

OFFICIAL

Northern Victoria long-term watering plan

2026 update



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Top left: Murray-Darling Rainbowfish, Credit MDBA Gunther Schmida

Top right: White-faced heron, Credit Jo Geddes Goulburn Broken CMA

Bottom: Campaspe River, boundary between Djaara Country and Taungurung Country, Credit ARI

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

We 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
EWPP	Environmental watering plan (Basin Plan chapter 8)
GMW	Goulburn-Murray Water
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
SDLAM	Sustainable Diversion Limit Adjustment Mechanism
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>Hird Swamp</i> <i>Lake Murphy</i> <i>Hattah Lakes</i> <i>Broken Creek</i>
Basin Plan	The <i>Basin Plan 2012</i> (Cth) was developed in accordance with the <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.	<u><i>Taungurung Country Plan</i></u>
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 • supports the transportation and dilution of nutrients,	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>

	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 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 .	<u><i>Murray Fans bioregion EVC 56: Floodplain Riparian Woodland</i></u>
Environmental water management plan (EWMP)		Victorian asset-based long-term (~10 year) plan that sets out environmental watering objectives and hydrological requirements	<u><i>Karadoc Swamp EWMP</i></u>
Environmental watering requirement	The environmental watering requirements of a priority environmental asset or priority ecosystem function, as the case may be, identified using the methods set out in Part 5 of Chapter 8. For details see C8, P5, S8.51.	<u>Hydrological objectives:</u> the flow components (river) or flooding regime (wetland/floodplain) that will 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,	<i>Winter fresh of 1,000 – 1,800 ML/day for 1-2 days, once per year in Jul-Aug.</i> <i>Maintain baseflows year-round, winter</i>

		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>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 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 access right to be for environmental use).	Water that is set aside for the environment as an environmental entitlement, as per the <i>Water Act 1989</i> (Vic).	
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, or other water left in the system, but 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.	
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.	<u>North East Waterway Strategy</u>
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.	<u>Seasonal watering plan 2025-26</u>
Seasonal watering proposal		Victorian planning document identifying desired environmental water use for rivers, wetlands and estuaries that receive environmental water.	<u>Mallee CMA Murray Wetlands 2025-26</u>

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 Northern Victoria water resource plan area, which extends from the Victorian Alps in the east, to Ballarat to the south and Kerang in the west, and includes the Ovens, Goulburn, Broken, Campaspe, and Loddon River systems.

This is a minor update to the 2021 LTWP for the Northern Victoria water resource plan area, as required under the Basin Plan (s. 8.22) following an update to the Basin-wide environmental watering strategy (MDBA, 2025a). This update:

- aligns with the 2025 Basin-wide environmental watering strategy expected environmental outcomes and the First Nations objectives
- incorporates *Water is Life: A 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 Northern Victoria 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 Northern Victoria 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 Northern Victoria LTWP is one of three LTWPs prepared to meet Victoria's planning obligations under Chapter 8 of the Basin Plan. The remaining LTWPs have been prepared for the Victorian Murray and Wimmera-Mallee water resource plan areas.

Key elements of this plan are summarised below.

Priority environmental assets

There are five main river systems and associated wetlands in the Northern Victoria 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. The river systems include the Loddon, Campaspe, Goulburn, Broken, and Ovens rivers, while wetlands include assets such as the Boort wetland complex, Horseshoe Lagoon and Reedy Swamp.

Priority ecosystem functions

Three main priority ecosystem functions (PEFs) have been identified for the Northern Victoria water resource plan area: longitudinal hydrological connectivity, maintenance of water quality and geomorphic habitat. 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 Northern Victoria water resource plan area supports important water-dependent ecological values including native fish (e.g. golden perch, Murray cod and freshwater crayfish); vegetation (e.g. river red gum communities, cane grass and box riparian vegetation); waterbirds (e.g. egrets, marsh sandpipers, and brolgas), as well as frogs, turtles, rakali and platypus. Ecosystem functions that support these ecological values include geomorphological condition and hydrological connectivity.

Objectives

The LTWP includes 27 objectives for identified ecological assets and ecosystem functions to support waterway health in the Northern Victoria 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 into a consistent suite of language involving 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.

Theme	No.	Objective
Connectivity	NV1	Improve longitudinal connectivity (between river reaches and with the Murray)
	NV2	Maintain water quality within an appropriate range to allow for ecosystem processes
	NV3	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)
Vegetation	NV4	Maintain the condition of aquatic vegetation in wetlands
	NV5	Maintain the condition of in-channel aquatic vegetation
	NV6	Improve the extent of aquatic vegetation
	NV7	Improve the abundance of aquatic vegetation
	NV8	Improve the species richness of aquatic vegetation in wetlands
	NV9	Improve the species richness of in-channel aquatic vegetation
	NV10	Maintain the extent of river red gum dominated EVCs
	NV11	Maintain the condition of river red gum dominated EVCs
	NV12	Improve species richness of river red gum dominated EVCs
	NV13	Maintain the extent of black box dominated EVCs
	NV14	Reduce the extent of exotic vegetation
Waterbirds	NV15	Improve breeding opportunities for waterbirds
	NV16	Improve habitat for waterbirds
Fish	NV17	Improve abundance of large-bodied native fish
	NV18	Improve abundance of small-bodied native fish
	NV19	Improve habitat for native fish
	NV20	Improve movement of native fish
	NV21	Maintain species richness of native fish
Other Fauna	NV22	Improve breeding of platypus and rakali
	NV23	Maintain abundance of platypus and rakali
	NV24	Improve breeding of frog communities
	NV25	Maintain species richness of frog communities
Invertebrates	NV26	Improve abundance of invertebrates
	NV27	Improve number of invertebrate functional groups present

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), storage managers (water corporations), Traditional Owners, environmental water holders and public land managers. All agencies must engage with Traditional Owners in undertaking their functions.

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 managers. The Southern Connected Basin Environmental Watering Committee (SCBEWC) coordinates the delivery of environmental water across the southern Murray Darling Basin.

The North East, Goulburn Broken, and North Central CMAs work across Northern Victoria, partnering with Traditional Owners in the planning and management of waterways and catchments. This includes formally recognised Traditional Owner groups and those that have not yet been formally recognised. *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

Development along rivers and associated river regulation has resulted in operational and physical constraints which restricts delivery of water including for the environment. These constraints have been examined and priority actions identified across the Basin, initially through the MDBA's Constraints Management Strategy 2013 to 2024 (MDBA, 2013) and then through reach-focused projects that are being led by Basin states.

State-led projects, called 'constraints measures', are exploring the potential impacts of delivering higher flows and how these can be addressed to support system-wide environmental outcomes through the reconnection of rivers to their floodplains. Working closely with affected communities will be critical to success.

The feasibility of relaxing constraints in Northern Victoria (DEECA, 2024d) used updated modelling and technical investigations to assess the benefits and risks of relaxing constraints along sections of the Goulburn and Murray Rivers and the potential implications for private landholders and local communities.

Following the publication of the Roadmap in December 2024, Basin governments and the MDBA have been focused on implementing key findings and facilitating more coordinated delivery across the Southern Basin constraints projects. This includes MDBA establishing an independent panel on constraints, which Victoria will provide information to as requested.

Risks

A detailed risk assessment was undertaken for Victoria's North and Murray 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 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. climate change), and;
- failure to demonstrate outcomes.

The risks associated with adverse impacts arising from the provision of environmental water have been assessed by their impact on environmental, social, cultural and economic values and management options identified.

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. Taungurung Land and Waters Council reviewed the Northern Victorian LTWP draft including content for the Molesworth Billabongs priority environmental asset.

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 Northern Victoria 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, followed by an update in 2021, and this update in 2026.

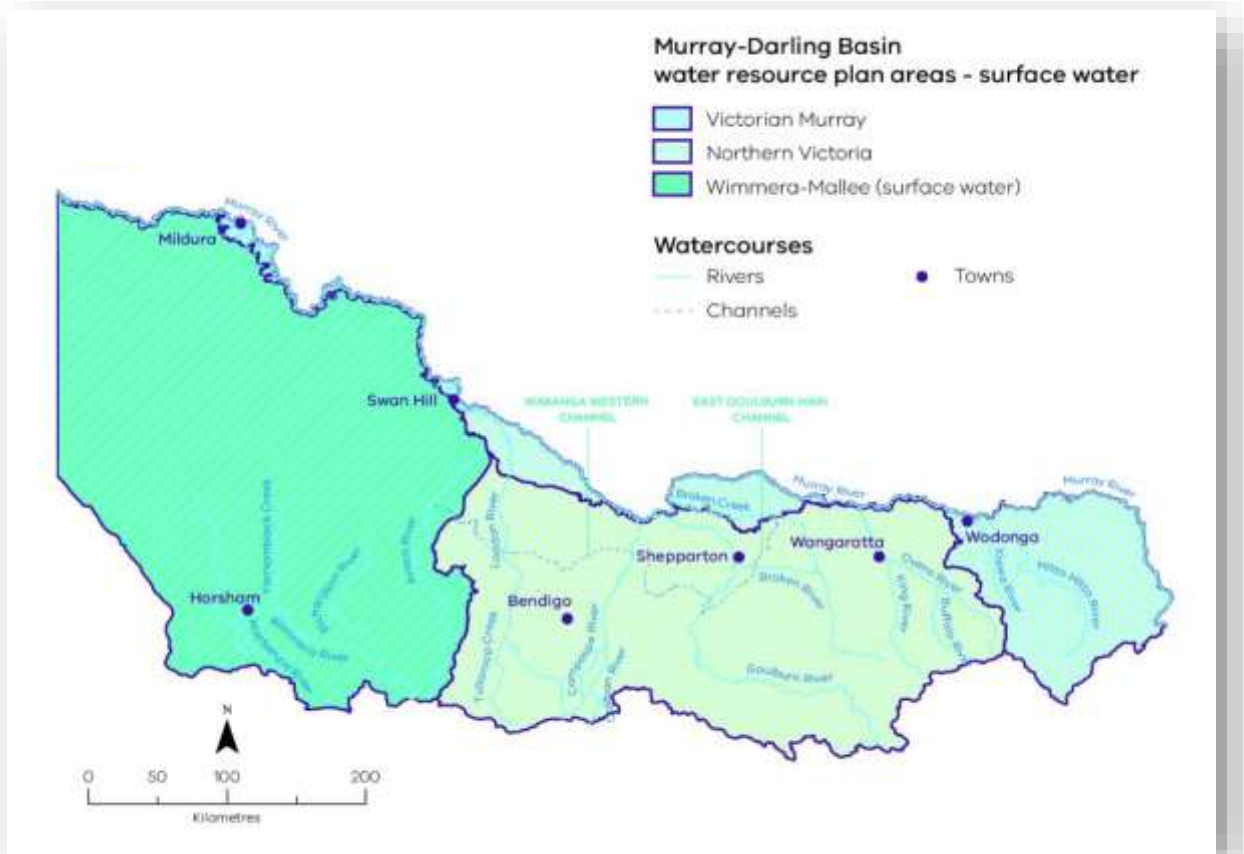


Figure 1. Victoria's three surface water resource plan areas – Victorian Murray, Northern Victoria, and Wimmera-Mallee.

1.1 Context

Many Victorian waterways have been highly modified by human use over the past 150 years, and 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. The provision of a suitable watering regime and

complementary activities (see section 8) are critical to improve the health of these areas and provides a shared resource that supports economic, cultural and recreational needs.

Provision of a suitable watering regime is essential to achieve the objectives and targets outlined in this plan. This does not require restoration of a completely natural water regime. Specific components may have higher importance for different biota or support 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 clearly 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 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 will support 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.

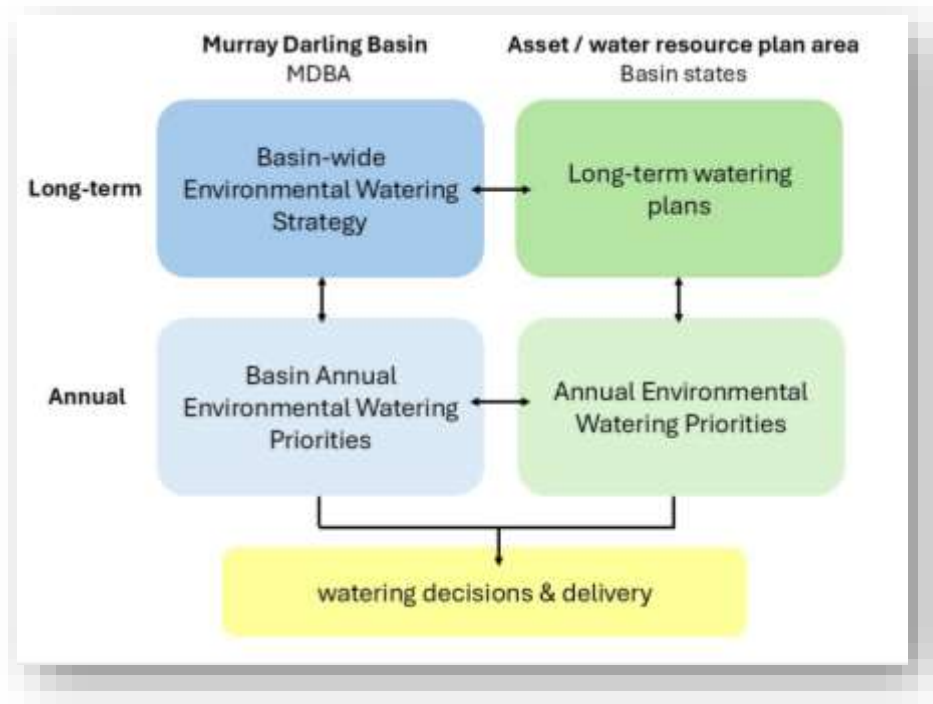


Figure 2. The long-term and annual planning documents required under Basin Plan Chapter 8 'Environmental Watering Plan'

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 Northern Victoria 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 describes how the targets in the plan can be monitored and evaluated.

Due to the environmental watering focus, this plan is not intended to provide holistic management for catchments or waterways (this 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 (see section 8).

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 **Error! Reference source not found..**

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 in order 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 area 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 Northern Victorian 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).

