively identifies a plan to best manage environmental watering at designated sites.

Also important to the EWMP is Traditional Owner ecological knowledge and input from community regarding the ecological values present at a wetland or river reach ('the asset'), the management goal for the asset, the objectives, and the hydrological regime of the asset. Traditional Owners has the right to partner with CMAs in EWMP development if they wish to.

EWMPs from the Wimmera, Mallee, North Central, Goulburn Broken, and North East CMAs have been used as important input to the preparation of LTWPs for Victoria's Basin Plan requirements. In particular, EWMPs have been used in the development of LTWP ecological objectives and watering requirements.

EWMPs also provide important asset-based information for other LTWP requirements regarding constraints, risks and community consultation.

Table 21 lists the EWMPs for priority environmental assets in the Wimmera-Mallee water resource plan area where further details can be found on all aspects of management of environmental watering.

Table 21. Priority environmental assets in the Wimmera-Mallee water resource plan area

Asset Name	CMA	EWMP (or other document)	Year
Bungalally Creek	Wimmera	<u>Environmental Water Management Plan - MacKenzie River and Burnt and Bungalally Creeks</u>	2025
Burnt Creek	Wimmera	<u>Environmental Water Management Plan - MacKenzie River and Burnt and Bungalally Creeks</u>	2025
Dock Lake	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2024
Lake Albacutya	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2024
Lake Hindmarsh	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2024
MacKenzie River	Wimmera	<u>Environmental Water Management Plan - MacKenzie River and Burnt and Bungalally Creeks</u>	2025
Mount William Creek	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2024
Mt Cole Creek	Wimmera	<u>VEWH Seasonal Watering Plan 2025-26</u>	2025
Outlet Creek	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2024
Ranch Billabong	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2024
Wimmera-Mallee pipeline wetlands	Mallee	<u>Environmental Water Management Plan – Wimmera-Mallee Pipeline wetlands – Mallee CMA Region</u>	2023
	North Central	<u>Environmental Water Management Plan – Wimmera-Mallee Pipeline wetlands – North Central CMA Region</u>	2016
	Wimmera	<u>Environmental Water Management Plan – Wimmera Mallee Pipeline Wetlands - Wimmera CMA Region</u>	2016
Wimmera River	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2016
Yarriambiack Creek	Wimmera	<u>Wimmera River, Yarriambiack Creek and terminal lakes EWMP</u>	2024

Appendix C Determining objectives, targets and watering requirements

This appendix describes the approach used to develop ecological objectives and targets for the Wimmera-Mallee water resource plan area and this LTWP. The overall process is shown in Figure 22 and is described in the following section. The green processes and products relate to objectives while the blue relates to targets, and the orange relates to watering requirements.

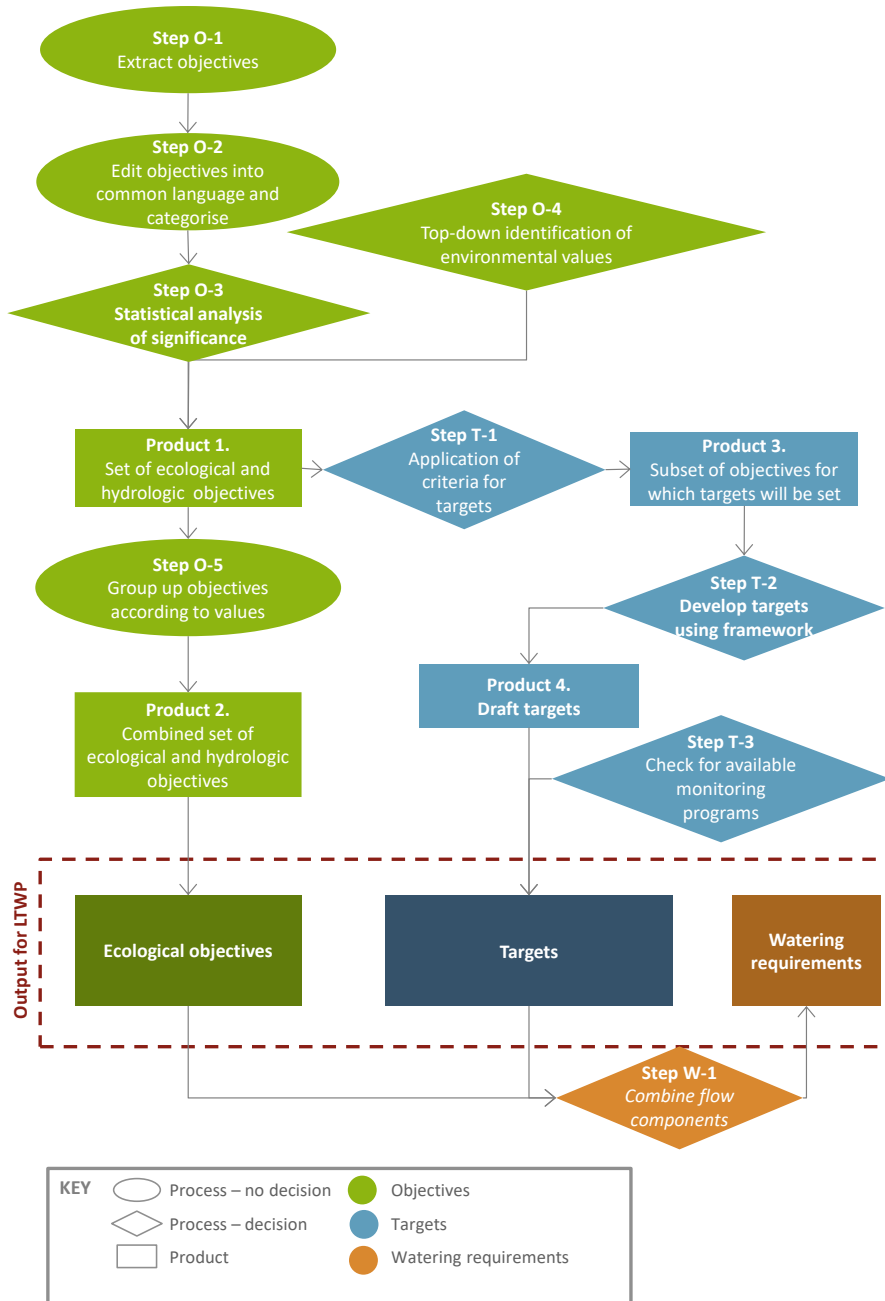


Figure 22. Overview of process for developing objectives and targets

The first step in process was to collate all available ecological objectives for environmental watering sites (assets) and ecological functions, as documented by Victoria's CMAs in Regional Waterway Strategies, EWMPs, SDL Business cases and TLM ecological watering guides. In all, for the three water resource plan areas, 70 individual plans were identified that covered over 100 assets. Some 600 individual objectives were identified within the 70 plans.

Step O-2

The list of extracted objectives contained a wide variety of terminology and level of detail. The next step in the process was to standardise each objective into a consistent suite of language and detail. Each objective was categorised according to Figure 23.

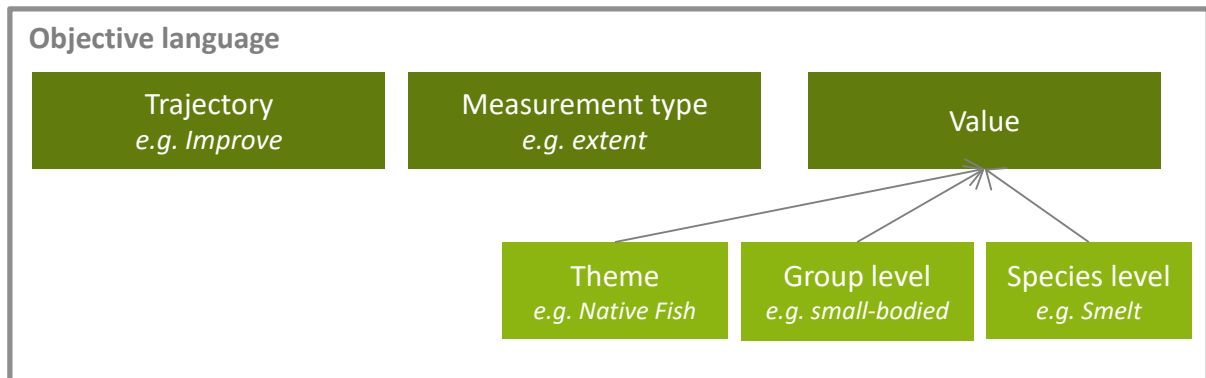


Figure 23. Objective language used to standardise objectives and categorise them

The **trajectory** represents the intended change (improve, maintain and reduce). The **measurement type** identifies in which particular aspect of the value the change should occur. This could include extent, abundance, species richness, condition, breeding, etc.

The **value** is the part of the ecosystem that is of interest, and split into 3 increasing levels of detail:

- Theme (native fish, vegetation, waterbirds, river flows and connectivity, other)
- Group-level (e.g. small-bodied fish, river red gum communities, colonial-nesting waterbirds)
- Species-level (e.g. brolga, Murray hardyhead, Charophytes)

Some objectives included cross-theme components, or included many group level elements. These were split into separate themes or groups. For example, the following objective was split between the vegetation and the waterbird theme:

“To provide a watering regime that supports a Cane-grass/Plains Grassy Wetland Complex and provides breeding opportunities for a diverse range of native wetland biota in particular brolga”

Examples of the final list of objectives included:

- Improve abundance of short lived/ small-bodied fish.
- Maintain condition of river red gum communities.
- Improve feeding areas for waterbirds.

Step O-3

To achieve a set of objectives that are relevant at a regional scale (i.e. the water resource plan area scale), objectives were ranked within each water resource plan area based on the number of assets that had an objective related to each value (group level) measurement type and trajectory. This is the **bottom-up approach** to achieving a set of objectives that represent the region.