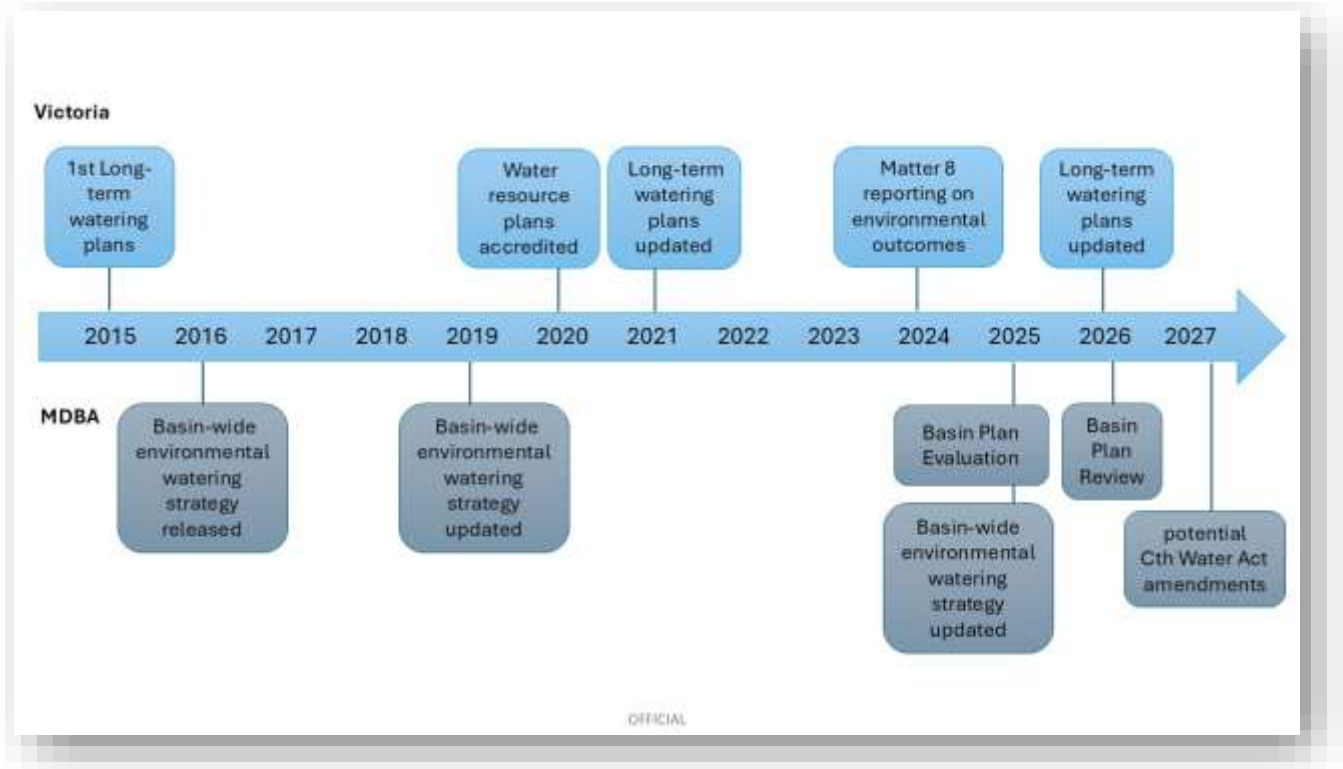


Figure 3. Victoria's long-term environmental water planning process in the context of other planning and strategic documents.

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 (Table 8).

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 8 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 Appendix A(b) (Table 19).

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 VEW (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)¹. Both proposals were included as pilot watering projects in the VEW's 2025-26 Seasonal Watering Plan (VEW, 2025a), released on 30 June 2025. One of these sites is relevant to the Northern Victoria LTWP, Molesworth Billabongs, led by Taungurung Land and Waters Council Aboriginal Corporation. In 2019, an EWMP for Horseshoe Lagoon was also developed in partnership between Taungurung Land and Waters Council Aboriginal Corporation and Goulburn Broken CMA. These sites are included in this LTWP 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 and explore any barriers to enable VEW to transfer water allocation to Traditional Owners, and for Traditional Owners to take on specific waterway management responsibilities and/or hold environmental water entitlements.

¹ Refer to VEW's Seasonal Watering Plan 2025-26 (VEW, 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 very unreliable as it is the first to be impacted under seasonal conditions.

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 Victoria’s North and Murray 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.
- 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 *Water Act 1989* (Vic).

CMAs have established regional catchment strategies that are the primary integrated planning framework for land, water and biodiversity management in each region in 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 Northern Victorian water resource plan area, the relevant CMAs and their regional waterway strategies are:

- North East: North East Waterway Strategy (NECMA, 2014).
- Goulburn Broken: Goulburn Broken Waterway Strategy 2014-2022 (GBCMA, 2014).
- North Central: North Central CMA Waterway Strategy 2014-22 (NCCMA, 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. The level of partnership is to be self-determined by each group or the partnership may be declined. DEECA provided funding for Traditional Owners to participate in a way that suits them. 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 licensed 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 water 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 outcomes to evaluate whether objectives are being achieved and to inform adaptive management.
- Reviewing the process 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 corporations 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 eventual leadership in environmental watering.

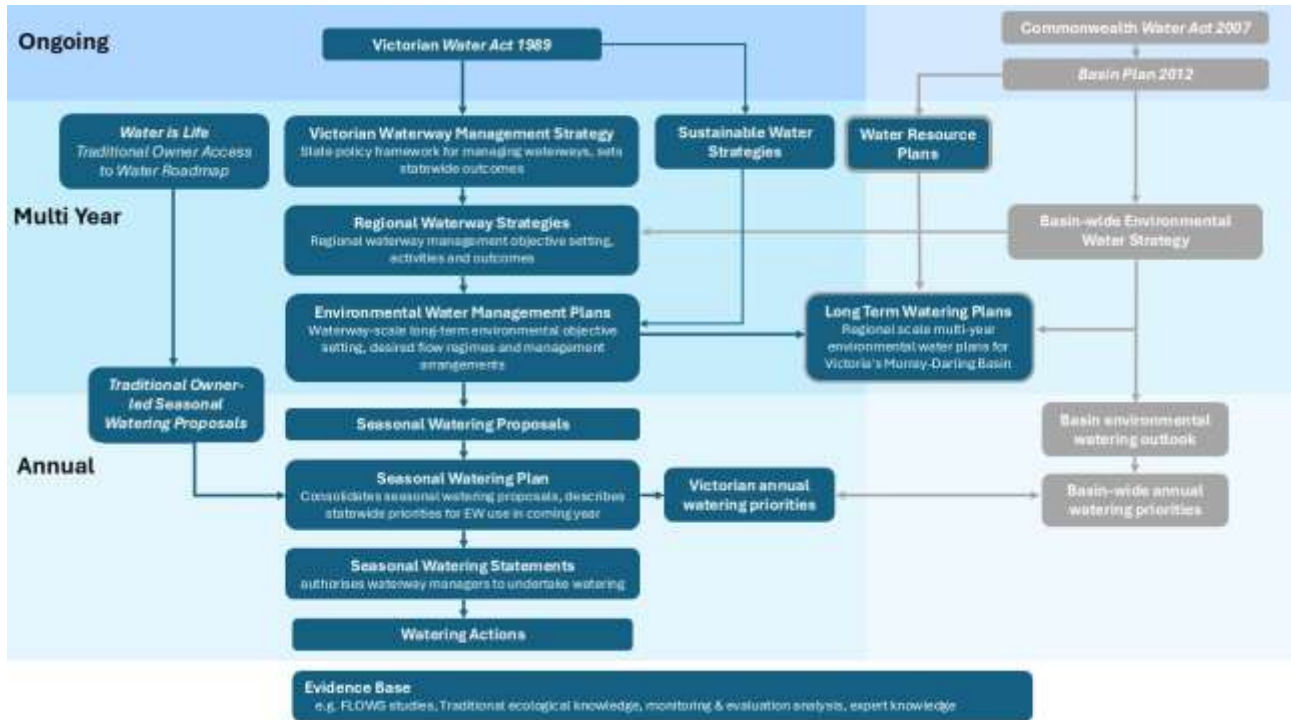


Figure 4. The environmental water planning and management framework in Victoria and how it intersects with the Murray-Darling Basin Plan and associated instruments.

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 VEWH 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. VEWH 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 managements of invasive species.

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

	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	• Protect refuges • Protect prioritised areas through fencing, invasive species management, and water quality improvement works • Environmental emergency management plans in place • Improve connectivity	• 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

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Drought	Dry	Average	Wet
• 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	• Implement post-bushfire river recovery plans		• Emergency flood management plans in place • Implement post flood river restoration programs

1.6.7 Delivery partners

Several organisations work together to deliver environmental water outcomes in Victoria. These organisations and their roles are described 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.

Waterway managers work with communities to identify the environmental, social, cultural and economic values of waterways through regional waterway strategies, EWMPs and seasonal watering proposals. Environmental water managers will continue to work with stakeholders to achieve shared or complementary benefits from environmental watering, as per the engagement principles outlined in Chapter 6 of the VWMS (DEPI, 2013a). More information can be found in Chapter 12 of the Victoria's North and Murray Water Resource Plan (DELWP, 2019a).

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 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 (VEWH, 2025b).

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), and at times, cultural water has been transferred for environmental purposes, such as Taungurung Land and Waters Council contributing water from a water entitlement to the VEWL for delivery in the Ovens system (King River) to heal Country.

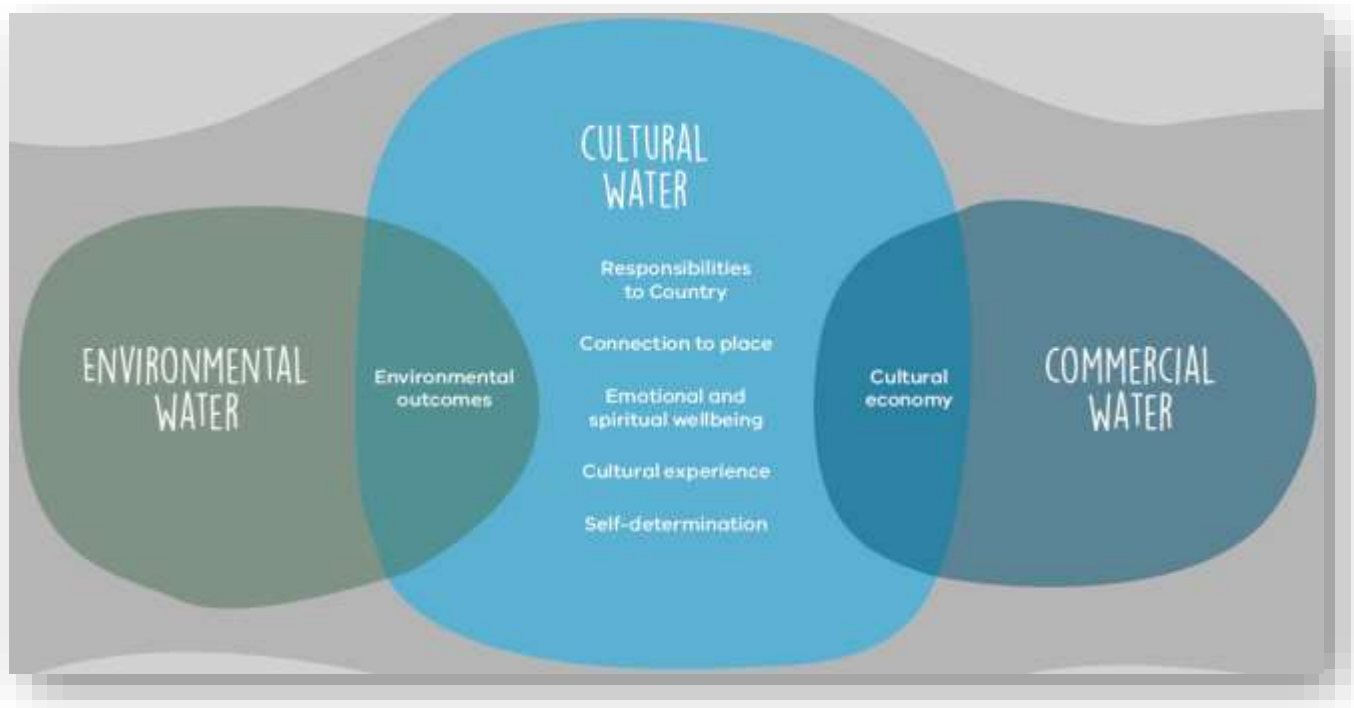


Figure 6. Cultural Water outcomes, from Water is Life (DELWP, 2022a)

2. Water resource plan area

The Northern Victoria water resource plan area extends from the Victorian Alps in the east, to Ballarat in the south and west of the Loddon River. This water resource plan area region is dominated by northerly flowing river systems connected to the Murray River. It contains sections of the Victorian CMA regions of North Central, Goulburn Broken and North East.

2.1 Features of the Northern Victoria water resource plan area

The Northern Victoria water resource plan area (Figure 7) comprises the major tributaries of the Murray River downstream of the junction with the Kiewa River. The water resource plan area is dominated by northerly flowing river systems connected to the Murray River. It includes the Ovens, Goulburn, Broken, Campaspe, Loddon (upstream of Kerang) and Coliban Rivers, Upper Broken Creek and Birch's Creek, with associated wetlands in the Loddon, Goulburn, Broken and Ovens catchments. The lower Loddon River, the lower Broken Creek, and wetlands associated with the Murray River (e.g. Barmah Forest) lie in the Victorian Murray water resource plan area immediately to the north of this water resource plan area.

Most of the major rivers are highly regulated by the presence and operation of the region's major water storages and weirs. Major storages include Lake Buffalo and Lake William Hovell on the Ovens River system, Lake Eildon and Goulburn Weir on the Goulburn River (plus Waranga Basin off-river storage), Lake Nillahcootie on the Broken River, Lake Eppalock on the Campaspe River, Cairn Curran, Tullaroop and Laanecoorie Reservoirs on the Loddon River and the Upper Coliban storages on the Coliban River.

2.1.1 Topography

The highest point in the water resource plan area is Mt Feathertop, located near the headwaters of the Ovens River and 1,922 m above sea level. The lowest elevations are around Kerang which has an elevation of 77 m metres above sea level. The eastern and southern extents of the water resource plan area are dominated by land that is steep and relatively high relief (over 500 m AHD). However, the majority of the water resource plan area is dominated by lowland rivers (generally under 200 m AHD). Figure 8 presents the (relative) topography in the Northern Victoria water resource plan area.

2.1.2 Geology, soils and land use

The geology of the plains in Northern Victoria is complex and comprise unnamed alluvium along the northern reaches of the Campaspe, Loddon, Goulburn and Broken rivers and associated floodplains. Along the Great Dividing Range, the geology is a combination of mainly sandstones and siltstones (e.g. Castlemaine Group, Adaminaby Group, Norton Gully Sandstone, Humevale Siltstone) and Late Devonian granitic rocks.

This region is often referred to as the 'food bowl of Victoria', in recognition of its major land use being production and having high agricultural productivity. It is the largest irrigation system in Australia (DEECA, 2024b) and contributes significantly to Victoria and Australia's cropping, dairy and horticultural production (GMW, 2025).

The land use is a combination of irrigation through lowland floodplains of the northern region, grazing in the mid to upper catchments in the south, with some softwood plantations in the south of the region (NCCMA, 2014).

2.1.3 Rainfall distribution

The climate of the Northern Victoria water resource plan area is highly variable across the whole region. The average annual rainfall ranges from over 2,000 mm in the Victorian Alps in the east to less than 400 mm near Kerang. This rainfall is generally highest in winter-spring (BoM, 2025).

2.1.4 Waterways as living and connected entities

The numerous waterways of the Northern Victorian water resource plan area lie in the five surface water SDL resource units of the Ovens (SS4), Broken (SS5), Goulburn (SS6), Campaspe (SS7) and Loddon (SS8) which are all regulated systems.

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 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).

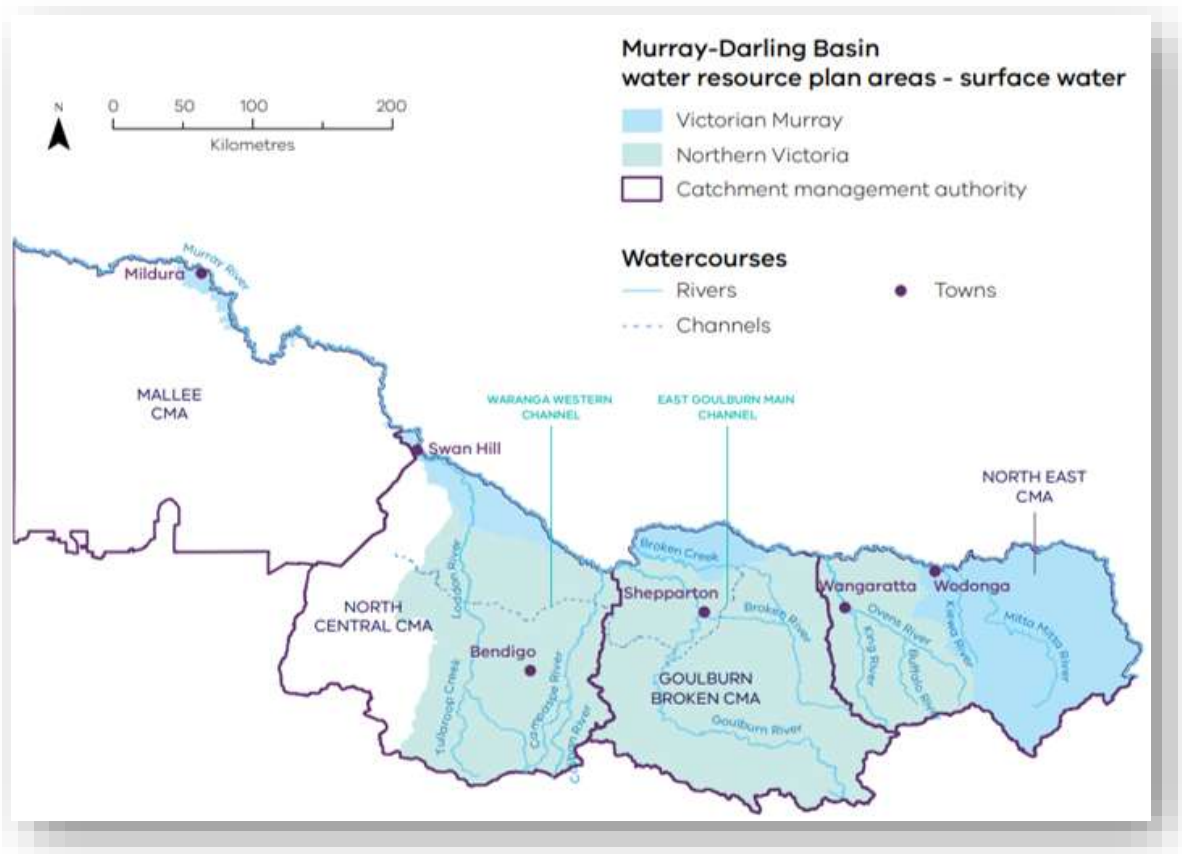


Figure 7. Victorian Murray and Northern Victorian water resource plan areas showing catchment management authority boundaries

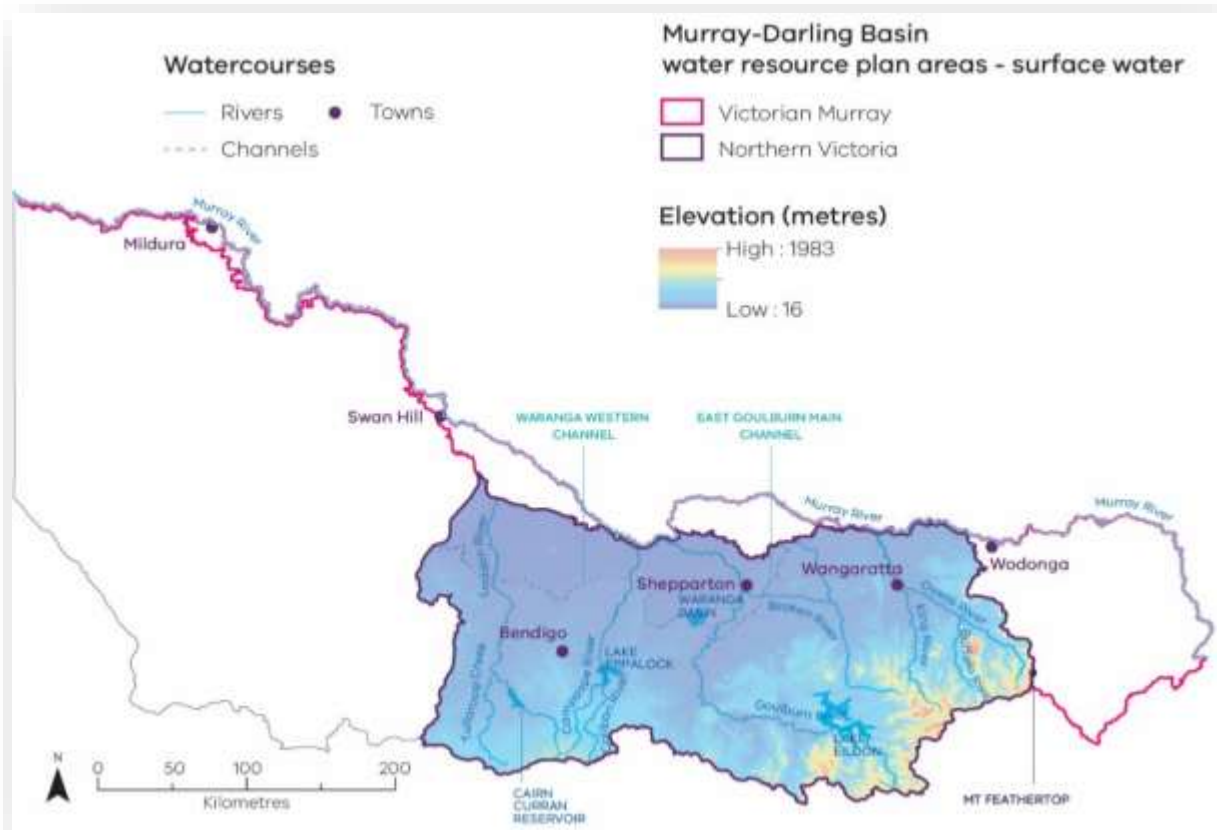


Figure 8. Topography across the Northern Victorian water resource plan area

2.2 Significant ecological values of the Northern Victorian water resource plan area

The priority environmental assets of the Northern Victoria 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.

Note: several Ramsar sites occur in the Goulburn Broken and North Central CMA areas (Barmah Forest, Gunbower Forest, Kerang Wetlands). However, water delivery to these sites occurs through the Murray River system, and so they are included as significant ecological systems in the Victorian Murray LTWP, rather than in this LTWP.

Significant water-dependent ecological values in the Victorian Basin are listed in the 2025 Matter 8 reporting (DEECA, 2024c).

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 Ovens River catchment

The Ovens River priority asset includes the regulated reaches - the Buffalo River below Lake Buffalo, the King River below Lake William Hovell and the Ovens River from its confluence with the Buffalo River to Lake Mulwala. The catchment upstream of the Buffalo River is unregulated and so the flow regime is not as

severely affected as other regulated rivers in the State. The existing Index of Stream Condition results indicated that much of the Ovens system to be in moderate environmental condition (DEPI, 2013b).

The diverse aquatic habitat and abundant food resources associated with the Ovens system support a wide range of native fish species including Murray cod, Macquarie perch, trout cod, golden perch and unspotted hardyhead, many of which are recognised for their conservation significance. The Buffalo River provides valuable habitat for large-bodied fish species during part of their breeding cycle, while trout cod have a large range within the system and are found as far up the King River as Whitfield. Successful projects have occurred in the Ovens River system to recover trout cod populations (DELWP, 2018a) and re-establish Macquarie perch (DELWP, 2018b).

The lower Ovens wetland complex contains over 1,800 wetlands. It is listed as nationally significant and is home to various waterbirds, including egrets, herons, cormorants and bitterns. The streamside zones of river channels throughout the Ovens system support some of Victoria's healthiest river red gum forests and woodlands, while the wetlands support a variety of aquatic and semi-aquatic vegetation communities.

2.2.2 Goulburn River catchment

The Goulburn River and its tributaries support a range of native fish including golden perch, silver perch, Murray cod, trout cod, Macquarie perch and freshwater catfish, as well as turtles, platypus and rakali. Aquatic vegetation and submerged logs provide a diversity of habitat to support adult and juvenile fish. The bank vegetation is dominated by river red gum open forest/woodland which provide significant habitat for many species including the squirrel glider. Birds such as egrets, herons and cormorants regularly use the rivers to feed and roost, while frogs benefit from shallow vegetated habitats at the edge of the river channel and in adjacent wetlands.

The Goulburn River downstream of Lake Eildon is a state Heritage River and the lower Goulburn River floodplain (which includes Reedy Swamp) is listed in the Directory of Important Wetlands. The 2013 Index of Stream Condition results indicated the majority of the Goulburn system to be in moderate environmental condition (DEPI, 2013b).

Wetlands in the Goulburn catchment (Reedy Swamp, Doctors Swamp, Gaynor Swamp, Horseshoe Lagoon, Kanyapella Basin, Molesworth billabongs and Loch Garry) contain a wide variety of vegetation communities including river red gum dominated EVCs, Tall Marsh, Floodway Pond Herbland and Cane Grass wetlands.

The wetlands support thousands of waterbirds, including brolga, intermediate egrets, royal spoonbills, ibis, herons, cormorants, musk ducks, and sandpipers, as well as the three Victorian freshwater turtle species.

2.2.3 Broken River catchment

The Broken River supports a range of small- and large-bodied native fish including Murray cod, Macquarie perch, golden perch, silver perch, river blackfish, mountain galaxias, southern pygmy perch and Murray-Darling rainbowfish. Various native submerged and emergent plant species, including eelgrass, common reed and water ribbons, populate the bed and margins of the river and support the native fish, as well as a platypus population.

Upper Broken Creek is dominated by unique box eucalypt vegetation and remnant plains grassy woodland. The creek and its streamside zone support numerous threatened species, including brolga, Australasian bittern, buloke and ridged water-milfoil. The creek supports a variety of native fish species, including carp gudgeon, Murray cod, river blackfish and Murray-Darling rainbowfish, as well as platypus, rakali (water rat) and common long-necked turtle.

The Lower Broken River floodplain (downstream of Caseys Weir) and the Broken Creek floodplain are listed in the Directory of Important Wetlands (Environment Australia, 2001). The 2013 Index of Stream Condition results indicated that sections of the Broken Creek were in poor condition and sections of the Broken River in very poor condition (DEPI, 2013b).

Wetlands in the Broken catchment (Black Swamp, Kinnairds Wetland and Moodie Swamp) support diverse vegetation communities including river red gum and cane grass dominated EVCs, as well as state and nationally threatened vegetation communities and species, including ridged water-milfoil and river swamp

wallaby grass. The wetlands also provide food resources and breeding habitat for bird species of high conservation significance, including eastern great egret, Latham's snipe, white-bellied sea eagle, Australasian bittern, brolga, royal spoonbill, yellow-billed spoonbill, Australasian shoveler and glossy ibis. Many of these species are listed in international agreements and conventions. Moodie Swamp also supports Sloane's froglet, listed in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

2.2.4 Campaspe and Coliban River catchments

The Campaspe River (downstream of Lake Eppalock) contains habitat for fish species including Murray cod, silver perch, golden perch and Murray-Darling rainbowfish. Platypus, rakali, turtles and frogs also inhabit the river. Along the river, there is a highly-connected, intact river red gum canopy. Index of Stream Condition results from 2013 indicated the Campaspe River below Lake Eppalock to be in good to moderate environmental condition (DEPI, 2013b)². Monitoring since 2013 indicates that the number of native fish species, their abundance and number of sites occupied has steadily increased. Instream aquatic and riparian native vegetation is recovering following the millennium drought and recent floods.

The Coliban River previously retained populations of Murray cod, trout cod, golden perch, river blackfish and Macquarie perch. However, there have been no survey or angler reports of these species in recent years. North Central CMA conducted fish surveys in 2025 and found overall species richness remains similar to that observed 2006, that abundance has increased significantly, and new species have been recorded including obscure galaxias, common galaxias and common roach. Platypus, rakali and common long-necked turtle have also been recorded. (. The river supports stands of emergent and submerged aquatic vegetation, while the riparian environment is dominated by remnant patches of stream bank vegetation. Similar to the Campaspe, Index of Stream Condition results from 2013 indicated the Coliban River to be in moderate environmental condition (DEPI, 2013b). The North Central CMA believe the condition of the Coliban River has since declined due to flow stress and insufficient environmental entitlement to maintain and improve the ecological values of the waterway.

2.2.5 Loddon River catchment

The Loddon River catchment includes the Loddon River downstream of Cairn Curran Reservoir to Kerang, Tullaroop Creek downstream of Tullaroop Reservoir, and Birch's Creek downstream of Newlyn Reservoir. Tullaroop Creek and the Loddon River contain populations of Murray cod, golden perch and river blackfish. Riparian vegetation is typically narrow river red gum woodland in the upper section, with some shrubby understorey of Lignum further downstream. Index of Stream Condition results from 2013 indicated the Loddon River to be in moderate environmental condition, Tullaroop and Birch's Creeks in poor condition, and Pyramid, Serpentine and Bullock Creeks to be in very poor condition (DEPI, 2013b). VEFMAP results found that the Loddon had low aquatic and fringing vegetation species richness (2 and 3 species respectively) but a relatively high emergent species richness (16 species); the Loddon also had low rates of fish population recovery following the millennium drought (Tonkin et al, 2020). The Boort wetlands (Lake Boort, Lake Leaghur, Lake Yando and the Meran Lakes complex) contain important habitat for a range of bird, reptile and amphibian species. The wetlands are extremely productive for waterbird use and breeding, including yellow-billed spoonbill, banded stilt, Australian white ibis, and several duck species.

Native vegetation values in the wetlands include several threatened ecological vegetation types such as Red Gum Swamp and Riverine Chenopod Woodland, and important plant species such as cane grass.

² Noting that the 2013 ISC assessment was at the end of the millennium drought and preceded establishment of the Campaspe Environmental Entitlement.