Note:

The production of a set of objectives for each water resource plan area in no way diminishes the importance of objectives at an individual asset scale. Some objectives that occur at only a few assets are not included in the Regional Objectives, but still remain valid for watering of the assets with that objective. Similarly, where the Regional Objective trajectory is “Maintain”, and a particular asset trajectory is “Improve”, any watering plan at the asset level should still be designed to improve the value.

It is recognised that there are no formal criteria for selecting how many assets need to have a particular value, measurement type or trajectory for inclusion, so there is a degree of subjectivity in the development of a regional set of objectives.

Step O-4

The sets of objectives were then cross-checked for gaps based on subjective assessments of the values in each water resource plan area. This subjective process was informed by guidance from the VEWH and DELWP, and expert ecologists (Alluvium team, Jane Roberts and Terry Hillman - LTWP reviewers).

This is the **top-down approach** at a regional scale to complement the bottom-up approach drawn from the objectives at an asset scale.

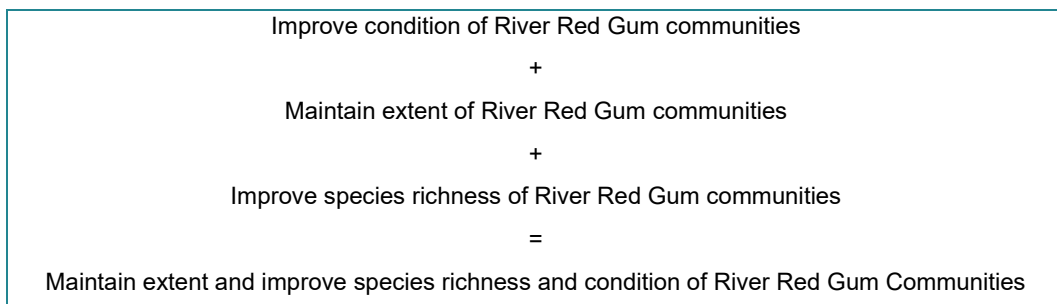
One identified objective that is not covered by individual asset objectives relates to the maintenance or improvement of the suite of wetland types (number and type based on water regime) across each water resource plan area.

Based on steps O-3 and O-4, a set of objectives was developed (in the format described in Step O-2). This feeds into the target setting process (from Step T-1).

Step O-5

To give the objectives more meaning and enhance readability, they were grouped according to the value (group level) they were focused on.

For example, where the following three objectives were included in the set of objectives (Product 1), they could be grouped into one objective about River Red Gum Communities (the value).



Based on this grouping process, a set of objectives was selected for each water resource plan area. This feeds directly into the LTWP. **Step T-1**

Not all of the objectives will lead to good targets that can be used for reporting outcomes. Therefore, targets will be set for a subset of the objectives. This subset of objectives needs to be based on criteria for target setting. The subset of objectives should lead to targets being set that meet these criteria and also be significant to the water resource plan area. Therefore, the following criteria were adopted (Figure 24):

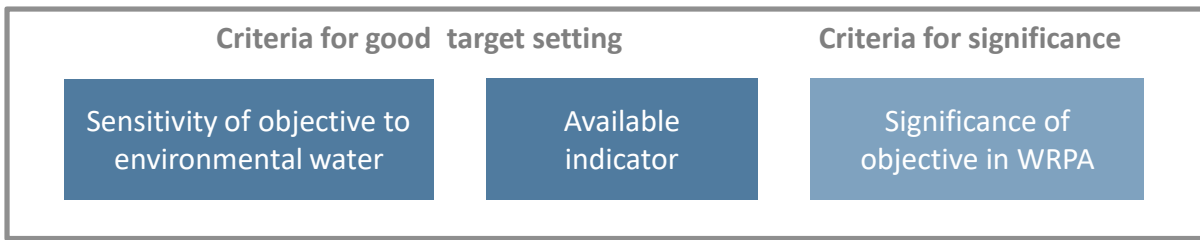


Figure 24. Criteria for target setting

The **sensitivity of the objective to environmental water** includes whether water delivery is the critical component that would lead to achieving the objective, or how dependent the value or asset associated with the objective is on water delivery. For example, successful bird breeding events are highly sensitive to inundation duration, and are therefore sensitive to the delivery of environmental water. Conversely, there is not a strong link established between flow and species richness of macroinvertebrates.

In order to match a target against an objective and report on that target, there must be an **available indicator** that can be monitored. This indicator guides the target setting process and relates directly to the *measurement type* component of the objective. For example, for extent of vegetation an indicator could be area in hectares. Some objectives where it would be difficult to provide an indicator include:

Maintain the quality of geomorphic habitat.

Improve breeding opportunities for platypus and rakali communities

Given that only a subset of the objectives for each water resource plan area will have targets set, this subset should represent the most **significant objectives** for that region. This significance has been informed by the number of assets in the water resource plan area that relate to each objective and also expert opinion. Note this is similar to the process used for the objectives in steps O-3 and O-4.

Based on the described criteria, a subset of objectives was selected for each water resource plan area to be used in the remainder of the target setting process.

Step T-2

In order to compose the targets, the following framework was used (Figure 25). This framework is based on the principles for target setting in the LTWP and an understanding of what components are required to set good targets that can be monitored and used for reporting.

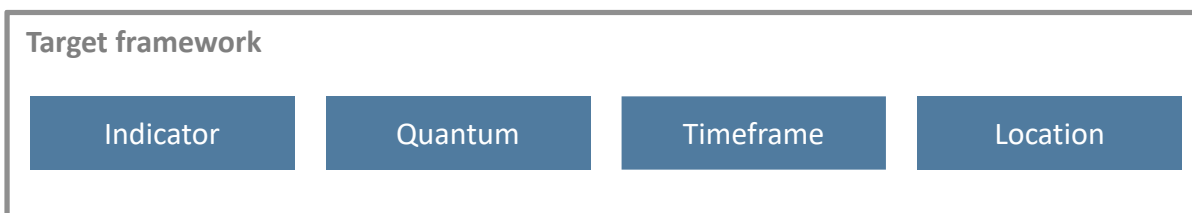


Figure 25. Framework for developing targets

The **indicator** was identified in Step T-1 (criteria for targets) and is the metric, that is, the item that will be measured. It relates directly to the objective type and value. For example, the **area** of Red Gum communities or **count per unit effort** (CPUE) of fish.

The **quantum** relates to the amount of the indicator that should be achieved. For example 3,000 ha or 10% increase. A target will include a **timeframe** within which the target should be achieved. Examples could include within 5 years or occurs in 90% of years. The **location** considers at which assets or type of assets the target should be achieved, for example, Tang Tang Swamp or priority river reaches.

For the subset of objectives (Product 3), draft targets were developed based on the framework for target setting. Any of these targets could be appropriate for inclusion in the LTWP.

Step T-3

Based on the draft targets, an extensive and bespoke monitoring program would be required to report on every target. Given that limited resources are available for monitoring, DELWP has indicated a preference to use existing monitoring programs where possible. Therefore, the list of draft targets was filtered for targets where there is an existing monitoring program already in place and/or can be replicated at increased spatial or temporal scales. This also impacts on whether baseline data will be available.

The output of step T-3 will be a finalised list of targets that will be incorporated into the LTWP.

Step W-1

The final step is to determine the watering requirements. At the regional scale, this is done by linking the objectives and targets to the relevant flow components. The EWMPs and Seasonal Watering Plan (SWP), which is developed each year, provide further detail on the watering requirements at an asset scale.

Updates to LTWP targets

Following the first LTWPs, updates to the LTWP targets were made by Ecological Associates (Cooling, 2017) during the process of developing a monitoring and evaluation plan to measure progress towards achievement of the objectives.

The targets were amended to ensure that they were measurable, unambiguous, time-bound and set clear thresholds for success. Where possible, the targets were worded to more closely align with existing monitoring protocols. This 2026 version of the LTWP uses those amended targets.

Further detail on the amendments can be found in the previous LTWP (DELWP 2021).

Targets may again be updated in future to align with updates to EWMPs.

Appendix D Management goals and objectives for priority environmental assets

Table 22 lists management goals and ecological objectives for each priority environmental asset in the Wimmera-Mallee water resource plan area, cross-referenced to LTWP objectives, Basin-wide environmental watering strategy expected environmental outcomes (BWS EEOs) and First Nations Objectives, and Basin Plan environmental watering plan (Basin Plan chapter 8) objectives where appropriate. Codes used for the BWS EEOs and First Nations objectives are in Appendix I. Please refer to the individual EWMP for full information on the relevant site. Refer to Appendix B for where to access relevant EWMPs.

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Table 22. Management goals and objectives for each priority environmental asset in the Wimmera-Mallee water resource plan area.

Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
Bungalally Creek	WCMA	Environmental water will maintain and enhance the condition of the MacKenzie River, and Burnt and Bungalally Creeks to support its role in providing connectivity for flora, fauna, carbon and nutrients between the Wimmera River and Gariwerd (Grampians National Park), as well as maintaining its strong environmental and cultural values, particularly as a refuge in periods of drought or low flows. This includes its diverse, abundant and resilient native fish communities (including River Blackfish) and sustainable platypus population	11. Facilitate dispersal and establishment of endemic fish species.	Native Fish	WM13	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
					WM14	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			12. Protect and restore riparian and floodplain EVCs.	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			13. Maintain structural integrity of stream bed and channel and prevent loss of channel capacity.	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			14. Maintain habitat values through prevention of streambed colonisation by terrestrial species	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			15. Improve channel diversity through increasing flow variability	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
Burnt Creek	WCMA	Environmental water will maintain and enhance the condition of the MacKenzie River, and Burnt and Bungalally Creeks to support its role in providing connectivity for flora, fauna, carbon and nutrients between the Wimmera River and Gariwerd (Grampians National Park), as well as	16. Maintain a 'good' diversity of macroinvertebrate species (based on MBI classifications)	Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			11. Facilitate dispersal and establishment of endemic fish species.	Native Fish	WM13	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
					WM14	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			12. Protect and restore riparian and floodplain EVCs.	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
		maintaining its strong environmental and cultural values, particularly as a refuge in periods of drought or low flows. This includes its diverse, abundant and resilient native fish communities (including River Blackfish) and sustainable platypus population	13. Maintain structural integrity of stream bed and channel and prevent loss of channel capacity.	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			14. Maintain habitat values through prevention of streambed colonisation by terrestrial species	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			15. Improve channel diversity through increasing flow variability	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			16. Maintain a 'good' diversity of macroinvertebrate species (based on MBI classifications)	Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
Dock Lake	WCMA	Environmental water will maintain and enhance the condition of the Wimmera River and terminal lakes to support its formally recognised status, its role in providing connectivity for flora, fauna, carbon and nutrients as well as maintaining its strong environmental values. This includes diverse, abundant and resilient native fish and vegetation communities, geomorphic diversity, sustainable platypus population and mitigated impacts of poor water quality	Return to a seasonal or intermittent wetting and drying cycle to encourage the establishment and maintenance of structurally and floristically diverse native vegetation.	Vegetation	WM6	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.06,6(a)
			Return to a seasonal or intermittent wetting and drying cycle to encourage the establishment and maintenance of structurally and floristically diverse native vegetation.	Vegetation	WM8	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Provide diverse habitat and foraging resources to a suite of birds by varying the water level in the lake over time.	Waterbirds	WM11	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)
			Provide diverse habitat and foraging resources to a suite of birds by varying the water level in the lake over time.	Waterbirds	WM12	B1, B2	2.2, 2.9	8.06,6(a), 8.06,6(b)
			Encourage the use of Dock Lake by common frog species at times of inundation.	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			Engage suitable habitats to attract and support an abundant and diverse community (macroinvertebrates)	Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
Lake Albacutya	WCMA	Environmental water will maintain and enhance the condition of the	1. Provide conditions suitable for the establishment and maintenance of vegetation in the lake bed zone representative of the wetted and	Vegetation	WM6	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.06,6(a)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
		Wimmera River and terminal lakes to support its formally recognised status, its role in providing connectivity for flora, fauna, carbon and nutrients as well as maintaining its strong environmental values. This includes diverse, abundant and resilient native fish and vegetation communities, geomorphic diversity, sustainable platypus population and mitigated impacts of poor water quality	dry phases of an episodically inundated wetland in a semi-arid environment.	Vegetation	WM8	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			2. Provide conditions suitable to maintain vegetation communities in fringing woodland zone.		WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			3. Support waterbird use of the terminal lakes system through improved access to feeding, roosting and breeding habitat during episodic filling of the lakes and provide extensive wetland habitat to support large populations of waterbirds in the lower terminal lakes in years when widespread natural flooding occurs.	Waterbirds	WM11	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)
					WM12	B1, B2	2.2, 2.9	8.06,6(a), 8.06,6(b)
			4. Provide habitat and refuge for migratory and resident woodland bird species.	Waterbirds	WM11	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)
			5. Promote biomass of macroinvertebrate and fish communities sufficient to provide food resources for waterbirds during wet phases.	Fish	WM13	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
				Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			6. Support the opportunistic colonisation of wetland habitats and Outlet Creek during inundation events by frogs and turtles.	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
Lake Hindmarsh	WCMA	Environmental water will maintain and enhance the condition of the Wimmera River and terminal lakes to support its formally recognised status, its role in providing connectivity for flora, fauna, carbon and nutrients as well as maintaining its strong environmental values.	1. Provide conditions suitable for the establishment and maintenance of vegetation in the lake bed zone representative of the wetted and dry phases of an episodically inundated wetland in a semi-arid environment.	Vegetation	WM6	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.06,6(a)
					WM8	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			2. Provide conditions suitable to maintain vegetation communities in fringing woodland zone.	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
		This includes diverse, abundant and resilient native fish and vegetation communities, geomorphic diversity, sustainable platypus population and mitigated impacts of poor water quality	3. Support waterbird use of the terminal lakes system through improved access to feeding, roosting and breeding habitat during episodic filling of the lakes and provide extensive wetland habitat to support large populations of waterbirds in the lower terminal lakes in years when widespread natural flooding occurs.	Waterbirds	WM11	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)
					WM12	B1, B2	2.2, 2.9	8.06,6(a), 8.06,6(b)
			4. Provide habitat and refuge for migratory and resident woodland bird species.	Other Fauna	WM16	NA	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			5. Promote biomass of macroinvertebrate and fish communities sufficient to provide food resources for waterbirds during wet phases.	Waterbirds	WM12	B1, B2	2.2, 2.9	8.06,6(a), 8.06,6(b)
			6. Support the opportunistic colonisation of wetland habitats and Outlet Creek during inundation events by frogs and turtles.	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
Mackenzie River	WCMA	Environmental water will maintain and enhance the condition of the MacKenzie River, and Burnt and Bungalally Creeks to support its role in providing connectivity for flora, fauna, carbon and nutrients between the Wimmera River and Gariwerd (Grampians National Park), as well as maintaining its strong environmental and cultural values, particularly as a refuge in periods of drought or low flows. This includes its diverse, abundant and resilient native fish communities (including River Blackfish) and sustainable platypus population	1. Maintain extant indigenous fish communities. Maintain fish in refuges in dry conditions through the provision of adequate water quality/habitat.	Native Fish	WM14	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			10. Maintain species richness of frog communities	Other Fauna	WM18	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			2. Facilitate dispersal and establishment of endemic fish species.	Native Fish	WM14	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			3. Protect and restore riparian and floodplain EVCs, and improved connectivity between Gariwerd and the Wimmera River	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			4. Maintain submerged and emergent aquatic vegetation quality, diversity and extent for fish habitat	Vegetation	WM6	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.06,6(a)
			5. Stimulate reproduction and recruitment of Callistemon wimmerensis and maintain condition of current mature specimens.	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
Mount William Creek	WCMA	Environmental water will maintain and enhance the condition of the Wimmera River and terminal lakes to support its formally recognised status, its role in providing connectivity for flora, fauna, carbon and nutrients as well as maintaining its strong environmental values. This includes diverse, abundant and resilient native fish and vegetation communities, geomorphic diversity, sustainable platypus population and mitigated impacts of poor water quality	6. Maintain structural integrity of stream bed and channel and prevent loss of channel capacity	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			7. Maintain habitat values through prevention of streambed colonisation by terrestrial species	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			8. Maintain a 'good' diversity of macroinvertebrate species (based on MBI classifications)	Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			9. Sustain a platypus population and facilitate its dispersal	Other Fauna	WM15	N/A	2.1, 2.2, 2.3, 2.9	8.06,6(b), 8.07,3
			Improve habitat for Platypus and Rakali	Other Fauna	WM15	N/A	2.1, 2.2, 2.3, 2.9	8.06,6(b), 8.07,3
			Improve longitudinal connectivity (between river reaches) to facilitate fish movement	Functions	WM1	FC1, FC6	2.1, 2.2, 2.3, 2.10	8.06,3(a), 8.06,3(b)(i), 8.06,3(f), 8.06,6(b), 8.07,6
			Improve the abundance, movement and species richness of native fish species.	Native Fish	WM13	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
					WM14	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Improve the condition of riparian EVCs.	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation.	Water Quality	WM2	FC1, FC6, V7, V8	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			Maintain habitat for crayfish communities	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			Maintain macroinvertebrate diversity	Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
			Maintain refuges for native fish species (prevent loss of channel capacity through sedimentation)	Functions	WM3	F1, F2, F4, F5, F6, F8, F17	2.1, 2.2, 2.3, 2.7	8.06,6(b), 8.07,3
			Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)
			Maintain the species richness and extent of in-channel aquatic vegetation, improve the abundance of aquatic vegetation	Vegetation	WM6	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.06,6(a)
Mt Cole Creek	WCMA	Not specified	F1 – Protect and increase native fish populations, including one of Victoria's few self-sustaining freshwater catfish populations	Native Fish	WM13	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			MI1 – Increase the abundance and diversity of waterbugs to break down dead organic matter and support the waterway's food web	Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			MI2 – Maintain crayfish populations by providing feeding and breeding habitat	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			WQ1 – Maintain water quality to provide suitable conditions for waterbugs, native fish and other water-dependent animals and plants	Functions	WM5	N/A	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
Outlet Creek	WCMA	Environmental water will maintain and enhance the condition of the Wimmera River and terminal lakes to support its formally recognised status, its role in providing connectivity for flora, fauna, carbon and nutrients as well as maintaining its strong environmental values. This includes diverse, abundant and resilient	Promote biomass of macroinvertebrate and fish communities sufficient to provide food resources for waterbirds during wet phases.	Fish	WM13	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
				Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			Provide conditions suitable for the establishment and maintenance of vegetation in the lake bed zone representative of the wetted and dry phases of an episodically inundated wetland in a semi-arid environment	Vegetation	WM6	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.06,6(a)
					WM8	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
		native fish and vegetation communities, geomorphic diversity, sustainable platypus population and mitigated impacts of poor water quality	Provide conditions suitable to maintain vegetation communities in fringing woodland zone	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Provide habitat and refuge for migratory and resident woodland bird species.	Other Fauna	N/A	N/A	2.2, 2.9xx	8.06,6(a), 8.06,6(b)
			Support waterbird use of the terminal lakes system through improved access to feeding, roosting and breeding habitat during episodic filling of the lakes and provide extensive wetland habitat to support large populations of waterbirds in the lower terminal lakes in years when widespread natural flooding occurs.	Waterbirds	WM11	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)
					WM12	B1, B2	2.2, 2.9	8.06,6(a), 8.06,6(b)
			Support the opportunistic colonisation of wetland habitats and Outlet Creek during inundation events by frogs and turtles.	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
Wimmera River	WCMA	Environmental water will maintain and enhance the condition of the Wimmera River and terminal lakes to support its formally recognised status, its role in providing connectivity for flora, fauna, carbon and nutrients as well as maintaining its strong environmental values. This includes diverse, abundant and resilient native fish and vegetation communities, geomorphic diversity, sustainable platypus population and mitigated impacts of poor water quality.	1. Improve the abundance, movement and species richness of native fish species.	Native Fish	WM13	F1, F2, F4, F5, F7, F8, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
					WM14	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			10. Maintain habitat for crayfish communities	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			2. Maintain the species richness and extent of in-channel aquatic vegetation, improve the abundance of aquatic vegetation	Vegetation	WM6	V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.06,6(a)
			3. Improve the condition of riparian EVCs	Vegetation	WM7	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			4. Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	Functions	WM4	FC1, FC6	2.1, 2.5	8.06,3(a)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
Wimmera-Mallee Pipeline Wetlands (MCMA)	MCMA	To maintain and enhance a network of wetland habitats and refuges for aquatic and terrestrial fauna across the Wimmera Mallee landscape	5. Improve longitudinal connectivity (between river reaches) to facilitate fish movement	Functions	WM1	FC1, FC6	2.1, 2.2, 2.3, 2.10	8.06,3(a), 8.06,3(b)(i), 8.06,3(f), 8.06,6(b), 8.07,6
			6. Maintain refuges for native fish species (prevent loss of channel capacity through sedimentation)	Functions	WM3	F1, F2, F4, F5, F6, F8, F17	2.1, 2.2, 2.3, 2.7	8.06,6(b), 8.07,3
			7. Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation	Functions	WM2	FC1, FC6, V7, V8	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			8. Maintain macroinvertebrate diversity	Other Fauna	WM17	N/A	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			9. Improve habitat for Platypus and Rakali	Other Fauna	WM15	N/A	2.1, 2.2, 2.3, 2.9	8.06,6(b), 8.07,3
			WMP2a: By 2030, maintain self-sustaining population of frogs at WMP wetlands	Other Fauna	WM18	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			WMP2b: By 2030, maintain self-sustaining population of turtles at WMP wetlands	Other Fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			WMP3: By 2030, improve condition and maintain extent from baseline levels of River red gum (<i>Eucalyptus camaldulensis</i>), Black box (<i>E. largiflorens</i>) and Lignum (<i>Duma florulenta</i>) to sustain communities and processes typical of such communities at Wimmera Mallee Pipeline assets	Vegetation	WM10	V1 - V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(b)(ii), 8.06,5, 8.06,6(a), 8.06,6(b), 8.06,7
			WMP4a: By 2030, maintain representative populations of shallow-water and deep-water feeding guilds of waterbird (F2 and F3, respectively, after Jaensch 2002) at the Wimmera-Mallee Pipeline wetlands asset, by maintaining a mixture of shallow and deep-water habitats.	Waterbirds	WM11	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)
			WMP4b: By 2030, maintain nesting and recruitment of non-colonial waterbirds (N1, N2, N3 and N4, after Jaensch 2002) at the Wimmera Mallee Pipeline wetlands asset, by maintaining a mixture of tree, low vegetation/shrubs, and ground/islet nesting habitat	Waterbirds	WM11	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
Wimmera-Mallee Pipeline Wetlands (NCCMA)	NCCMA	Maintain aquatic habitat and refugia through the landscape to provide refuge, shelter, watering points and feeding opportunities for waterbird, turtles, frogs and terrestrial fauna species in the region.	Provide watering points for terrestrial species	Other fauna	WM16	N/A	2.1, 2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			Re-establish aquatic habitat and refugia through the landscape	Functions	WM3	F1, F2, F4, F5, F6, F8, F17	2.1, 2.2, 2.3, 2.7	8.06,6(b), 8.07,3
Wimmera-Mallee Pipeline Wetlands (WCMA)	WCMA	Maintaining and improving the values and condition of waterways that have formally recognised significance; Improve connectivity and condition along priority wetland systems and riparian corridors; Improved water quality in priority areas for; water supply, environmental condition and recreation; Waterways with high social, cultural and economic values are maintained in a state that continues to support those values in line with climatic conditions.	Improve vital habitat at Wimmera Pipeline wetlands by 2030, by improving species richness and abundance of aquatic vegetation against 2012-2013 EVC benchmark levels of: a) Black box wetland EVC 369 at Carapugna, Challambra, Harcoans, Mutton, Pinedale and Schultz/Koschitzke wetlands. b) Herb-rich Gilgai Wetland EVC 235 at Fielding's Dam c) Intermittent swampy woodland EVC 813 at Crow Swamp and Sawpit Swamp d) Northern Wimmera Riverine Chenopod Woodland EVC 103 at Carapugna, Challambra, Crow and Pinedale e) Lake Bed Herbland EVC 107 at Challambra, Crow, Harcoans and Mutton f) Lignum Swampy Woodland EVC 823 at Krong Swamp and Tarkedia g) Lignum Shrubland EVC 808 at Krong Swamp h) Floodway Pond Herbland EVC 810 and Floodway Pond Herbland/Riverine Swamp Forest Complex (EVC 945) at Sawpit Swamp i) Cane Grass Wetland/Aquatic Herbland Complex EVC 602, Swamp-Cane Grass Wetland Complex EVC 114 and Red Gum Swamp-Cane Grass Wetland Complex EVC 114 Wal Wal Swamp	Vegetation	WM6 WM8 WM9 WM10	V2, V3, V4, V6, V7, V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,2, 8.06,3(a), 8.05,3(b), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Maintain breeding of frogs at Wimmera Pipeline wetlands in 80% of years in which water is present by 2030: a) Maintain presence of Spotted Marsh Frog (Limnodynastes tasmaniensis) at Carapugna wetland b) Maintain presence of Common Froglet (Crinia signifera), Plains froglet (Crinia parainsignifera), Pobblebonk (Limnodynastes dumerili), and Spotted Marsh Frog (Limnodynastes tasmaniensis) at Mutton Swamp	Other Fauna	WM16 WM17 WM18	N/A	2.1, 2.3, 2.5, 2.6, 2.7, 2.9	8.06,6(b), 8.07,3