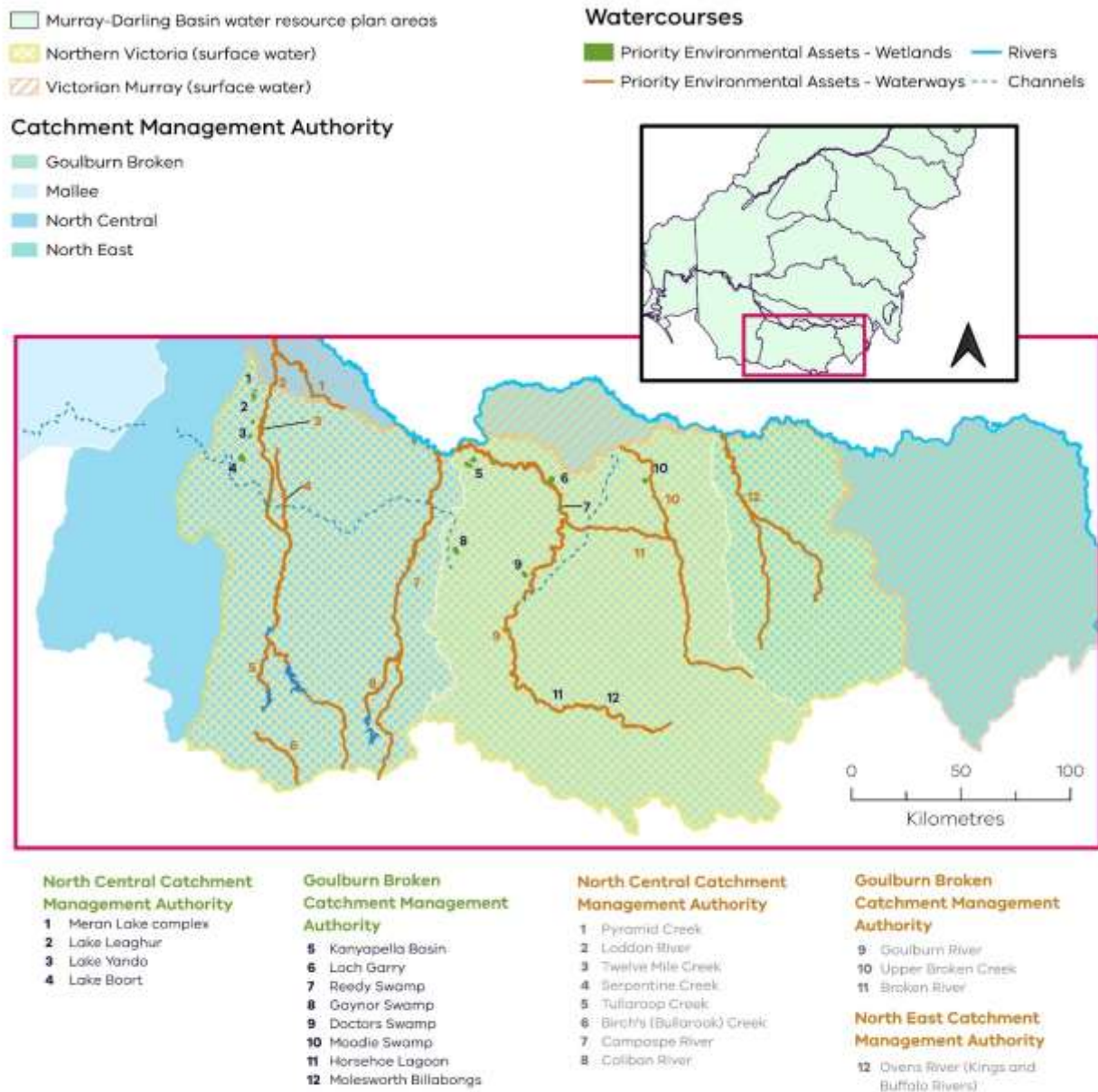
3. Priority environmental assets within the Northern Victoria water resource plan area

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. Mansfield Swamp), a wetland complex (e.g. Lake Meran complex), or a river/creek (e.g. Campaspe River). Asset locations are shown in Figure 9 and listed in Table 2.

All of the sites listed are considered by Victoria to be priority assets in that they currently receive environmental water and meet criteria in Basin Plan schedule 8. Figure 9 shows the distribution of these priority assets in the Northern Victoria water resource plan area.

It is important to note that all of the priority rivers in Table 2 are regulated. These are the rivers that have held environmental water (HEW), this plan seeks to guide use of HEW to meet objectives and targets. There are also many unregulated rivers that are also important assets within the WPRA that have important environmental values. However, in unregulated systems, there is no HEW to manage for specific environmental outcomes. The aim for unregulated rivers is to maintain existing arrangements such as conditions regulating the take of water through Bulk Entitlements and licences (see section 5.1.3).

Note that significant values have been identified by Traditional Owners in individual nation statements published in Victoria's North and Murray Water Resource Plan (DELWP, 2019a) chapter 8 and Appendix F, and Water is Life: Traditional Owner Access to Water Roadmap – Section B: Traditional Owner Statements (DELWP, 2022a).



*Wetlands which are part of the Wimmera-Mallee wetland complex and sit in the Wimmera-Mallee water resource plan area but source water from the Victorian Murray resource plan area.

**The floodplains of the River Murray source water from the River Murray and are considered part of the Victorian Murray water resource plan area.

Figure 9. Priority environmental assets within the Northern Victoria water resource plan area

Table 2. Priority environmental assets in the Northern Victoria water resource plan area

* refer to Appendix J

PEA Map no.	Asset Name	Catchment	Asset Manager	Basin Plan schedule 8 criteria *	Asset characteristics
Wetlands					
1	Meran Lakes Complex	Loddon	North Central CMA	1	JAMBA, CAMBA, Bonn Convention
				2	Intermediate Swampy Woodland – Vulnerable EVC813
				3	Permanent, deep freshwater lake providing refuge during drought
				4	EPBC Act, FFG Act
				5	High biodiversity
2	Lake Leaghur	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	Deep freshwater marsh
				3	Semi-arid woodland – Endangered, EVC97
				4	High connectivity to Loddon River
				5	Important breeding habitat for birds EPBC Act, FFG Act High biodiversity
3	Lake Yando	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	Deep freshwater marsh
				3	Red Gum Swamp – Vulnerable, EVC292
				4	Riverine Chenopod Woodland - Vulnerable, EVC103
				5	High habitat diversity EPBC Act, FFG Act High biodiversity
4	Lake Boort	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA
				2	Plains Woodland – Endangered, EVC68
				4	EPBC Act, FFG Act
				5	Supports significant levels of native biodiversity

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PEA Map no.	Asset Name	Catchment	Asset Manager	Basin Plan schedule 8 criteria *	Asset characteristics
5	Kanyapella Basin	Goulburn	Goulburn Broken CMA	1 3 4 5	JAMBA, CAMBA, Bonn Convention EPBC Act, FFG Act Shallow freshwater marsh Riverine Grassy Woodland and Plains Woodland – Endangered EVC 295/803 Plains Woodland (Black Box dominated) – Endangered EVC 803 High biodiversity
6	Loch Garry	Goulburn	Goulburn Broken CMA	1 2	JAMBA, CAMBA EPBC Act, FFG Act Tall Marsh – Least Concern – EVC 821 Floodway Pond Herbland – Depleted – EVC 810 Riverine Swamp Forest – Depleted - EVC 814 Sedgy Riverine Forest - Depleted - EVC 816 Riverine Grassy Woodland – Vulnerable – EVC 295 Riverine Swampy Woodland - Vulnerable – EVC 815 Sand Ridge Woodland - Endangered – EVC 264
7	Reedy Swamp	Goulburn	Goulburn Broken CMA	1 2 4 5	JAMBA, CAMBA, ROKAMBA, Bonn Convention Reedy Freshwater Marsh – only 30% remains since settlement Tall Marsh – Endangered, EVC821 EPBC Act, FFG Act High biodiversity
8	Gaynor Swamp	Goulburn	Goulburn Broken CMA	1 3 4 5	JAMBA, CAMBA, ROKAMBA, Bonn Convention Critical breeding ground for vulnerable Brolga and other threatened waterbird species Deep freshwater marsh Cane-grass Swamp – Vulnerable, EVC 291 Red Gump Swamp – Vulnerable, EVC 292 Threatened flora species (e.g. Spiny Lignum and Salt Paperbark) EPBC Act, FFG Act

PEA Map no.	Asset Name	Catchment	Asset Manager	Basin Plan schedule 8 criteria *	Asset characteristics
					High biodiversity
9	Doctors Swamp	Goulburn	Goulburn Broken CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	Shallow freshwater marsh
				4	Plains Grassy Wetland – Endangered, EVC125
				5	Plains Woodland – Endangered, EVC803
					EPBC Act, FFG Act
					High biodiversity
10	Moodie Swamp	Broken Creek	Goulburn Broken CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	Shallow freshwater marsh
				4	Cane Grass Wetland – Vulnerable EVC291
				5	EPBC Act, FFG Act
					High biodiversity
11	Horseshoe Lagoon	Goulburn	Goulburn Broken CMA	1	JAMBA, CAMBA, ROKAMBA
				2	Tall Marsh - Depleted – EVC 821
					Floodway Pond Herbland – Vulnerable, EVC 810
					Floodplain Riparian Woodland – Vulnerable, EVC 56
					EPBC Act, FFG Act
12	Molesworth Billabongs	Goulburn	Taungurung Land and Waters Council	3	Culturally significant vegetation species
				4	Threatened vegetation communities and species
				5	EPBC Act, FFG Act
Rivers					
1	Pyramid Creek	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	High instream woody habitat values - critical habitat component for river blackfish
				3	Deep pools – critical drought refuge
				4	Provides connectivity to facilitate migration, movement and dispersal
				5	EPBC Act, FFG Act

PEA Map no.	Asset Name	Catchment	Asset Manager	Basin Plan schedule 8 criteria *	Asset characteristics
					Supports significant levels of native biodiversity Endangered EVCs
2	Loddon River (upper - to Kerang Weir)	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	Creekline Grassy Woodland – Endangered, EVC68
				3	Floodplain Riparian Woodland – Endangered, EVC56
				4	High instream woody habitat values - critical habitat component for river blackfish
				5	Deep pools – critical drought refuge
					Provides connectivity to facilitate migration, movement and dispersal
					EPBC Act, FFG Act
					Supports significant levels of native biodiversity
					Diverse channel form including slackwater habitats that support small-bodied fish species
3	Twelve Mile Creek	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	High instream woody habitat values - critical habitat component for river blackfish
				3	Deep pools – critical drought refuge
				4	Provides connectivity to facilitate migration, movement and dispersal
				5	EPBC Act, FFG Act
					Supports significant levels of native biodiversity
					Endangered EVCs
4	Serpentine Creek	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention
				2	High instream woody habitat values - critical habitat component for river blackfish
				3	Deep pools – critical drought refuge
				4	Provides connectivity to facilitate migration, movement and dispersal
				5	EPBC Act, FFG Act
					Supports significant levels of native biodiversity
					Endangered EVCs
5	Tullaroop Creek	Loddon	North Central CMA	1	JAMBA, CAMBA, ROKAMBA, Bonn Convention

PEA Map no.	Asset Name	Catchment	Asset Manager	Basin Plan schedule 8 criteria *	Asset characteristics
				2	High instream woody habitat values - critical habitat component for river blackfish
				3	Deep pools – critical drought refuge
				4	Provides connectivity to facilitate migration, movement and dispersal
				5	EPBC Act, FFG Act Supports significant levels of native biodiversity Endangered EVCs
6	Birch's (Bullarook) Creek	Campaspe	North Central CMA	2	Swampy Riparian Woodland – Endangered EVC83
				4	Creekline Grassy Woodland – Endangered EVC68 EPBC Act, FFG Act
7	Campaspe River	Campaspe	North Central CMA	1	Complex instream woody habitat
				2	Large deep pools – critical drought refuge
				3	Extensive slackwater areas – nursery habitat
				4	Provides connectivity to facilitate migration, movement and dispersal
				5	EPBC Act, FFG Act
8	Coliban River	Campaspe	North Central CMA	1	JAMBA
				2	Plains Grassy Woodland – Endangered, EVC55
				3	Creekline Grassy Woodland – Endangered, EVC68
				4	Stream Bank Shrubland– Endangered, EVC851 Instream woody habitat Submerged vegetation Waterfalls, riffles and pools EPBC Act, FFG Act
9	Goulburn River	Goulburn	Goulburn Broken CMA	1	Floodplain Riparian Woodland – Endangered, EVC 56
				2	Creekline Grassy Woodland – Endangered, EVC68
				3	Wetland Formation – Endangered, EVC74

PEA Map no.	Asset Name	Catchment	Asset Manager	Basin Plan schedule 8 criteria *	Asset characteristics
				4	Plains Grassy Woodland – Endangered, EVC55
				5	Drainage Line Aggregate – EVC168/EVC1022
					Riverine Grassy Woodland – Endangered, EVC1040
					Riverine Swampy Woodland – Endangered, EVC1099
					Mid-Goulburn – heritage listed
					Complex instream woody habitat
					Large deep pools – critical drought refuge
					Extensive slackwater areas – nursery habitat
					Provides connectivity to facilitate migration, movement and dispersal
					EPBC Act, FFG Act
					High diversity of aquatic environments
10	Upper Broken Creek (to Boosey Creek confluence)	Broken	Goulburn Broken CMA	3	Box streamside vegetation and remnant plains grassy woodland
				4	EPBC Act, FFG Act
					Directory of Important Wetlands in Australia
11	Broken River	Broken	Goulburn Broken CMA	2	Floodplain Riparian Woodland – Endangered, EVC 56
				3	Floodplain Riparian Woodland – Endangered, EVC 56
				4	Creekline Grassy Woodland – Endangered, EVC68
					Plains Grassy Woodland – Endangered, EVC55
					Riverine Swampy Woodland – Endangered, EVC1099
					Instream woody habitat Riffles and pools
					Large deep pools – critical drought refuge
					Extensive slackwater areas – nursery habitat
					Provides connectivity to facilitate migration, movement and dispersal
					High diversity of aquatic environments
					EPBC Act, FFG Act
12	Ovens River including King and Buffalo	Ovens	North East CMA	2	Entire lower Ovens system is of high environmental value due to its relative intactness and near natural flow regime
				3	

PEA Map no.	Asset Name	Catchment	Asset Manager	Basin Plan schedule 8 criteria *	Asset characteristics
	Rivers, and Mullinmur Wetland			4	Heritage listed
				5	High habitat diversity
					Complex instream woody habitat
					Cobbles, riffles, pools, bars
					Anabranches, flood runners
					Littoral fringe
					Provides connectivity to facilitate migration, movement and dispersal
					EPBC Act, FFG Act
					High biodiversity

3.1 Changes to priority environmental assets since the previous LTWP

Updates to priority environmental assets (PEAs) since the 2021 LTWP are outlined in Table 3. One asset is no longer considered a priority environmental asset as it is now incorporated into another priority environmental asset. Two assets were previously included in the previous LTWP (2021) for potential inclusion and this update confirms their inclusion into the LTWP. There is one new asset, Molesworth Billabongs, which has been included in the Northern Victoria LTWP for its significant cultural values and significant ecological values.

Table 3. Changes to priority environmental assets since 2021 LTWP

Asset	Changes since 2021 LTWP
Mullinmur Wetland	This site is no longer considered as a standalone priority environmental asset as it is now managed as part of the Ovens River - refer to the Ovens River priority environmental asset
Horseshoe Lagoon	This site is confirmed as a priority environmental asset for the LTWP
Molesworth Billabongs	This is a new asset in this LTWP update. Molesworth Billabongs is an off-channel billabong complex on the floodplain of the Goulburn River that is managed by Parks Victoria, with environmental water delivery and complementary works at the site managed by Taungurung Land and Waters Council (TLWC). This asset supports EPBC-listed and FFG-listed flathead galaxias, culturally significant vegetation species and threatened vegetation communities. This asset receives water via a temporary pump from the Goulburn River

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)³. There are 45 ANAE wetland classifications identified in the Northern Victoria water resource plan area and eight ANAE riverine classifications. These are outlined in Table 4 and Table 5 below.

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.