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	BWS First Nations objectives	EWMP objective (s)
			c) Maintain presence of Common Froglet (<i>Crinia signifera</i>) at Pinedale d) Maintain presence of Common Froglet (<i>Crinia signifera</i>) and Spotted Marsh Frog (<i>Limnodynastes tasmaniensis</i>) at Sawpit Swamp and Wal Wal Swamp.					
			Protect and restore ecosystem functions of the Wimmera Pipeline wetlands to support the creation of vital habitat for waterbird feeding habitat guilds on a regular basis, including during drought. Target waterbird feeding habitat guilds are densely vegetated habitat and shallow water <0.5m habitat a) As a minimum at least seven of the following ten species present across Carapugna, Challambra, Fielding's, Mutton, Pinedale, and Wal Wal over any assessment period: • Australian Shelduck (<i>Tadorna tadornides</i>), Australian Wood Duck (<i>Chenonetta jubata</i>), Australasian Grebe (<i>Tachybaptus novaehollandiae</i>), Black-fronted Dotterel (<i>Elseyornis melanops</i>), Black-tailed Native Hen (<i>Tribonyx ventralis</i>), Grey Teal (<i>Anas gracilis</i>), Hardhead (<i>Aythya australis</i>), Little Pied Cormorant (<i>Microcarbo melanoleucos</i>), Pacific Black Duck (<i>Anas superciliosa</i>), and White Faced Heron (<i>Egretta novaehollandiae</i>).	Waterbirds	WM11 WM12	B1 - B4	2.2, 2.9	8.06,6(a), 8.06,6(b)
Yarriambiack Creek and Beulah Weir Pool	WCMA	Yarriambiack Creek: To maintain and enhance the Black Box woodlands fringing the creek Beulah Weir Pool: To introduce weir pool variations, whilst maintaining refuges for native fish and recreational use.	YC1: By 2030, improve condition and maintain extent from baseline (2006) levels of Black Box (<i>Eucalyptus largiflorens</i>) to sustain communities and processes reliant of such communities at Yarriambiack Creek, Yarriambiack Creek asset YC2: By 2030, protect and restore representative populations of native fish species in Beulah Weir Pool, Yarriambiack Creek asset including Golden Perch (<i>Macquaria ambigua</i>), Carp Gudgeon (<i>Hypseleotris</i> spp.) and Flathead Gudgeon (<i>Philypnodon grandiceps</i>).	Vegetation Native Fish	WM9 WM14	V2, V3, V4, V6, V7, V8 F1 - F9, F17	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10 2.2, 2.5, 2.6, 2.7	8.06,3(b)(ii), 8.06,6(a), 8.06,6(b) 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)

Note: See Appendix I for codes: EWP (Basin Plan Chapter 8 environmental watering plan objectives) Table 29; BWS EEO (Basin-wide environmental watering strategy expected environmental outcomes) Table 30; BWS First Nations objectives Table 31.

The information in the table above presents some of the key planning information collated from the EWMPs for the relevant priority environmental assets in the Wimmera-Mallee water resource plan area. Note that this information is only intended to provide an indication of the level of planning undertaken by catchment management authorities for these sites. Please refer to the individual EWMP for full information on the relevant site (Appendix B).

Appendix E Roles and Responsibilities

Table 23 outlines the range of agencies and authorities that are involved in managing and delivering environmental water.

Table 23. Responsible minister and agencies

Minister / Agency	Responsibilities
Minister for Water	Oversees Victoria's environmental water management policy framework Oversees the VEWH, including appointment and removal of commissioners and creation of rules ensuring VEWH manages the water holdings in line with environmental water management policy. Administers the broader water allocation and entitlements framework and the Water Act 1989
Department of Energy, Environment, and Climate Action (DEECA)	DEECA is a Victorian Government department that develops and implements statewide policy for waterway management, including environmental water and water resource allocation. It oversees Victoria's compliance with international and national water obligations and intergovernmental agreements, for example the Murray-Darling Basin Plan, Living Murray and Ramsar Convention for wetlands. DEECA's role includes: Manage the water allocation and entitlements framework Develop state policy on water resource management and waterway management approved by the Minister for Water and Minister for Environment and Climate Change Develop state policy for the management of environmental water in regulated and unregulated systems Act on behalf of the Minister for Environment and Climate Change to maintain oversight of the VEWH and waterway managers (in their role as environmental water managers).
Victorian Environmental Water Holder (VEWH)	The VEWH is an independent statutory authority under the <i>Water Act 1989</i> that manages Victoria's environmental water entitlements and liaises with other water holders to coordinate the use of all environmental water entitlements at Victorian sites. VEWH's role includes: Make decisions about the most effective use of the water holdings, including use, trade and carryover Authorise waterway managers to implement watering decisions Liaise with other water holders to ensure co-ordinated use of all sources of environmental water Publicly communicate environmental watering decisions and outcomes Commission targeted projects to demonstrate ecological outcomes of environmental watering at key sites Report on management of the water holdings

Minister / Agency	Responsibilities
Catchment management authorities (Wimmera, North Central, and Mallee CMAs for this water resource plan area)	CMAs are independent statutory authorities that develop and coordinate the implementation of regional catchment strategies, regional waterway strategies and regional floodplain management strategies. They are the waterway manager appointed under Part 10 of the <i>Water Act 1989</i> and the regional floodplain manager. CMAs are required to submit seasonal watering proposals to the VEWH each year and deliver approved watering plans. They also provide critical input to management of other types of environmental water. Their role includes: Identify regional priorities for environmental waterway management in regional waterway strategies, in consultation with the community Assess water regime requirements of priority rivers, estuaries and wetlands to identify environmental watering needs to meet agreed objectives Identify opportunities for, and implement, environmental works to use environmental water more efficiently Propose annual environmental watering actions to the VEWH and implement the VEWH environmental watering decisions Provide critical input to management of other types of environmental water (passing flows management, above cap water) Report on environmental water management activities undertaken
Commonwealth Environmental Water Holder (CEWH)	Make decisions about the use of commonwealth water holdings, including delegating water to the VEWH for use in Victoria Liaise with the VEWH to ensure co-ordinated use of environmental water in Victoria Report on management of commonwealth water holdings
Murray-Darling Basin Authority (MDBA)	Coordinates planning and management for the equitable, efficient and sustainable use of the water and other natural resources of the Murray-Darling Basin. This includes coordination of The Living Murray Program and management of its joint water portfolio.
Water corporations (Grampians Wimmera-Mallee Water and Lower Murray Water in this water resource plan area)	Manage irrigation districts, some reservoirs and water diversion licences (surface water and groundwater). Some water corporations manage land, including determined recreational areas (<i>Water Act 1989</i>) and riparian land in water supply catchments. Some provide untreated water to rural customers for domestic and stock use (e.g. via pipelines and channels) and operate water supply infrastructure such as dams and irrigation distribution systems to deliver environmental water. They work with the VEWH, waterway managers and Traditional Owners in planning for the delivery of environmental water and ensure the provision of passing flows and compliance with the management of diversion limits in unregulated and groundwater systems.

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Minister / Agency	Responsibilities
Formally recognised Traditional Owner groups in the Wimmera Mallee water resource plan area • Barengi Gadjin Land Council Aboriginal Corporation • First People of the Millewa-Mallee • Wamba Wemba Aboriginal Corporation • Dja Dja Wurrung Clans Aboriginal Corporation	There are currently three different processes for groups to become formally recognised as Traditional Owners of Country in Victoria. This includes holding Registered Aboriginal Party (RAP) status (under the <i>Aboriginal Heritage Act 2006</i>), Native Title Determination (under the Commonwealth <i>Native Title Act 1993</i>) and entering into a Recognition and Settlement Agreement (under the Victorian <i>Traditional Owner Settlement Act 2010</i>). First Nations people are recognised as: • holding cultural rights and responsibilities • having customary obligations to care for Country • holders of traditional ecological knowledge • holders of knowledge about Aboriginal cultural values • partners in waterway management • holders of contemporary rights to participate or take a leadership role and develop enduring cultural governance arrangements for managing Country. They have state recognition of ‘right people for right Country.’
First Nations groups without formal recognition	First Nations people are also recognised as: • holding cultural rights and responsibilities • having customary obligations to care for Country • holders of Traditional ecological knowledge • holders of knowledge on Aboriginal cultural values • partners in waterway management.
Local Government	Specifically with regard to waterways, local government have the responsibilities to: Incorporate waterway and catchment management objectives, priorities and actions into strategic and statutory planning processes Undertake elements of floodplain management in accordance with the renewed Victorian Floodplain Management Strategy Develop and implement urban stormwater plans Manage on-site domestic wastewater systems Manage sections of waterways where formal agreements are in place Manage rural drainage and infrastructure (e.g. town weirs) where appropriate.

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Minister / Agency	Responsibilities
Parks Victoria	Parks Victoria is a statutory authority under the <i>Parks Victoria Act 2018</i> . It manages public land including some waterway lands for conservation, recreation, leisure, tourism and water transport. It works with waterway managers, Traditional Owners, water corporations and the VEWH to plan and deliver environmental water entitlements, including endorsing relevant seasonal watering proposals that affect public land.

Appendix F Qualitative risk analysis

This appendix documents a qualitative analysis of long-term risks identified for this LTWP through the water resource plan (DELWP, 2019a). The analysis includes a review of the process that generates the risk, the implications of that process and the options for management of the risk.

Table 24 relates to risks that result in failure to achieve objectives.

Table 25 relates to risks that arise from the provision of environmental water.

Table 24. Risks that result in failure to achieve objectives

Risk category	Threat	Implication	Themes and related objectives at risk	Management options
Failure to provide recommended watering regime	Operational failure in delivery e.g. Water released from dam at incorrect time	Failure to provide appropriate duration, timing, frequency, depth, extent, and velocity of watering	Has potential to impact on all ecological objectives for the WRPA	The identified risks can be addressed through the provision of an appropriate flow regime that addresses the objective
	Loss of water during delivery	Failure to provide appropriate duration, timing, frequency, depth, extent, and velocity of watering	Has potential to impact on all ecological objectives for the WRPA	The provision of water can be complemented with: • Monitoring watering regime and ecological response • Liaison with water authorities, land holders, other stakeholders and the broader community
	Constraints that prevent delivery of water e.g. isolation of wetlands from floodplain or river	Failure to provide appropriate duration, timing, frequency, depth, extent, and velocity of watering Reduced lateral connectivity	Has potential to impact on all ecological objectives for the WRPA	• Prioritisation of watering requirements (in SWP) • Determine environmental water requirements based on seasonal conditions and within constraints • Develop and implement programs to alleviate physical constraints
	Inadequate conceptual and detailed modelling of water requirements	Failure to provide appropriate duration, timing, frequency, depth, extent, and velocity of watering	Has potential to impact on all ecological objectives for the WRPA	- Monitoring watering regime and ecological response - Update conceptual model with latest research - Undertake research to fill knowledge gaps

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Risk category	Threat	Implication	Themes and related objectives at risk	Management options
Failure to undertake complementary works necessary to achieve objective	Poor quality or lack of in-channel habitat associated with past practice e.g. de-snagging and channel modifications	Limited habitat and refuge for target species	Native fish, macroinvertebrates, platypus	Provision of in-channel habitat through large woody debris installation. Management of accelerated rates of erosion and sedimentation within and in adjoining reaches of waterway
	Presence of fish barriers	Reduced longitudinal connectivity	Native fish, aquatic vegetation, platypus	Provision of fish passage over / around structures and or removal of obsolete structures
	Inadequate riparian habitat (includes grazing pressures)	Prevent and regeneration of establishment of appropriate vegetation	Macroinvertebrates, native fish, aquatic and riparian vegetation	Fencing and stock management
	Introduced species	Limits establishment of native vegetation Predation of fauna Competition – reduced habitat and resource availability	Vegetation, platypus, native fish	Monitor introduced species Provide watering regimes that provide competitive advantage for native species Development and implementation of pest management plans Installation of carp screens
	Inappropriate fish stocking or excessive recreational fishing	Limits native fish populations through fishing pressure, predation and competition for resources	Native fish	Review fish stocking programs Education programs for recreational fishing
	Poor water quality	Low dissolved oxygen High turbidity High water temperature Increased salinity levels	Fish, Waterbirds, vegetation, amphibians, invertebrates, wetland habitats and types	Monitor groundwater and assets Manage water regime

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Risk category	Threat	Implication	Themes and related objectives at risk	Management options
	Saline groundwater intrusion	Poor vegetation health Limited regeneration and dominance of salt tolerant species Unsuitable habitat for waterbirds and food sources	Vegetation, waterbirds, wetland habitats and types	Monitoring, adaptive management of watering regime Investigate regional groundwater influences
External factors	Climate variability	Extreme low flows	May apply to all objectives	Use seasonally adaptive approach in setting EWRs
	Fire	Altered hydrology, sediment	May apply to all objectives	Monitoring and adaptive management of watering regime
	Land use change	Salinisation, altered hydrology	May apply to all objectives	Monitoring and adaptive management of watering regime
	Climate change	Changes in species composition and hence watering requirements at sites Changes in the variability of flow regimes		Monitoring and adaptive management of watering regime Undertake ongoing research into climate change adaption
Failure to demonstrate achievement of ecological objectives	Delayed ecosystem response	Objective may be achieved, but may not be demonstrated	May apply to all objectives	Monitoring and adaptive management of watering regime Ongoing research into ecosystem response to environmental water
	Monitoring not provided			
	Inadequate research to support conceptual models or monitoring design			