Broadly, most waterway types present in northern Victoria are represented by existing priority environmental assets. Some waterway types are well represented, particularly river red gum swamps and black box woodland riparian zones, while others 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.

Ten of the 45 ANAE wetland types recorded across the Northern Victoria water resource plan area are represented as priority environmental assets in this LTWP (Table 4). The predominant types are temporary river red gum swamp (33% of the priority environmental wetland assets), freshwater meadow (30%), and permanent lake (10%).

³ 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).

Of the eight ANAE river types present in Northern Victoria, seven are present in priority environmental assets for this water resource plan area (Table 5). These types are predominantly permanent lowland stream (51% of the priority environmental river assets), temporary lowland stream (28%), and temporary transitional zone stream (11%).

ANAE types of individual priority environmental assets are listed in Appendix H.

Table 4. Representativeness of wetland priority environmental asset types compared with Northern Victoria water resource plan area ANAE waterway types

ANAE Type	Northern Victoria WRPA		Northern Victoria PEA	
	Area (ha)	% of total WRPA in this ANAE type	Area (ha)	% of total PEA in this ANAE type
Pt1.1.2: Temporary river red gum swamp	9,522.7	5.2	795.0	33.6
Pt2.3.2: Freshwater meadow	5,912.5	3.2	706.9	29.9
Lp1.1: Permanent lake	7,318.4	4	238.7	10.1
Pt1.2.2: Temporary black box swamp	2,038.3	1.1	214.3	9.1
Lt1.1: Temporary lake	2,315.1	1.3	181.5	7.7
Pt2.2.2: Temporary sedge/grass/forb marsh	312.4	0.2	130.5	5.5
Pt1.7.2: Temporary lignum swamp	3,055.6	1.7	82.9	3.5
Rp1.4: Permanent lowland stream	4,625.5	2.5	12.6	0.5
F1.4: River red gum woodland riparian zone or floodplain	22,967.1	12.5	3.0	0.1
Rt1.4: Temporary lowland stream	20,110.7	11	1.4	0.1
Pt3.1.2: Clay pan	26,571.7	14.5	0	0
F1.12: Woodland riparian zone or floodplain	23,634.3	12.9	0	0
Rt1.2: Temporary transitional zone stream	14,967.9	8.2	0	0
F1.2: River red gum forest riparian zone or floodplain	8,320.9	4.5	0	0
Rt1.1: Temporary high energy upland stream	8,317.2	4.5	0	0
F1.8: Black box woodland riparian zone or floodplain	6,246.4	3.4	0	0
F2.2: Lignum shrubland riparian zone or floodplain	6,153.2	3.4	0	0
Pt1.6.2: Temporary woodland swamp	3,887.6	2.1	0	0
Pt2.1.2: Temporary tall emergent marsh	1,120.6	0.6	0	0
F4: Unspecified riparian zone or floodplain	1,054.4	0.6	0	0
Rp1.2: Permanent transitional zone stream	948.1	0.5	0	0
Pp4.2: Permanent wetland	740.4	0.4	0	0
Pp2.4.2: Permanent forb marsh	570.8	0.3	0	0
Rt1.3: Temporary low energy upland stream	435.6	0.2	0	0
Pst1.1: Temporary saline swamp	404.8	0.2	0	0
Rt1: Temporary stream	310.3	0.2	0	0

ANAE Type	Northern Victoria WRP		Northern Victoria PEA	
	Area (ha)	% of total WRP in this ANAE type	Area (ha)	% of total PEA in this ANAE type
Lst1.2: Temporary saline lake with aquatic bed	238.1	0.1	0	0
Lst1.1: Temporary saline lake	173.5	0.1	0	0
Rp1.1: Permanent high energy upland stream	173.3	0.1	0	0
Ru1: Unspecified river	150.1	0.1	0	0
Pt1.8.2: Temporary shrub swamp	112.0	0.1	0	0
Rp1.3: Permanent low energy upland stream	64.9	0	0	0
Pst3.2: Salt pan or salt flat	64.4	0	0	0
Pp2.1.2: Permanent tall emergent marsh	58.2	0	0	0
Lt1.2: Temporary lake with aquatic bed	54.8	0	0	0
Lsp1.1: Permanent saline lake	46.4	0	0	0
F1.6: Black box forest riparian zone or floodplain	27.2	0	0	0
Pst4: Temporary saline wetland	23.8	0	0	0
F3.2: Sedge/forb/grassland riparian zone or floodplain	20.4	0	0	0
Pt4.2: Temporary wetland	19.1	0	0	0
F2.4: Shrubland riparian zone or floodplain	16.5	0	0	0
Rw1: Waterhole	7.6	0	0	0
Rp1: Permanent stream	4.9	0	0	0
Pps5: Permanent spring	3.7	0	0	0
Pp2.2.2: Permanent sedge/grass/forb marsh	2.4	0	0	0
total	183,124 ha		2,367 ha	

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

Table 5. Representativeness of riverine priority environmental assets compared with Northern Victoria ANAE waterway

ANAE Type	Northern Victoria WRPA		Northern Victoria priority environmental assets	
	Length (km)	% Length within WRPA of this ANAE type	Length (km)	% Length within PEA of this ANAE type
Rp1.4: Permanent lowland stream	2072.9	6	2522.3	51.6
Rt1.4: Temporary lowland stream	7878.1	22.7	1389.3	28.4
Rt1.2: Temporary transitional zone stream	15076.8	43.5	549.6	11.2
Rp1.2: Permanent transitional zone stream	664.5	1.9	274.3	5.6
Rt1.1: Temporary high energy upland stream	8628.8	24.9	134.3	2.7
Rt1.3: Temporary low energy upland stream	97.8	0.3	15.7	0.3
Rp1.1: Permanent high energy upland stream	202	0.6	4.7	0.1
Rp1.3: Permanent low energy upland stream	28.8	0.1	0	0
total	34,650 ha		4,890 ha	

3.3 Priority ecosystem functions in the Northern Victoria water resource plan area

Three ecosystem functions are prioritised for the Northern Victoria water resource plan area: longitudinal connectivity, water quality and geomorphic habitat (Table 6), 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 functions which CMAs can manage using held environmental water and which have specific watering objectives.

The priority ecosystem functions in Table 6 meet the criteria in Basin Plan schedule 9. The individual assets associated with these functions are listed in Table 9 of section 4.3.

Table 6. Priority ecosystem functions in the Northern Victoria water resource plan area

Ecosystem Function	Basin Plan Schedule 9 criteria *	Function characteristics
Longitudinal hydrological connectivity (between river reaches for fish movement)	1	Supports the creation and maintenance of vital habitats
	2	
	3	Supports the transportation and dilution of nutrients, organic matter and sediment Provides connections along a watercourse (longitudinal connections)
Water quality (that allows for ecosystem processes)	1	Supports the creation and maintenance of vital habitats
	2	Supports the transportation and dilution of nutrients, organic matter and sediment
Geomorphic habitat	1	Supports the creation and maintenance of vital habitats

* refer to Appendix J

Longitudinal connectivity is identified as a priority ecosystem function for this LTWP, but lateral connectivity is less realistic. Many of the wetland PEAs in the Northern Victoria water resource plan area are connected to environmental water delivery through infrastructure such as channels and pumps. Refer to chapter 7 Constraints for further information.

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 Northern Victoria water resource plan area.

4.1 Approach to developing objectives, targets and watering requirements

The objectives for this LTWP have been collated from the EWMPs, environmental flow studies, seasonal watering proposals, or other watering guides prepared by CMAs or Traditional Owners for priority environmental assets across the Northern Victoria water resource plan area (refer to Appendix B for full list of EWMPs). 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 8). 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 (section 4.4) 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 10. DEECA will work with CMAs over coming years to consider whether more aspirational objectives can be revised and targets set for the LTWP.

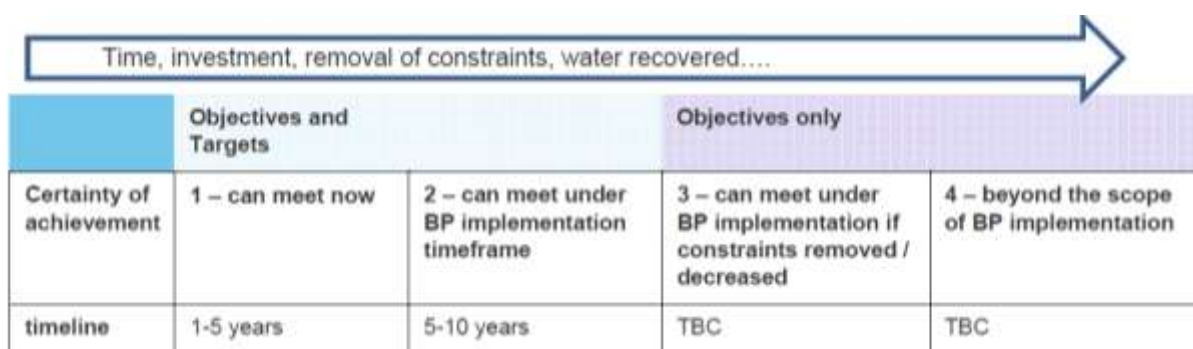


Figure 10. Certainty of achievement has been used in setting objectives and targets in this LTWP. Longer-term aspirational objectives have not had targets set, due to uncertainty in future conditions and ability for associated targets to be met.

4.2 Management goals for the Northern Victoria water resource plan area

The Goulburn Broken, North Central, and North East CMAs developed site-specific environmental water management goals in consultation with communities through the EWMP process. Taungurung Land and Waters Council also developed watering goals for Molesworth Billabongs through a seasonal watering proposal (2025-26). During development of the Northern Victoria LTWP, these were summarised into management goals for the Northern Victoria water resource plan area (see Table 7). Management goals for individual assets are presented in Appendix D.

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

Table 7. Management goals for the Northern Victoria water resource plan area

Management goals
Maintain or improve populations of threatened species and communities that are dependent upon waterways that receive environmental water in the region.
Maintain or improve the connectivity within and between the different types of waterways.
Maintain the condition of waterways that are formally recognised and in a near-natural or ecologically healthy state.
Provide flow regimes that protect and improve the region's important aquatic flora and fauna, instream habitats, connected floodplains and ecological processes.
Build populations of threatened native fish and waterbirds and ensure that they are resilient.
Provide watering regimes in wetlands that support the recruitment and maintenance of river red gum habitats and promote the growth of a diverse range of aquatic and amphibious plant species offering a variety of habitats to waterbirds, reptiles and amphibians, and ensure opportunities for waterbird foraging, nesting and breeding.

4.3 Ecological objectives for the Northern Victoria water resource plan area

Twenty-seven ecological objectives have been developed for the Northern Victoria water resource plan area and are set out in Table 8 below, with alignment to the Basin Plan environmental watering plan (EWP), and relevant 2025 BWS expected environmental outcomes (EEOs) and First Nations objectives. Refer to Appendix I for definitions of the codes used (Table 29, Table 30, Table 31).

Table 8. Ecological objectives for the Northern Victoria water resource plan area

Theme	No.	Objectives	2025 BWS EEOs	BWS First Nations objectives	EWP Objectives
Connectivity and Functions	NV1	Improve longitudinal connectivity (between river reaches and with the Murray)	FC1, FC3, FC5, FC6, FC7, F3, F4, F6, F9, F17	2.1, 2.2, 2.3, 2.5, 2.10	8.06,3(a), 8.06,3(b)(i) 8.06,3(b)(ii), 8.06,3(f) 8.06,6(b), 8.07,6
	NV2	Maintain water quality within an appropriate range to allow for ecosystem processes	no specific EEOs but supports fish, waterbird and vegetation EEOs	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
	NV3	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	no specific EEOs but supports fish, and vegetation EEOs	2.1, 2.5	8.06,4
Vegetation	NV4	Maintain the condition of aquatic vegetation in wetlands	V3, V4, V6, V8, V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a) 8.06,5, 8.06,7
	NV5	Maintain the condition of in-channel aquatic vegetation	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a) 8.06,5, 8.06,7
	NV6	Improve the extent of aquatic vegetation	V1, V5, V7	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2 8.06,3(a), 8.06,5 8.06,6(a), 8.06,7
	NV7	Improve the abundance of aquatic vegetation	V1, V5, V7, V8, V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2 8.06,3(a), 8.06,5 8.06,6(a), 8.06,7
	NV8	Improve the species richness of aquatic vegetation in wetlands	V2, V7, V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a) 8.06,5, 8.06,7
	NV9	Improve the species richness of in-channel aquatic vegetation	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a) 8.06,5, 8.06,7
	NV10	Maintain the extent of river red gum dominated EVCs	V1	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
	NV11	Maintain the condition of river red gum dominated EVCs	V3	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)

Theme	No.	Objectives	2025 BWS EEOs	BWS First Nations objectives	EWP Objectives
					8.06,6(b), 8.06,7
	NV12	Improve species richness of river red gum dominated EVCs	V2, V4	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
	NV13	Maintain the extent of black box dominated EVCs	V1	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,3(b)(ii), 8.06,6(a) 8.06,6(b)
	NV14	Reduce the extent and diversity of exotic vegetation	No specific EEO	2.2, 2.9	8.07,5
Waterbirds	NV15	Improve breeding opportunities for waterbirds	B3, B4	2.2, 2.9	8.06,6(a)
	NV16	Improve habitat for waterbirds	no specific EEO but supported by e.g. V7	2.2, 2.5, 2.6, 2.7	8.06,6(b)
Fish	NV17	Improve abundance of large-bodied native fish	F1, F2, F4, F5, F6, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b) 8.07,3
	NV18	Improve abundance of small-bodied native fish	F1, F2, F4, F5, F6, F7, F9F17	2.2, 2.5, 2.6, 2.7	8.06,5 8.06,6(a)
	NV19	Improve habitat for native fish	no specific EEOs but supported by FC1-7	2.2, 2.5, 2.6, 2.7	8.06,6(a) 8.06,6(b) 8.07,3
	NV20	Improve movement of native fish	F3, F4, F6, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(b)
	NV21	Maintain species richness of native fish	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a)
Other Fauna	NV22	Improve breeding of Platypus and Rakali	no specific EEOs	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
	NV23	Maintain abundance of Platypus and Rakali	no specific EEOs	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
	NV24	Improve breeding of frog communities	no specific EEOs	2.3, 2.5, 2.6, 2.9	8.06,6(b) 8.07,3
	NV25	Maintain species richness of frog communities	no specific EEOs	2.3, 2.5, 2.6, 2.9	8.06,6(b) 8.07,3
Invertebrates	NV26	Improve abundance of invertebrates	no specific EEOs	2.6, 2.7, 2.8	8.06,6(b) 8.07,3

Theme	No.	Objectives	2025 BWS EEOs	BWS First Nations objectives	EWP Objectives
	NV27	Improve number of invertebrate functional groups present	no specific EEOs	2.6, 2.7, 2.8	8.06,6(b) 8.07,3

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). BWS First Nations objectives codes are outlined in **Error! Reference source not found.**1.

The specific assets these objectives relate to are set out in Table 9 and individual objectives for each asset can be found in Appendix D. Targets are also included in Table 9 and explained in section 4.4 below.

Table 9. Priority environmental assets associated with each ecological objective and target

Theme	No.	Objective	Target	Assets
Connectivity and functions	NV1	Improve longitudinal connectivity (between river reaches and with the Murray)	<i>To be confirmed</i>	Campaspe River, Coliban River, Loddon River (upper), Pyramid Creek
	NV2	Maintain water quality within an appropriate range to allow for ecosystem processes	<i>To be confirmed</i>	Birch's Creek, Campaspe River, Coliban River, Loddon River (upper), Pyramid Creek, Serpentine Creek, Twelve Mile Creek, Tullaroop Creek
	NV3	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	<i>To be confirmed</i>	Broken River and Upper Broken Creek, Goulburn River Loddon River (upper), Pyramid Creek, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
Vegetation	NV4	Maintain the condition of aquatic vegetation in wetlands	The condition of wetland vegetation 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: • cover/abundance of native species • native species richness recruitment of woody and non-woody understorey and survival of juvenile plants	Gaynor Swamp, Horseshoe Lagoon, Lake Boort, Lake Leaghur, Lake Yando, Meran Lakes Complex, Goulburn River, Broken River and Upper Broken Creek
	NV5	Maintain the condition of in-channel aquatic vegetation	<i>To be confirmed</i>	Broken River and Upper Broken Creek, Coliban River, Campaspe River, Loddon River (upper), Twelve Mile Creek
	NV6	Improve the extent of aquatic vegetation	<i>To be confirmed</i>	Campaspe River, Coliban River, Goulburn River, Lake Leaghur, Meran Lakes Complex, Broken River and Upper Broken Creek, Loddon River (upper), Serpentine Creek, Pyramid Creek, Tullaroop Creek, Twelve Mile Creek, Lake Yando
	NV7	Improve the abundance of aquatic vegetation	<i>To be confirmed</i>	Birch's Creek, Coliban River, Campaspe River, Goulburn River, Meran Lakes Complex, Lake Leaghur, Loddon River, Molesworth Billabongs
	NV8	Improve the species richness of aquatic vegetation in wetlands	<i>To be confirmed</i>	Kanyapella Basin, Lake Boort, Lake Leaghur, Lake Yando, Loch Garry, Meran Lakes Complex, Molesworth Billabongs, Moodie Swamp, Reedy Swamp, Broken River and Upper Broken Creek

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Theme	No.	Objective	Target	Assets
	NV9	Improve the species richness of in-channel aquatic vegetation	<i>To be confirmed</i>	Birch's Creek, Coliban River, Goulburn River, Campaspe River, Loddon River, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV10	Maintain the extent of river red gum dominated EVCs	<i>To be confirmed</i>	Campaspe River, Coliban River, Lake Boort, Lake Leaghur, Lake Yando, Meran Lakes Complex, Loddon River (upper), Serpentine Creek, Tullaroop Creek, Twelve Mile Creek, Goulburn River
	NV11	Maintain the condition of river red gum dominated EVCs	The condition of river red gum dominated EVCs in the asset improves over ten years as measured by the following sub-targets: • health of adult river red gum trees • recruitment and survival of juvenile trees • native species richness • native species cover/abundance recruitment of understorey vegetation	Birch's Creek, Campaspe River, Coliban River, Doctors Swamp, Meran Lakes Complex, Lake Leaghur, Lake Yando, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV12	Improve species richness of river red gum dominated EVCs	<i>To be confirmed</i>	Doctors Swamp, Campaspe River, Gaynor Swamp, Meran Lakes Complex, Loddon River (upper)
	NV13	Maintain the extent of black box dominated EVCs	<i>To be confirmed</i>	Lake Boort, Meran Lakes Complex, Lake Yando, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek, Kanyapella Basin
	NV14	Reduce the extent and diversity of exotic vegetation	<i>To be confirmed</i>	Birch's Creek, Doctors Swamp, Gaynor Swamp, Kanyapella Basin, Moodie Swamp, Molesworth Billabongs, Reedy Swamp
	NV15	Improve breeding opportunities for waterbirds	<i>To be confirmed</i>	Doctors Swamp, Gaynor Swamp, Kanyapella Basin, Meran Lakes Complex, Moodie Swamp, Lake Leaghur, Lake Yando, Lake Boort
Waterbirds	NV16	Improve habitat for waterbirds	<i>To be confirmed</i>	Horseshoe Lagoon, Lake Boort, Lake Yando, Loch Garry, Meran Lakes Complex, Reedy Swamp
Fish	NV17	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	Birch's Creek, Campaspe River, Coliban River, Goulburn River, Loddon River (upper), Pyramid Creek, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek

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Theme	No.	Objective	Target	Assets
			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	
	NV18	Improve abundance of small-bodied native fish	<i>To be confirmed</i>	Birch's Creek, Campaspe River, Coliban River, Goulburn River, Meran Lakes Complex, Loddon River (upper), Pyramid Creek, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV19	Improve habitat for native fish	<i>To be confirmed</i>	Birch's Creek, Broken River and Upper Broken Creek, Coliban River, Goulburn River, Ovens River, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV20	Improve movement of native fish	<i>To be confirmed</i>	Broken River and Upper Broken Creek, Campaspe River, Goulburn River, Ovens River, Loddon River, Pyramid Creek, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV21	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	Birch's Creek, Campaspe River, Coliban River, Loch Garry, Molesworth Billabongs, Ovens River, Campaspe River, Loddon River (upper), Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
Other fauna	NV22	Improve breeding of Platypus and Rakali	<i>To be confirmed</i>	Birch's Creek, Campaspe River, Coliban River, Goulburn River, Loddon River (upper), Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV23	Maintain abundance of Platypus and Rakali	<i>To be confirmed</i>	Birch's Creek, Broken River and Upper Broken Creek, Coliban River, Campaspe River, Coliban River, Goulburn River, Loddon River (upper), Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV24	Improve breeding of frog communities	<i>To be confirmed</i>	Doctors Swamp, Moodie Swamp, Lake Leaghur
	NV25	Maintain species richness of frog communities	The number of frog species observed in eight in a ten-year period must be more than 75% of the highest diversity recorded in any one year.	Gaynor Swamp, Horseshoe Lagoon, Meran Lakes Complex, Loch Garry, Reedy Swamp, Loddon River (upper), Serpentine Creek, Tullaroop Creek, Twelve Mile Creek

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Theme	No.	Objective	Target	Assets
Invertebrates	NV26	Improve abundance of invertebrates	<i>To be confirmed</i>	Goulburn River, Birch's Creek, Broken River and Upper Broken Creek, Campaspe River, Coliban River, Lake Yando, Lake Leaghur, Serpentine Creek, Tullaroop Creek, Twelve Mile Creek
	NV27	Improve number of invertebrate functional groups present	<i>To be confirmed</i>	Birch's Creek, Campaspe River, Coliban River, Meran Lakes Complex, Lake Leaghur, Loddon River (upper), Serpentine Creek, Tullaroop Creek, Twelve Mile Creek

4.4 Targets for environmental watering in the Northern Victoria water resource plan area

Targets have been developed for a subset of the objectives developed for this water resource plan area (refer Table 9). The process for the development of the targets is set out in Appendix C. The aim was to make objectives 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:

- '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
- Waterbird guilds are based on feeding and habitat requirements. The main guilds in northern Victorian 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 biota sub-index is used, as outlined in the Index of Wetland Condition assessment procedure (DELWP, 2022b).

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

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 11). In regulated rivers, some of the flow components that are needed can be provided through held environmental water (see section 5.1.5) 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, very high flows (including bankfull and overbank flows) are generally not feasible via regulated delivery (due either to the volume of water required, infrastructure constraints or potential flooding issues including legal liability), although natural flows can be “topped up” to meet critical depth or duration requirements. Figure 11 graphically depicts the benefits of different environmental flow components in rivers.

Table 10 links specific flow components to the ecological objectives for river assets. While the flow components apply across all river assets, the details (flow rate, timing, frequency and duration) will be asset specific. An example of the flow components required to meet ecological objectives for the lower Goulburn River is presented in Table 11 (Horne et al, 2020).

In addition to watering requirements in individual river and wetland EWMPs (refer Appendix B), the environmental watering requirements of priority environmental 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 and can be used to interrogate watering requirements at varying scales, from single environmental assets up to CMA and water resource plan scales.

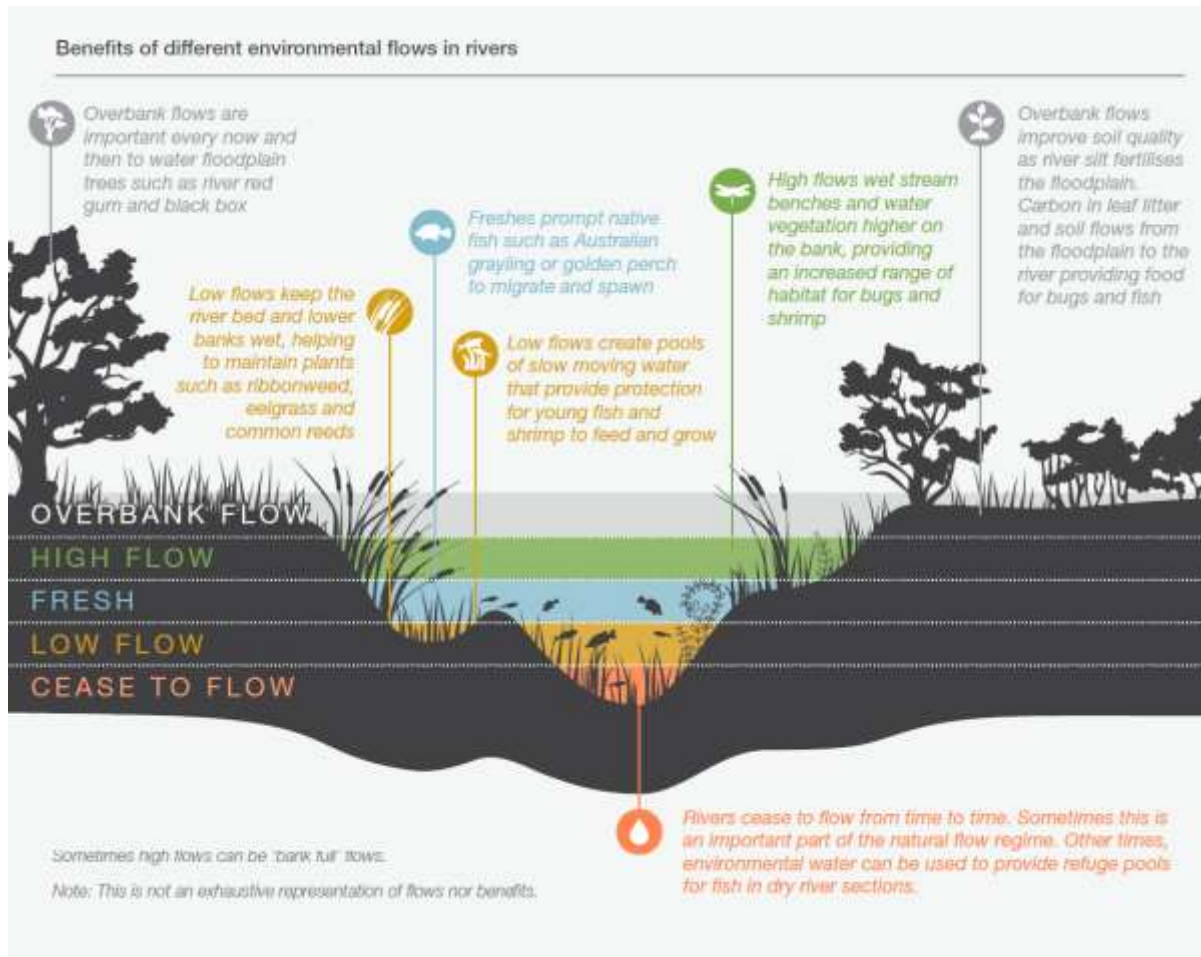


Figure 11. Benefits of different environmental flow components in rivers (VEWH, 2025c)

Table 10. Flow components required to meet native fish, vegetation, functions and other fauna 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 abundance of small-bodied native fish	✓	✓				Low flows all year for habitat; summer fresh for habitat quality
	Improve habitat for native fish	✓	✓				Low flows all year for habitat; summer fresh for habitat quality
	Improve movement of native fish	✓	✓	✓			Low flows all year for habitat; summer fresh for local movement; Winter/ spring high flow for movement trigger.
	Maintain species richness of native fish	✓	✓	✓			Low flows for habitat; freshes and high flows for channel maintenance, habitat quality, movement and breeding
Vegetation	Maintain the condition of in-channel aquatic vegetation	✓	✓	✓			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
	Improve the extent of aquatic vegetation	✓	✓	✓	✓		Low flows for habitat; summer fresh for dispersal of propagules into disturbed habitats
	Improve the abundance 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 species richness of in-channel 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>
	Maintain the extent of river red gum dominated EVCs			✓	✓	✓	Overbank flows to wet higher benches and facilitate recruitment, high flow and bank full to inundate river red gums.
	Maintain the condition of river red gum dominated EVCs			✓	✓	✓	Overbank flows to wet higher benches and, high flow and bank full to inundate riparian river red gum.

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Objective		Low flow	Freshes	High Flow	Bankfull	Overbank flow	Explanation (based on conceptual models)
	Improve species richness of river red gum dominated EVCs			✓	✓	✓	Overbank flows to wet higher benches and facilitate recruitment, high flow and bank full to inundate river red gum.
	Maintain the extent of black box dominated EVCs			✓	✓	✓	Overbank flows to wet higher benches and facilitate recruitment, high flow and bank full to inundate riparian black box.
	Reduce the extent and diversity of exotic vegetation			✓	✓		High and bankfull flows to physically remove exotic vegetation, and disturb ability to populate channel or bank.
Functions	Improve longitudinal connectivity (between river reaches and with the Murray)	✓	✓				Base flows maintain edge habitats in deeper pools and runs, and shallow water habitat availability for macroinvertebrates and endemic fish.
	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
	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)	✓	✓	✓	✓	✓	Low flows and freshers 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,
Other fauna	Improve breeding of 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.
	Maintain abundance of Platypus and Rakali	✓	✓	✓	✓		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 that flood burrows when juveniles are present, low flow and freshes for habitat in dry periods
	Improve breeding of frog communities	✓	✓	✓	✓	✓	Low flows for habitat; freshes for habitat and increased foraging; spring high flows, bankfull and unregulated overbank flows for connection to new habitats and move organic debris in the channel to support macroinvertebrate communities for feeding.