Table 25. Risk that arise from the provision of environmental water

Category	Threat	Implication	Comment and management options
Environmental	Winter high fresh inundate platypus burrows	Limits platypus populations	Deliver winter high fresh in August to trigger female to select or construct nursery burrows at high elevation in the river bank
	Summer fresh mobilises build-up of leaf litter and nutrients	Blackwater event or other water quality issues	Time water events to coincide with cooler water temperatures to reduce microorganism activity Management option is to deliver a summer fresh at the same magnitude as the previous winter low flow therefore the summer fresh will entrain only litter that has built up since the winter low flow was ceased Monitor nutrient and Blue Green Algae levels, and the ecological response of the wetland to flooding
	Other native species (non-target) disadvantaged	Decrease in abundance of non-target species	Identify potential non-target species and monitor the effect of intervention Adapt management intervention to reduce the effects on non-target species
	Watering regime favours non-native species	May competitively inhibit native species	Monitor the abundance of native and invasive aquatic species. Pest management plans and complementary works
	Watering regime initiates erosion	Scour of banks, loss of habitat, sediment mobilisation in large events	Manage rise and fall rates of freshes. Provision of complementary works including revegetation
Cultural	Inundation of cultural heritage sites	Damage to cultural heritage sites	Monitor condition of sites, communicate with community
Social	Reduction in recreation opportunity	Use of water for environmental outcome, reduces water available for recreation outcomes	Work closely and engage with local communities Monitor water levels
Economic	Inundation and or erosion of private land and or watering infrastructure (pump equipment)	Community angst and liability	Work closely with land managers, water agencies to provide advanced warning of water delivery Monitor water levels Communicate with landholders and establish watering agreements

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Category	Threat	Implication	Comment and management options
	Inundation and or erosion of roads and other transport and communications infrastructure		Work closely with infrastructure managers to provide advanced warning of water delivery Monitor water levels

Appendix G Groundwater dependency and risk from take

Table 26 provides the groundwater dependency of priority river and wetland assets in the Wimmera Mallee water resource plan area, and the risk posed to the assets by groundwater use, as identified by Groundwater Logic (2019).

Table 26. Groundwater dependent priority environmental assets in the Wimmera-Mallee water resource plan area.

Priority environmental asset	Index of Stream Condition Basin-Reach	Surface water SDL resource unit	Groundwater-dependent features (confidence)	Risk posed by groundwater use
Wimmera River	15-2	SS9 (Wimmera-Mallee)	H	L
	15-3	SS9 (Wimmera-Mallee)	H	L
	15-4	SS9 (Wimmera-Mallee)	H	L
	15-5	SS9 (Wimmera-Mallee)	H	L
	15-6	SS9 (Wimmera-Mallee)	H	L
	15-7	SS9 (Wimmera-Mallee)	H	L
	15-8	SS9 (Wimmera-Mallee)	H	L
	15-9	SS9 (Wimmera-Mallee)	H	L
MacKenzie River	15-14	SS9 (Wimmera-Mallee)	L	L
	15-15	SS9 (Wimmera-Mallee)	M	L
	15-16	SS9 (Wimmera-Mallee)	M	L
Burnt Creek	15-18	SS9 (Wimmera-Mallee)	M	L
	15-19	SS9 (Wimmera-Mallee)	L	L
Mount William Creek	15-28	SS9 (Wimmera-Mallee)	M*	L
	15-29	SS9 (Wimmera-Mallee)	L	L
Yarriambiack Creek	15-21	SS9 (Wimmera-Mallee)	L	L
	15-22	SS9 (Wimmera-Mallee)	L	L
	15-23	SS9 (Wimmera-Mallee)	L	L
	15-24	SS9 (Wimmera-Mallee)	L	L
Lake Hindmarsh	Index of Wetland Condition - 18651	SS9 (Wimmera-Mallee)	H	L

*Another study (Alluvium, 2015) indicates that groundwater dependence confidence is high for Mount William Creek

Appendix H Waterway representativeness

Table 27 and Table 28 show the Australian National Aquatic Ecosystems (ANAE) wetland and riverine type (Brooks, 2021) of each priority environmental asset in the Wimmera-Mallee water resource plan area.

Table 27. ANAE wetland types of the priority environmental assets in the Wimmera-Mallee water resource plan area

Asset Name	ANAE type	Area (ha)
Wetlands and Floodplain		
Beulah Reservoir	F1.6: Black box forest riparian zone or floodplain	4.1
	Lt1.1: Temporary lake	1.6
	Rt1.4: Temporary lowland stream	5.9
Broom Tank	Lt1.1: Temporary lake	2.2
Bull Swamp	Pt1.8.2: Temporary shrub swamp	7.7
Challambra Swamp	Pt1.2.2: Temporary black box swamp	1.3
Cherrip Swamp	F2.2: Lignum shrubland riparian zone or floodplain	0.0
	Pt2.3.2: Freshwater meadow	69.1
Chiprick	Pt1.8.2: Temporary shrub swamp	3.1
Cokum	Pt1.8.2: Temporary shrub swamp	1.0
Considines	F1.6: Black box forest riparian zone or floodplain	0.4
Corack Lake	Pt2.3.2: Freshwater meadow	36.8
Creswick Swamp	Pt3.1.2: Clay pan	17.0
Cronomby Tanks	Pt1.8.2: Temporary shrub swamp	1.5
Crow Swamp	Pt1.2.2: Temporary black box swamp	5.8
Dock Lake	Lt1.2: Temporary lake with aquatic bed	199.1
Goulds Reserve	Pt1.6.2: Temporary woodland swamp	1.1
Greens Wetland	Pt1.8.2: Temporary shrub swamp	16.6
Falla Dam	NA	0.5
Harcoans	Pt1.6.2: Temporary woodland swamp	3.6
Jeffcott W.R	Pt2.3.2: Freshwater meadow	22.6
Jesse Swamp	Pt2.3.2: Freshwater meadow	9.7
Krong Swamp	F1.6: Black box forest riparian zone or floodplain	0.3
	Pt1.2.2: Temporary black box swamp	2.6
Lake Albacutya	Lt1.1: Temporary lake	5,842.2
Lake Danaher	Pt1.8.2: Temporary shrub swamp	4.5
Lake Hindmarsh	Lt1.1: Temporary lake	13,961.5
Moreton Plains	Pt1.6.2: Temporary woodland swamp	1.6
Mutton Swamp	Pt1.7.2: Temporary lignum swamp	12.5
Pam Juergens Dam	Pt1.6.2: Temporary woodland swamp	0.6
Part Of Gap Reserve	Pt1.6.2: Temporary woodland swamp	0.8

Asset Name	ANAE type	Area (ha)
Pinedale	Pt1.8.2: Temporary shrub swamp	12.4
Ranch Billabong	F1.12: Woodland riparian zone or floodplain	1.3
Round Swamp	Pt1.8.2: Temporary shrub swamp	3.3
Sawpit Swamp	Pt1.1.2: Temporary river red gum swamp	5.1
Schultz/Koschitske	Pt1.6.2: Temporary woodland swamp	0.7
Tchum Lake Wetland	Pt1.2.2: Temporary black box swamp	34.3
Uttiwillock Wetland	Pt3.1.2: Clay pan	0.2
Wal Wal Swamp	Pt1.1.2: Temporary river red gum swamp	9.5

Table 28. ANAE riverine types of priority environmental assets in the Wimmera-Mallee water resource plan area

Asset Name	ANAE type	Length (km)
Bungalally Creek	Rt1.4: Temporary lowland stream	152.93
Burnt Creek	Rt1.2: Temporary transitional zone stream	12.29
	Rt1.4: Temporary lowland stream	298.21
Burra Creek floodplain (Burra Creek North, Burra Creek South, Burra Creek South Proper)	Rt1.4: Temporary lowland stream	0.11
Karadoc Swamp (Outlet Creek, Inlet Creek, Karadoc)	Rt1.4: Temporary lowland stream	36.66
Mackenzie River	Rt1.1: Temporary high energy upland stream	13.56
	Rt1.2: Temporary transitional zone stream	64.91
	Rt1.4: Temporary lowland stream	233.83
Mount William Creek	Rt1.2: Temporary transitional zone stream	23.40
	Rt1.4: Temporary lowland stream	194.62
Mt Cole Creek	Rt1.2: Temporary transitional zone stream	93.08
	Rt1.4: Temporary lowland stream	78.49
Wimmera River	Rt1.2: Temporary transitional zone stream	103.99
	Rt1.4: Temporary lowland stream	770.86
Yarriambiack Creek and Beulah Weir Pool	Rt1.2: Temporary transitional zone stream	42.93
	Rt1.4: Temporary lowland stream	569.80

Appendix I Basin Plan objectives

Table 29. Basin Plan objectives – Chapter 8 Environmental Watering Plan (EWP).

EWP objective code	EWP objective
Ecosystem type and biodiversity	
8.05,2(a)	An objective is to protect and restore a subset of all water-dependent ecosystems of the Murray-Darling Basin, including by ensuring that: declared Ramsar wetlands that depend on Basin water resources maintain their ecological character; and (Note: see paragraph 21(3)(c) of the Act
8.05,2(b)	An objective is to protect and restore a subset of all water-dependent ecosystems of the Murray-Darling Basin, including by ensuring that: water-dependent ecosystems that depend on Basin water resources and support the life cycles of species listed under the Bonn Convention, CAMBA, JAMBA or ROKAMBA continue to support those species; and
8.05,2(c)	An objective is to protect and restore a subset of all water-dependent ecosystems of the Murray-Darling Basin, including by ensuring that: water-dependent ecosystems are able to support episodically high ecological productivity and its ecological dispersal.
8.05,3(a)	An objective is to protect and restore biodiversity that is dependent on Basin water resources by ensuring that: water-dependent ecosystems that support the life cycles of a listed threatened species or listed threatened ecological community, or species treated as threatened or endangered (however described) in State law, are protected and, if necessary, restored so that they continue to support those life cycles; and
8.05,3(b)	An objective is to protect and restore biodiversity that is dependent on Basin water resources by ensuring that: representative populations and communities of native biota are protected and, if necessary, restored.
Ecosystem function	
8.06,2	An objective is that the water quality of Basin water resources does not adversely affect water-dependent ecosystems and is consistent with the water quality and salinity management plan
8.06,3(a)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the diversity and dynamics of geomorphic structures, habitats, species and genes are protected and restored; and
8.06,3(b)(i)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: ecological processes dependent on hydrologic connectivity: (i) longitudinally along watercourses;
8.06,3(b)(ii)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: ecological processes dependent on hydrologic connectivity: (ii) laterally between watercourses and their floodplains (and associated wetlands);
8.06,3(b)(iii)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: ecological processes dependent on hydrologic connectivity: (iii) vertically between the surface and subsurface; are protected and restored; and
8.06,3(c)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the Murray Mouth remains open at frequencies, for durations, and with passing flows, sufficient to enable the conveyance of salt, nutrients and sediment from the Murray-Darling Basin to the ocean; and