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
	Improve abundance of invertebrates	✓	✓	✓	✓	✓	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
	Improve number of invertebrate functional groups present	✓	✓	✓	✓	✓	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 and increase diversity

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

Table 11. Example of Environmental flow recommendations for the Lower Goulburn River from the Kaiela FLOWS study (Horne et al, 2020)

Priority	Flow Component	Magnitude	Duration	Timing	Frequency	Relevant Objectives
1	Year round Baseflow (Providing habit diversity and sustaining the system)	- Preferred flows are between 500 – 1000 ML/d (or natural) during summer and autumn - During summer and autumn, ensure variability in flow regime (CV > 0.2) (e.g. mean of 750 and standard deviation of 150 ML/d) - During winter and spring ensure flow is greater than 500 ML/d	N/A	Year round	Every Year	All Fish, Instream Productivity, Macroinvertebrates, Littoral Vegetation, Midbank Vegetation, Bank Stability, Turtles, Social
2a	Overbank or high flows (channel forming event)	- Opportunistic event – aim to provide as high as possible an event by piggybacking natural event. Where overbank not possible, still provide as large an event as possible (aiming for 15,000 ML/d) for channel maintenance and forming >30,000 ML/d allow significant area of floodplain vegetation to be inundated >20,000 ML/d inundates floodplain near Loch Garry >10,500 ML/d starts to inundate low lying flood runners and anabranches	- Areas on the lower floodplain will fill instantaneously. 5 days at peak to fill larger wetlands (base this on opportunity to piggyback)	- Ideally late winter to spring or as naturally - induced - Not during summer to minimize black water events.	- As often as possible given natural flow events - Aim for an event >10,500 each year (rainfall runoff or release) >20,000 7 in 10 years or as per natural rainfall runoff >30,000 Natural frequency	Opportunistic Fish, Periodic/Equilibrium Fish, Instream Productivity, Macroinvertebrates, Littoral/Bank Vegetation, Floodplain Vegetation, Instream Habitat Complexity, Turtles, Platypus
2b	Early Spring fresh (Priming the system)	(Provide if 2a not achievable or if 2a occurred early in winter allowing a second fresh) - Range 5,000 ML/d to 10,500 ML/d >5000 ML/d provide some benefit for bank vegetation >7300 ML/d to mobilize bed sediments and scour fine sediment	7 days at peak	At least one annually in early spring	Yearly	All Fish, Macroinvertebrates, Littoral/Bank Vegetation, Instream Habitat Complexity
4	Autumn fresh (flow variability and ecosystem maintenance)	>5700 ML/d to reset surfaces	1 – 2 days at peak for vegetation and scouring 7 days at peak for migration of fish	During the growing season	Yearly	All Fish, Macroinvertebrates, Littoral/Bank Vegetation, Instream Habitat Complexity
5	Late Spring fresh (to cue fish spawning)	>7,500 ML/d for high chance of spawning >5600 ML/d for any benefit	2 days at peak	Nov – Dec when Water temperature > 19°C	Yearly	Periodic Fish, Macroinvertebrates, Instream Habitat Complexity
6	Winter-Spring variable baseflow (Ensure habitat diversity)	- Variability required – mimic natural variability by passing freshes and larger events from tributaries >500 ML/d - natural	N.A	Winter/spring	Yearly	All Fish, Macroinvertebrates, Littoral Vegetation,

Priority	Flow Component	Magnitude	Duration	Timing	Frequency	Relevant Objectives
						Midbank Vegetation, Instream Habitat Complexity

4.5.2 Watering requirements for wetlands

The Northern Victoria water resource plan area contains a considerable diversity of wetland types. Based on area, the priority environmental assets are predominantly temporary river red gum swamp, freshwater meadow, permanent lakes and temporary black box swamp.

Historically, wetlands would typically receive water from high river flows in wet winter/spring periods. Very heavy rainfall in summer/autumn could also lead to substantial inflows into wetlands. Land and water resource development since colonisation has altered the frequency, timing and duration of rivers flows, putting at risk the ecological values of priority wetland assets. Environmental water can be used to reinstate a more natural watering regime, including a wetting and drying cycle where appropriate.

In wetlands, phases of the managed watering regime include (Figure 12 and Figure 13):

- 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. An example of wetland watering requirements is presented in Table 13, which shows the objectives and required regime for Lake Yando (NCCMA, 2016).

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. Another consideration in 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). These factors are considered annually in the development of the VEWH’s Seasonal Watering Plan.

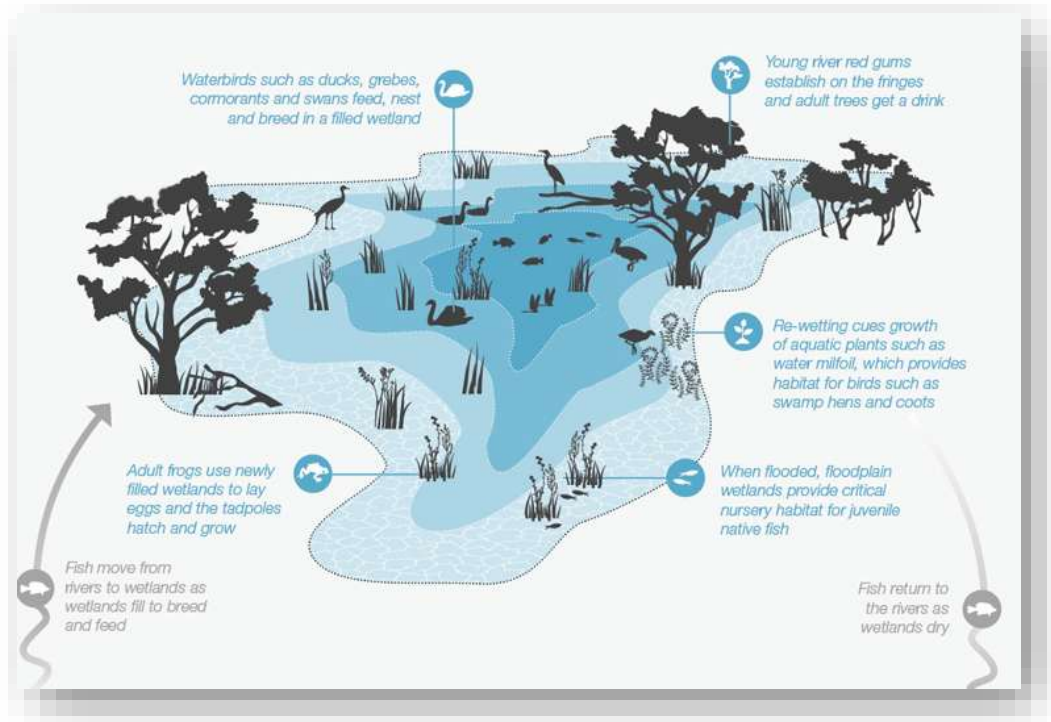


Figure 12. Benefits of wetting phases in wetlands (VEWH, 2025d)

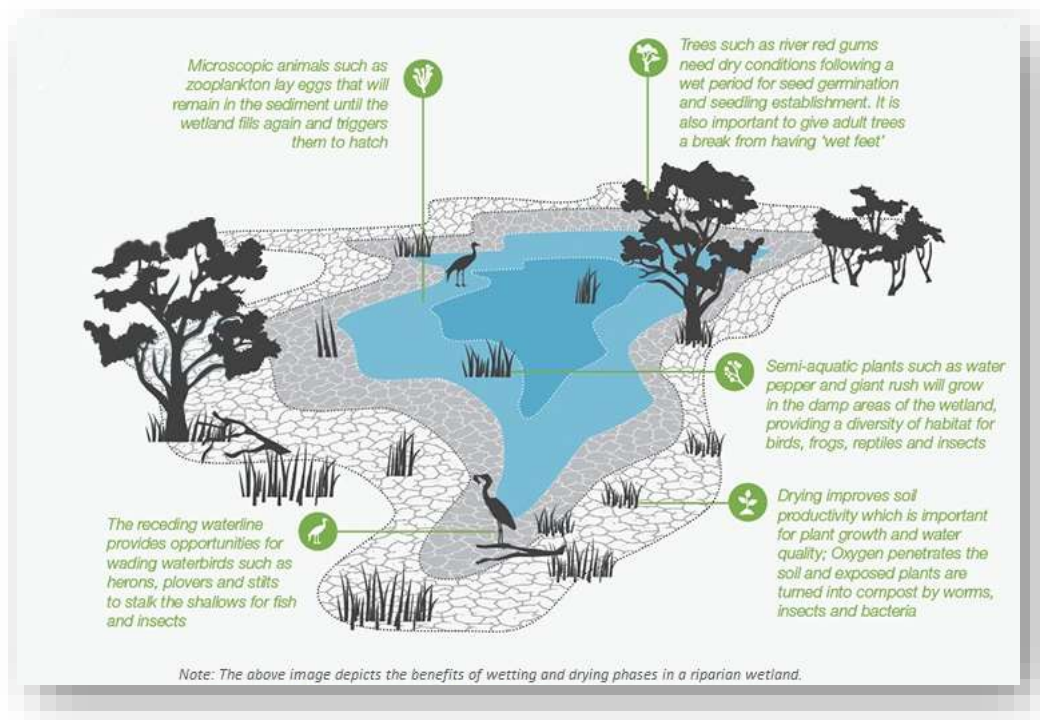


Figure 13. Benefits of drying phases in wetlands (VEWH, 2025e)

Table 12. Elements of the wetting/drying cycle required to meet waterbird, vegetation and other fauna objectives for wetlands

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 habitat 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	Maintain the condition of aquatic vegetation in wetlands	✓		✓	✓	✓		Filling and natural drying promotes germination of different functional groups and diversity of habitats
	Improve the extent of aquatic vegetation	✓		✓	✓	✓		Managed floodplain level represents the maximum extent of communities
	Improve the abundance of aquatic vegetation	✓		✓	✓	✓		Filling and natural drying promotes germination of different functional groups and diversity of habitats Managed floodplain level represents the maximum extent of communities
	Improve the species richness of aquatic vegetation in wetlands	✓		✓	✓	✓		Filling and natural drying promotes germination of different functional groups and diversity of habitats Managed floodplain level represents the maximum extent of communities
	Maintain the extent of river red gum dominated EVCs	✓	✓	✓	✓	✓	✓	Flooding to manage wetland extent then reducing to full level will water adult trees, but prevent waterlogging
	Maintain the condition of river red gum dominated EVCs	✓	✓	✓	✓	✓	✓	Flooding to manage wetland extent then reducing to full level will water adult trees, but prevent waterlogging
	Maintain the species richness of river red gum dominated EVCs	✓	✓	✓	✓	✓	✓	Flooding to manage wetland extent then reducing to full level will water adult trees, but prevent waterlogging
	Maintain the extent of black box dominated EVCs	✓	✓			✓	✓	Flooding to manage black box extent then reducing to prevent waterlogging

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Objective		Regional mosaic	Dry	Filling	Full	Flooded	Drying	Explanation (based on EWMP conceptual model)
	Reduce the extent and diversity of exotic vegetation	✓	✓	✓	✓	✓	✓	Mosaic of watering regimes to promote wetland aquatic vegetation, drying to remove exotic species, flooding to manage terrestrial species.
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
	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. Example wetland watering requirements for Lake Yando (NCCMA, 2016)

Ecological objectives	Water management area	Hydrological Requirements											Preferred timing of inflows	Depth (m)
		Recommended number of events in 10 years			Inter-drying period duration (months)			Duration of ponding (months)						
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max				
1. Vegetation objectives														
1.1	Maintain the health and restore the distribution of river red gum and understorey species associated with Intermittent swampy woodland EVC	Bed/Fringe	1	2	3	24	36	60	1-3	3-6	6	Not critical, but more growth and regeneration achieved if flooded during spring summer	Not critical for mature trees, but juveniles not to be fully inundated	
1.2	Maintain and rehabilitate EVCs 107 (Lake bed herbland), 653 (Aquatic herbland), 949 (Dwarf floating aquatic herbland) - Provide a water regime that supports these EVCs and allows species to complete their lifecycles (i.e. set seed) - Ensure a viable seed bank is maintained		2	3	5	12	24	60	1	6	12	Late winter/spring	0.4 - 1m	
1.3	Maintain the health and increase the distribution of Riverine chenopod woodland (EVC 103) Maintain health of existing trees	Bed and riparian zone	1	2	3	36	60	120	2	3-7	12	Spring		

		Hydrological Requirements											
Ecological objectives	Water management area	Recommended number of events in 10 years			Inter-drying period duration (months)			Duration of ponding (months)			Preferred timing of inflows	Depth (m)	
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max			
Provide opportunities for recruitment													
2. Fauna objectives													
2.1	Maintain and where necessary rehabilitate the abundance and diversity of waterbirds using the wetland when it is full and as it draws down	Bed/fringe	3	5-10	10	4	4-6	-	4	6	12	Winter to summer	Variable

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 Victorian Environmental Water Holder or Commonwealth Environmental Water Holder (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

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. For example, the Ovens system has two relatively small reservoirs, receives relatively high annual river flows and is sometimes called semi-regulated. The Goulburn River has two major storages (Lake Eildon and Goulburn Weir) and high consumptive demand. Impact on the environment from regulation is greater in the Goulburn River than in the Ovens River.

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 northern Victorian regulated systems, environmental water requirements can be met with HEW (section 5.1.5), a small amount of planned environmental water (section 5.1.6), and other water in the system which also supports environmental water outcomes (section 5.1.7). Other water includes passing flow requirements that meet multiple objectives, delivery of water from reservoirs to downstream users, delivery of water from inter-valley trade accounts, or transfers from storages.

There are six main regulated systems in the Northern Victoria water resource plan area, the Ovens, Broken, Goulburn, Campaspe, Coliban and Loddon (Table 14).

Table 14. Regulated systems in the Northern Victoria water resource plan area

System	Description	Comments
Ovens/King	Flows are regulated by Lake Buffalo on the Buffalo River (major tributary of the Ovens River) and Lake William Hovell on the King River. Regulated flows extend downstream from the storages to the confluence of the Ovens River with the Murray at Lake Mulwala.	These systems are sometimes referred to as semi-regulated, as much of the flow originates from the unregulated Upper Ovens and key tributaries or spills over the two storages. Flows in the system are supplemented by storage releases during drier months, typically December to March.
Broken	Flows are regulated by Lake Nillahcootie on the Broken River and Caseys Weir, right through to its confluence with the Goulburn River at Shepparton. Flow is diverted at Caseys Weir into the Upper Broken Creek.	The extent of regulation in this system has decreased following the decommissioning of Lake Mokoan to generate environmental water savings.
Goulburn	Flows are regulated by Lake Eildon and Goulburn Weir on the Goulburn River. Waranga Basin is a major off-stream storage filled by flows diverted at Goulburn Weir and is used to meet irrigation demands in the Goulburn component of the Goulburn Murray Irrigation District. The Goulburn River is regulated from Lake Eildon through to its confluence with the River Murray.	The Goulburn catchment is one of the major supply sources for irrigation in the Shepparton, Central Goulburn, Rochester and Loddon Valley Irrigation Areas. Water is diverted from the Goulburn River and supplied via the Waranga Western Channel to the Central Goulburn, Rochester and Loddon Valley area, and via the East Goulburn Main Channel to the Shepparton Irrigation Area. The Goldfields super pipeline also allows water to be diverted from Waranga Basin to Ballarat. Supplementary supplies can be diverted into the Waranga Western Channel from the Campaspe River and the Loddon River.
Campaspe	Flows are regulated by Lake Eppalock and Campaspe Weir on the Campaspe River. The Campaspe River is regulated from Lake Eppalock through to its confluence with the River Murray.	The Campaspe system supplies irrigation demands on the Campaspe River and urban demands for Bendigo. Pumps are also able to deliver supplement water (the Goulburn supplement) to the Waranga Western Channel, however these have not been utilised in many years and would require recommissioning to operate. There are significant environmental entitlements in the Campaspe system which were established in part with water acquired as part of the decommissioning of the Campaspe Irrigation District, as well as through water purchase.
Coliban	Flows are regulated by Upper Coliban, Lauriston and Malmsbury reservoirs on the Coliban River, which is a tributary of the Campaspe River upstream of Lake Eppalock. The Coliban River is regulated from Upper Coliban through to Lake Eppalock	The Coliban system supplies rural and urban water needs to the Bendigo region. No water is released downstream of Malmsbury Reservoir into the Coliban River for consumptive purposes. A small Commonwealth environmental entitlement is available in the Coliban River which can be released from Malmsbury Reservoir into the Coliban River, however this has never been delivered. Instead passing flows are banked for use as needed.