EWP objective code	EWP objective
8.06,3(d)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the Murray Mouth remains open at frequencies, and for durations, sufficient to ensure that the tidal exchanges maintain the Coorong's water quality (in particular salinity levels) within the tolerance of the Coorong ecosystem's resilience; and Note: This is to ensure that water quality is maintained at a level that does not compromise the ecosystem and that hydrologic connectivity is restored and maintained.
8.06,3(e)(i)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the levels of the Lower Lakes are managed to ensure sufficient discharge to the Coorong and Murray Mouth and help prevent river bank collapse and acidification of wetlands below Lock 1, and to avoid acidification and allow connection between Lakes Alexandrina and Albert, by: (i) maintaining levels above 0.4 metres Australian Height Datum for 95% of the time, as far as practicable; and
8.06,3(e)(ii)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the levels of the Lower Lakes are managed to ensure sufficient discharge to the Coorong and Murray Mouth and help prevent river bank collapse and acidification of wetlands below Lock 1, and to avoid acidification and allow connection between Lakes Alexandrina and Albert, by: (ii) maintaining levels above 0.0 metres Australian Height Datum all of the time; and
8.06,3(f)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: barriers to the passage of biological resources (including biota, carbon and nutrients) through the Murray-Darling Basin are overcome or mitigated.
8.06,4	An objective is that natural in-stream and floodplain processes that shape landforms (for example, the formation and maintenance of soils) are protected and restored.
8.06,5	An objective is to support habitat diversity for biota at a range of scales (including, for example, the Murray-Darling Basin, riverine landscape, river reach and asset class).
8.06,6(a)	An objective is to protect and restore ecosystem functions of water-dependent ecosystems that maintain populations (for example recruitment, regeneration, dispersal, immigration and emigration) including by ensuring that: flow sequences, and inundation and recession events, meet ecological requirements (for example, cues for migration, germination and breeding); and
8.06,6(b)	An objective is to protect and restore ecosystem functions of water-dependent ecosystems that maintain populations (for example recruitment, regeneration, dispersal, immigration and emigration) including by ensuring that: habitat diversity, extent, condition and connectivity that supports the life cycles of biota of water-dependent ecosystems (for example, habitats that protect juveniles from predation) is maintained.
8.06,7	An objective is to protect and restore ecological community structure, species interactions and food webs that sustain water-dependent ecosystems, including by protecting and restoring energy, carbon and nutrient dynamics, primary production and respiration.
Ecosystem resilience	
8.07,2	An objective is that water-dependent ecosystems are resilient to climate change, climate variability and disturbances (for example, drought and fire).
8.07,3	An objective is to protect refugia in order to support the long-term survival and resilience of water-dependent populations of native flora and fauna, including during drought to allow for subsequent re-colonisation beyond the refugia.
8.07,4	An objective is to provide wetting and drying cycles and inundation intervals that do not exceed the tolerance of ecosystem resilience or the threshold of irreversible change.
8.07,5	An objective is to mitigate human-induced threats (for example, the impact of alien species, water management activities and degraded water quality).

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EWP objective code	EWP objective
8.07,6	An objective is to minimise habitat fragmentation.

Note: Coding system is from (Butcher & Fenton, 2020)

Table 30. Basin-wide environmental watering strategy (2025) (BWS) Expected Environmental Outcomes relevant to Victoria.

Ecological themes	Types	Scale	BWS ID/code	Expected environmental outcomes	Page of BWS	Relevance to WM WSPA
River flows and connectivity	Longitudinal connectivity	Basin-wide	FC1	To keep base flows at least 60% of the natural level (note: this will be especially important during dry years).	19	✓
		Barwon–Darling tributaries	FC2	A 10% overall increase in flows. From increased tributary contributions from the Condamine–Balonne, Border Rivers, Gwydir, Namoi and Macquarie–Castlereagh catchments collectively.	19	
		River Murray tributaries	FC3	A 30% overall increase in flows. From increased tributary contributions from the Murrumbidgee, Goulburn, Campaspe, Loddon and Lower Darling catchments collectively.	19	✓
		Lower Lakes, Coorong & Murray Mouth	FC4	A 30 to 40% increase in flows to the Murray mouth.	19	
	Lateral connectivity	Murray, Murrumbidgee, Goulburn–Broken and Condamine–Balonne	FC5	A 30 to 60% increase in the frequency of freshes, bank-full and lowland floodplain flows.	19	
		Border Rivers, Gwydir, Namoi, Macquarie–Castlereagh, Barwon–Darling, Lachlan, Campaspe, Loddon and Wimmera	FC6	A 10 to 20% increase of freshes and bank-full events.	19	✓
		Paroo, Moonie, Nebine, Kiewa, Ovens and Warrego	FC7	Current levels of connectivity maintained.	19	
	End-of-Basin flows	Lower Lakes, Coorong & Murray Mouth	FC8	The barrage flows are greater than 2,000 GL/yr on a 3-year rolling average basis for 95% of the time, with a two-year minimum of 600 GL at any time.	19	

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Ecological themes	Types	Scale	BWS ID/code	Expected environmental outcomes	Page of BWS	Relevance to WM WRP A
Native vegetation	End-of-Basin flows	Lower Lakes, Coorong & Murray Mouth	FC9	The water levels in the Lower Lakes are maintained above: a) sea level (0m AHD) b) 0.4 metres AHD, for 95% of the time, as far as practicable, to allow for barrage releases	19	
	End-of-Basin flows	Lower Lakes, Coorong & Murray Mouth	FC10	Salinity in the Coorong and Lower Lakes remains below critical thresholds for key flora and fauna including: a) salinity in Lake Alexandrina is lower than 1,000 EC 95% of the time and less than 1,500 EC all the time b) salinity in the Coorong's south lagoon is less than 100 grams per litre 95% of the time c) the Murray Mouth is open 90% of the time to an average annual depth of one metre.	20	
	Forest and woodlands	Basin-wide	V1	To maintain the extent of forest and woodland vegetation including approximately: a) 360,000 ha of river red gum b) 409,000 ha of black box c) 310,000 ha of coolabah	21	✓
		Regional	V2	Improved age class structure of river red gum, black box and coolabah communities to support viable population demographics.	22	✓
		Regional	V3	No decline in the condition of river red gum, black box and coolabah across the Basin.	22	✓
		Regional	V4	Improved condition of river red gum in the Lachlan, Murrumbidgee, Lower Darling, Murray, Goulburn-Broken and Wimmera-Avoca.	22	✓
	Shrublands	Basin-wide	V5	To maintain the extent of the large areas of lignum shrublands within the Basin.	22	✓

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Ecological themes	Types	Scale	BWS ID/code	Expected environmental outcomes	Page of BWS	Relevance to WM WRPA
Non-woody vegetation	Non-woody vegetation	Basin-wide	V6	Improvement in the condition of lignum shrublands.	22	✓
		Basin-wide	V7	To maintain the extent of non-woody vegetation.	22	✓
		Basin-wide	V8	Increased periods of growth for communities that closely fringe or occur within the main river corridors.	22	✓
		Regional	V9	Increased periods of growth for communities that form extensive stands within wetlands and floodplains including (but not limited to) Moira grassland in Barmah-Millewa Forest; common reed and cumbungi in the Great Cumbung Swamp and Macquarie Marshes; water couch on the floodplains of the Macquarie and Gwydir rivers; and marsh club-rush sedgeland in the Gwydir.	22	
		Lower Lakes, Coorong & Murray Mouth	V10	A sustained and adequate population of <i>Ruppia tuberosa</i> in the south lagoon of the Coorong, including: a) <i>Ruppia tuberosa</i> to occur in at least 80% of sites across at least a 43 km extent b) By 2029, the seed bank to be sufficient for the population to be resilient to major disturbances	22	
		Basin-wide	B1	The number and type of waterbird species present in the Basin will not fall below current observations.	24	✓
		Basin-wide	B2	A significant improvement in waterbird populations in the order of 20-25% over the baseline scenario*, with increases in all waterbird functional groups.	24	✓
		Basin-wide	B3	Breeding events (the opportunities to breed rather than the magnitude of breeding per se) of group-	24	✓

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Ecological themes	Types	Scale	BWS ID/code	Expected environmental outcomes	Page of BWS	Relevance to WM WRP
Native fish				nesting waterbirds to increase by up to 50% compared to the baseline scenario*.		
		Basin-wide	B4	Breeding abundance (nests and broods) for all of the other functional groups to increase by 30-40% compared to the baseline scenario*, especially locations where the Basin Plan improves over-bank flows.	24	✓
		Lower Lakes, Coorong & Murray Mouth	B5	At a minimum, maintain populations of the following 4 key species: curlew sandpiper, greenshank, red-necked stint and sharp-tailed sandpiper, at levels recorded between 2000 and 2014.	24	
	All native fish	Basin-wide	F1	No loss of native fish species currently present within the Basin.	27	✓
		Basin-wide	F2	Improved population structure of key fish species through regular recruitment.	27	✓
		Basin-wide	F3	Increased movement of key fish species.	27	✓
		Basin-wide	F4	Expanded distribution of key fish species and populations in the northern and southern Basin.	27	✓
		Basin-wide	F5	Improved community structure of key native fish species.	27	✓
	Short-lived species	Basin-wide	F6	Restored distribution and abundance to levels recorded pre-2007 (prior to major losses caused by extreme drought). This will require annual or biennial recruitment events depending on the species.	27	✓
	Moderate to long-lived	Basin-wide	F7	Improved population structure (i.e. a range of size/age classes for all species and stable sex ratios where relevant) in key sites. This will require annual recruitment events in at least 8 out of 10 years at	27	✓

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Ecological themes	Types	Scale	BWS ID/code	Expected environmental outcomes	Page of BWS	Relevance to WM WRPA
Estuarine species				80% of key sites, with at least 4 of these being 'strong' recruitment events.		
		Basin-wide	F8	A 10–15% increase of mature fish (of legal take size) for recreational target species (Murray cod and golden perch) in key populations.	27	✓
		Basin-wide	F9	Annual detection of species and life stages representative of the whole fish community through key fish passages; with an increase in passage of Murray cod, trout cod, golden perch, silver perch, Hyrtl's tandan, congolli, short-headed lamprey and pouched lamprey through key fish passages to be detected in 2019–2027; compared to passage rates detected in 2014–2019.	27	✓
		Lower Lakes, Coorong & Murray Mouth	F10	Detection of all estuarine-dependent fish families throughout 2014–2027.	28	
		Lower Lakes, Coorong & Murray Mouth	F11	Maintenance of annual population abundance (Catch Per Unit Effort – CPUE) of key estuarine prey species (sandy sprat and small-mouthed hardyhead) throughout the Coorong.	28	
		Lower Lakes, Coorong & Murray Mouth	F12	Detection of a broad spatial distribution of black bream and greenback flounder; with adult black bream and all life stages of greenback flounder present across >50% of the Coorong in 8 out of 10 years.	28	
		Lower Lakes, Coorong & Murray Mouth	F13	Detection in 9 out of 10 years of bi-directional seasonal movements of diadromous species through the barrages and fishways between the Lower Lakes and Coorong.	28	

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Ecological themes	Types	Scale	BWS ID/code	Expected environmental outcomes	Page of BWS	Relevance to WM WRPA
		Lower Lakes, Coorong & Murray Mouth	F14	Increased rates of native fish passage in 2019–2027 compared to 2014–2019.	28	
		Lower Lakes, Coorong & Murray Mouth	F15	Improved population structure of mullocky, including spawning aggregations at the Murray Mouth in 6 out of 10 years and recruitment in at least 5 out of 10 years.	28	
	Distribution of key fish species	Northern Basin	F16	A doubling of the current (mostly restricted) distributions of key species in the northern Basin.*.	28	
		Southern Basin	F17	Significant increases in the distributions of key species in the southern Basin.*	28	✓

Table 31. First Nations shared objectives for environmental water from the Basin-wide environmental watering strategy 2025.

ID/code	Objective	Description	Supporting information
2.1	Ensure Nations can fulfill their responsibilities to downstream and upstream neighbours	Nations passing on healthy water from their Country and supporting the health of Country upstream	-Healthy water flowing out of Country to mobs downstream, replenishing Country so everyone can be healthy and thrive -Consider upstream Nations when using water and support outcomes that benefit upstream -Nations Vegetation (grasses, sedges, rushes) filters water as it passes through Country
2.2	Restore proper flows across all waterways	Returning flow regimes to conditions that sustain cultural values.	- Restore flow components, volumes, timing and duration - Proper timing of environmental flows to match seasonal cues, including breeding - Reinstate overbank flows to support total system health - Support adequate base flows - Support end of system flows and salt transport - Address flow variation from irrigation demand, extraction, and diversion.
2.3	Maintain and enhance connectivity across all waterways	Restoring connected flows along the lengths of rivers and onto the floodplain	- Connected flows bringing water out to fill creeks, lakes, wetlands, and billabongs - Water flowing out and nourishing dry and neglected parts of Country - Restore flows in degraded rivers and support connected rivers from snowmelt to sea
2.4	Consider groundwater values and connectivity	Maintaining and restoring connections between surface and groundwater.	- Consider the cultural significance of groundwater - Maintain and restore surface water/groundwater connections
2.5	Maintain and enhance important physical features of waterways	Protecting and restoring riverbanks, lake edges, riverbeds and cultural infrastructure.	- Minimise erosion and use environmental water to help stabilise riverbanks and lake edges - Address sediment and sand build-up that impacts on flows and culturally significant species, sites and uses - Support cultural infrastructure, fish traps and breeding structures, to slow down flows and recharge the landscape
2.6	Protect and restore water quality	Contribute to protecting and restoring water quality and mitigating thermal pollution and black water.	- Reduce and minimise the impact of blackwater events, blue-green algae and salinity - Contribute to mitigating the impact of cold water released from dams on native fish and other aquatic life
2.7	Support healthy native fish	Support healthy native fish	- Culturally significant food fish species - Small-bodied fish

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ID/code	Objective	Description	Supporting information
			- Crayfish, yabbies and shrimp - Freshwater mussels
2.8	Support healthy plants and forests	Support healthy plants and forests, culturally significant plant species.	- Including, amongst others: River red gum (especially mature and culturally modified trees), black box and yellow box (especially mature and culturally modified trees). - Medicinal plants - Fibre and weaving plants - Food plants
2.9	Support healthy animals	Protecting and restoring habitat and flows for culturally significant bird and animal species, including totemic species.	- Birds and waterbirds - Aquatic mammals, reptiles and amphibians - Significant terrestrial species
2.10	Safeguard culture and cultural heritage	Sustain and strengthen tangible and intangible cultural heritage, practices and lore.	- Protect and enhance cultural heritage features, including amongst others: scar trees, culturally modified/significant trees, middens, burial sites and earth ovens - Protect and enhance significant cultural places and landscapes - Strengthen cultural practices, lore and wellbeing by sustaining the health of Country

Appendix J Basin Plan Schedules 8 and 9

Table 32. Basin Plan Schedule 8 Criteria for identifying an environmental asset

Criterion 1: The water-dependent ecosystem is formally recognised in international agreements or, with environmental watering, is capable of supporting species listed in those agreements	
1	Assessment indicator: A water-dependent ecosystem is an environmental asset that requires environmental watering if it is: (a) a declared Ramsar wetland; or (b) with environmental watering, capable of supporting a species listed in or under the JAMBA, CAMBA, ROKAMBA or the Bonn Convention.
Criterion 2: The water-dependent ecosystem is natural or near-natural, rare or unique	
2	Assessment indicator: A water-dependent ecosystem is an environmental asset that requires environmental watering if it: (a) represents a natural or near-natural example of a particular type of water-dependent ecosystem as evidenced by a relative lack of post-1788 human induced hydrologic disturbance or adverse impacts on ecological character; or (b) represents the only example of a particular type of water-dependent ecosystem in the Murray-Darling Basin; or (c) represents a rare example of a particular type of water-dependent ecosystem in the Murray-Darling Basin.
Criterion 3: The water-dependent ecosystem provides vital habitat	
3	Assessment indicator: A water-dependent ecosystem is an environmental asset that requires environmental watering if it: (a) provides vital habitat, including: (i) a refugeum for native water-dependent biota during dry spells and drought; or (ii) pathways for the dispersal, migration and movements of native water-dependent biota; or (iii) important feeding, breeding and nursery sites for native water-dependent biota; or (b) is essential for maintaining, and preventing declines of, native water-dependent biota.
Criterion 4: Water-dependent ecosystems that support Commonwealth, State or Territory listed threatened species or communities	
4	Assessment indicator: A water-dependent ecosystem is an environmental asset that requires environmental watering if it: (a) supports a listed threatened ecological community or listed threatened species; or Note: See the definitions of listed threatened ecological community and listed threatened species in section 1.07. (b) supports water-dependent ecosystems treated as threatened or endangered (however described) under State or Territory law; or (c) supports one or more native water-dependent species treated as threatened or endangered (however described) under State or Territory law.
Criterion 5: The water-dependent ecosystem supports, or with environmental watering is capable of supporting, significant biodiversity	
5	Assessment indicator: A water-dependent ecosystem is an environmental asset that requires environmental watering if it supports, or with environmental watering is capable of supporting, significant biological diversity. This includes a water-dependent ecosystem that: (a) supports, or with environmental watering is capable of supporting, significant numbers of individuals of native water-dependent species; or

(b) supports, or with environmental watering is capable of supporting, significant levels of native biodiversity at the genus or family taxonomic level, or at the ecological community level.

Table 33. Basin Plan Schedule 9 Criteria for identifying an ecosystem function

Criterion 1: The ecosystem function supports the creation and maintenance of vital habitats and populations	
1	Assessment indicator: An ecosystem function requires environmental watering to sustain it if it provides vital habitat, including: (a) a refugium for native water-dependent biota during dry periods and drought; or (b) pathways for the dispersal, migration and movement of native water-dependent biota; or (c) a diversity of important feeding, breeding and nursery sites for native water-dependent biota; or (d) a diversity of aquatic environments including pools, riffle and run environments; or (e) a vital habitat that is essential for preventing the decline of native water-dependent biota.
Criterion 2: The ecosystem function supports the transportation and dilution of nutrients, organic matter and sediment	
2	Assessment indicator: An ecosystem function requires environmental watering to sustain it if it provides for the transportation and dilution of nutrients, organic matter and sediment, including: (a) pathways for the dispersal and movement of organic and inorganic sediment, delivery to downstream reaches and to the ocean, and to and from the floodplain; or (b) the dilution of carbon and nutrients from the floodplain to the river systems.
Criterion 3: The ecosystem function provides connections along a watercourse (longitudinal connections)	
3	Assessment indicator: An ecosystem function requires environmental watering to sustain it if it provides connections along a watercourse or to the ocean, including longitudinal connections: (a) for dispersal and re-colonisation of native water-dependent communities; or (b) for migration to fulfil requirements of life-history stages; or (c) for in-stream primary production.
Criterion 4: The ecosystem function provides connections across floodplains, adjacent wetlands and billabongs (lateral connections)	
4	Assessment indicator: An ecosystem function requires environmental watering to sustain it if it provides connections across floodplains, adjacent wetlands and billabongs, including: (a) lateral connections for foraging, migration and re-colonisation of native water-dependent species and communities; or (b) lateral connections for off-stream primary production.