System	Description	Comments
Loddon	Flows are regulated by Cairn Curran Reservoir and Laanecoorie Reservoir on the Loddon River, Tullaroop Reservoir on the Tullaroop Creek, and by Newlyn Reservoir and Hepburn Lagoon on Birch's Creek in the uppermost reaches of the system. Birch's Creek enters Tullaroop Creek near Clunes, and Tullaroop Creek enters the Loddon upstream of Laanecoorie Reservoir. The Loddon River is regulated from these reservoirs through to Loddon Weir near Boort (see comments). Serpentine Creek is regulated by Serpentine Weir.	The Loddon system supplies irrigation demands on the Loddon River and via supplements delivered into the Waranga Western Channel at Loddon Weir. Supplies are not released downstream of Loddon Weir for consumptive purposes, but environmental releases can be made into the reach downstream of Loddon Weir if required.

5.1.2 Unregulated

In northern Victoria, the unregulated systems are generally tributaries of regulated rivers and often upstream of reservoirs. Many unregulated rivers and streams in the Northern Victoria water resource plan area have high environmental values. As there are no major storages on these rivers and streams, flows in these unregulated systems are largely unmodified. While this is positive, the absence of large storages means that there is no HEW in these systems that can be released to target specific flow components. 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.

A water supply protection area has been declared for the Upper Ovens River, and an integrated water management plan recognises and jointly manages both surface water and groundwater. Local management rules have been developed and published for virtually all other significant unregulated streams in the water resource plan area⁴.

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, 2015) 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

⁴ Local management plans or rules are developed and signed off by rural water corporations, as a delegate of the Minister for Water. All can be found on the relevant water corporations' websites.

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.

The hydrogeology of the water resource plan area is broadly subdivided into two distinct geological regions (DELWP, 2019a). The first is the southern highlands region features exposed bedrock and valleys of eroded material that form the Quaternary Aquifer. This thin, shallow aquifer made up of sand, colluvium, fluvial sands, gravels, clay and silts is found in upland valleys such as Alexandra, Yea and Flowerdale. Water is also held in the Mesozoic and Palaeozoic basement rock, which is close to the surface near Jamieson, Mansfield, Marysville, Kilmore and Seymour.

The other geological region (DELWP, 2019a) is the northern floodplain of the Ovens, Broken, Goulburn, Campaspe, Loddon and Murray rivers. It includes the Upper Tertiary Quaternary Aquifer (UTQA) of the Shepparton formation of layered clay, sands and silt that runs from near Seymour north to Nathalia, Barmah and Numurkah. Along the River Murray, the UTQA overlies the Calivil Formation Upper Tertiary Aquifer fluvial, containing fluvial sand, gravel and clay. Other formations include the Lower Tertiary Aquifers of the Renmark formation near Nathalia and Barmah, and Cretaceous Permian sediments made of fractured rock, sand and minor coal near Shepparton to parts of the north near Nathalia and Numurkah.

Groundwater dependency of priority environmental assets

Victoria's North and Murray Water Resource Plan (DELWP, 2019a) identifies the groundwater-dependent priority environmental assets in the Northern Victoria water resource plan area (refer Appendix G Table 25). These assets have been assessed as to whether they are sufficiently protected from risks via the provision of existing groundwater management plans (Groundwater Logic, 2019).

Whilst the confidence assigned to groundwater dependence varied from high to low, the level of risk posed by groundwater resource use was generally assessed as low for priority environmental assets across northern Victoria (Groundwater Logic, 2019). Only four river reaches and one wetland have been classified as moderate risk GDEs, but all are in areas with existing water management protections in place (e.g. ongoing groundwater usage restriction triggers in place under the Local Management Plan, or where there are baseflow-related targets for environmental watering). Groundwater dependent wetlands were all considered to be at low risk from groundwater extraction. Overall, existing measures were considered sufficient to protect priority environmental assets from excessive groundwater resource use.

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. The entitlement framework provides for:

- 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 North and Murray 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 PEW or 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 CMAs 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 Northern Victoria water resource plan area is summarised in Table 15 **Error! Reference source not found..**

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.

Section 10.09(1) of the Basin Plan requires the identification of planned environmental water (PEW). A review of Victoria's bulk entitlements and statutory management plans in Victoria's North and Murray water resource plan area was undertaken to determine what forms of PEW there are in northern Victoria.

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.

There are three instances in Victoria's North and Murray water resource plan - covering the connected Victorian Murray and Northern Victorian water resource plan areas together - where instruments meet the Basin Plan definition of PEW. These are:

- Minimum passing flows available under the Bulk Entitlement (Broken System – Goulburn-Murray Water) Conversion Order 2004.
- Minimum passing flows available under the Bulk Entitlement (Ovens System – Goulburn-Murray Water) Order 2004.
- Minimum passing flows available under the Upper Ovens River water supply protection area water management plan (GMW, 2012).

PEW in Victoria's North and Murray water resource plan is protected in two ways:

- Through the instruments that establish PEW and the instruments that regulate water resource management in Victoria under the *Water Act 1989* (Vic); and
- Measures under the *Water Act 1989* (Vic) such as the Environmental Water Reserve and offences for taking water without authorisation.

These are considered 'rules and arrangements' relating to the PEW and are identified in Table 2 of Appendix E of the Victoria's North and Murray water resource plan (DELWP, 2019a). The water resource plan also provides further details on PEW in Victoria.

The locations of PEW relevant to this LTWP are shown in Figure 14.

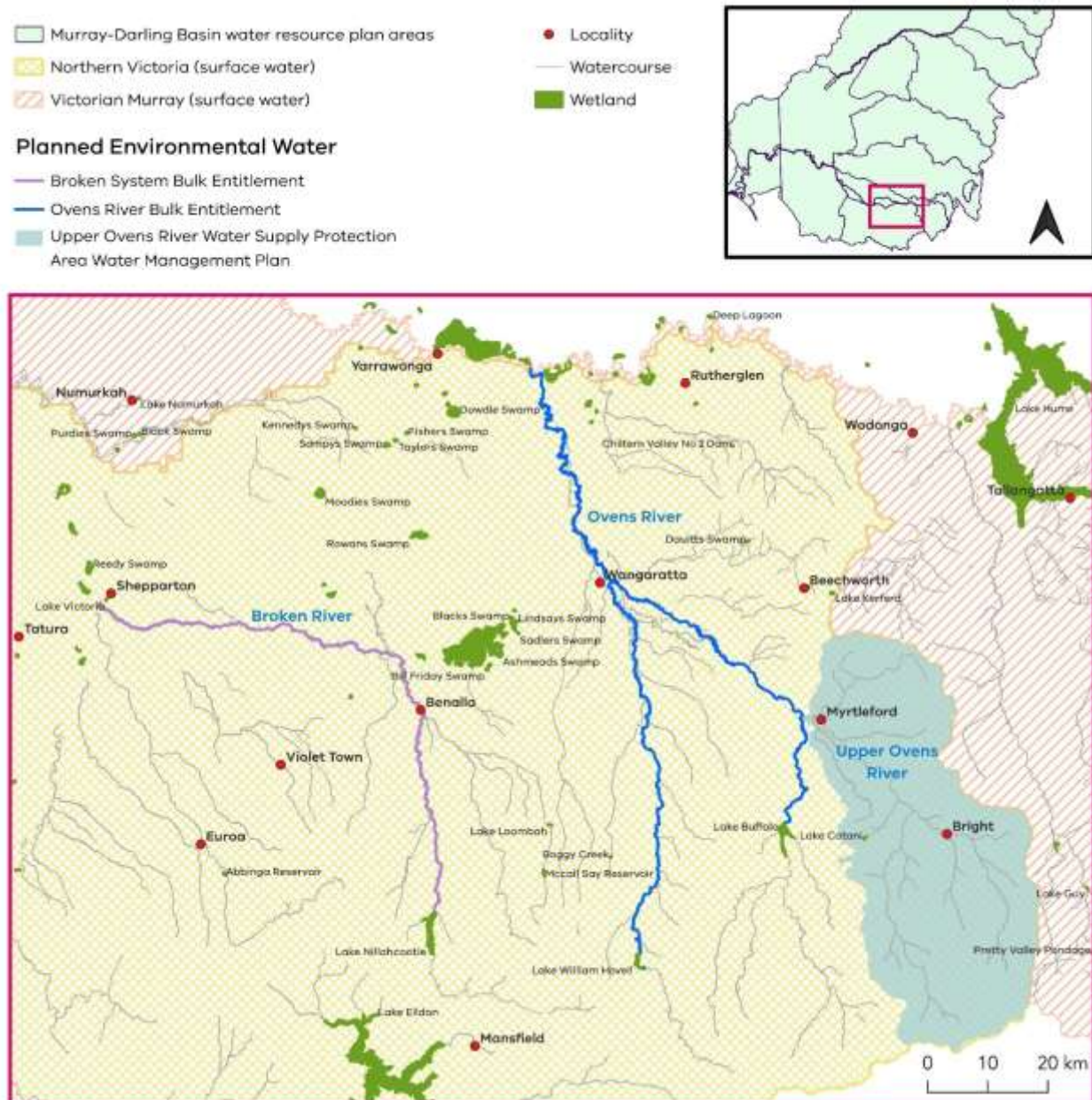


Figure 14. Victorian locations of planned environmental water as identified in Victoria's North and Murray water resource plan.

Table 15: Summary of held environmental water holdings relevant to the Northern Victoria water resource plan area⁵

System	Entitlement	Volume (ML)	Class	Holder	Notes
Broken	CEWH water shares	534	High	CEWH	
		4	Low		
	VEWH water shares	90	High	VEWH	
		19	Low		
Campaspe	Environmental Entitlement (Campaspe River – Living Murray Initiative) 2007	126	High	VEWH	The Living Murray entitlements are held by the VEWB in trust for the MDBA
		5,048	Low		
	Campaspe River Environmental Entitlement 2013	20,855	High	VEWH	
		4,394	Low		
	CEWH water shares	6,624	High	CEWH	Includes 30 ML of entitlement in the Coliban system.
		395	Low		
Goulburn	Goulburn River Environmental Entitlement 2010	24,992	High	VEWH	
		5,792	Low		
	Environmental Entitlement (Goulburn System – Living Murray) 2007	39,625	High	VEWH	The Living Murray entitlements are held by the VEWB in trust for the MDBA.
		156,980	Low		
	Silver and Wallaby Creeks Environmental Entitlement 2006	N/A	Passing flow only	VEWH	
	CEWH water shares	342,874	High	CEWH	

⁵ Sources: Victorian Water Register (<https://waterregister.vic.gov.au/>), VEWB water holdings at 31 March 2024 (<https://www.vewb.vic.gov.au/watering-program/our-water-holdings>), CEWH water holdings at 28 February 2026 (<https://www.dccew.gov.au/cewh/manage-water/basin/water-holdings>) <https://www.dccew.gov.au/cewh/manage-water/basin/water-holdings> <https://www.dccew.gov.au/cewh/manage-water/basin/water-holdings>)

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System	Entitlement	Volume (ML)	Class	Holder	Notes
		51,097	Low		
	The Living Murray - water shares	5,559	High	VEWH	The Living Murray entitlements are held by the VEWB in trust for the MDBA
Loddon	Bulk Entitlement (Loddon River – Environmental Reserve) Order 2005	11,798	High	VEWH	The entitlement includes passing flows in addition to a volumetric entitlement.
		2,024	Low		
	Environmental Entitlement (Birch Creek – Bullarook System) 2009	100	Provisional	VEWH	The entitlement includes passing flows in addition to a volumetric entitlement. Allocation to these entitlements is made subject to specific triggers, as specified in the entitlement.
	Goulburn System – Mitigation Water Environmental Entitlement 2023	1,504	High	VEWH	Water to offset impacts of the Connections Project, to be used at wetlands on the Loddon system as per Schedule 1 of the entitlement.
		749	Low		
	CEWH water shares	3,356	High	CEWH	
		527	Low		
Ovens	CEWH water shares	123	High	CEWH	

Note: The Northern Victorian and Victorian Murray water resource plan areas are highly connected allowing water sourced in one water resource plan area to be used in another. Water trading allows VEWB to move water to the systems where it is most needed and manage some of the variability within systems. In some systems, environmental water delivered through upstream sites can be used at downstream sites – the water credited to VEWB accounts at downstream sites is called return flows.

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 or complementary 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, 2024b) 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 like the GMW Water Efficiency Project.
 - 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 also 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 (Table 22) 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 Northern Victoria water resource plan area, the responsible CMAs are North Central, Goulburn Broken, and North East CMAs.
- **Storage managers** (water corporations) deliver water for all water users, including for waterway managers / environmental water holders. In the Northern Victorian water resource plan area, Goulburn-Murray 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 must prioritise across large regions or water resource plan areas. In Northern Victoria, the environmental water holders are VEWH, CEWH and TLM.
- **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 Northern Victoria, the public land managers are Parks Victoria, DEECA, local Councils and Traditional Owner land management boards.
- **Private land holders and other community members** are actively involved in environmental water planning, for example through seasonal watering proposal advisory boards or in cooperative management of wetland assets.
- **Traditional Owner groups** in the Northern Victoria water resource plan area include formally recognised Traditional Owner groups of the Dja Dja Wurrung Clans Aboriginal Corporation, Taungurung Land and Waters Aboriginal Corporation, and Yorta Yorta Nations 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 Bangerang Aboriginal Corporation, Barapa Country Aboriginal Corporation, Dalka Warra Mittung Aboriginal Corporation, Dhudhuroa

Waywurru Clans Aboriginal Corporation, Duduroa Dhargal Aboriginal Corporation, Jaithmathang Traditional Ancestral Bloodline Original Owners First Nation Aboriginal Corporation, Konermar Buller Jaithmatang, Ngurai Illum Wurrung and Waywurru Traditional Owners.

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).

6.3 Coordination processes

Coordination of environmental watering in the surface water systems in Northern Victoria water resource plan area, and across Victoria's state borders, is done through cooperative arrangements. The VEWH leads annual environmental water planning and coordination for Victorian waterways at a water resource plan area scale, in close consultation with CMAs as the local environmental water managers.

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 in areas where Commonwealth water holdings may be used in Victoria. The VEWH and CEWH have an agreement to collaborate and coordinate their activities (DELWP, 2019a). The VEWH also collaborates closely with CMAs and water corporations (e.g. Goulburn-Murray Water) in the planning and delivery of environmental water at local and regional scales as part of its annual watering planning process.

The VEWH's annual Seasonal Watering Plan outlines the annual watering priorities for the entire state. The process for development of the Seasonal Watering Plan is shown in **Error! Reference source not found..**

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). As noted above, Traditional Owners may also develop and submit seasonal watering proposals to the VEWH.
- **April-May:** 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 – see below) 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 communicate environmental watering decisions. The VEWH Office undertakes the role of waterway manager for multi-jurisdictional deliveries to the Murray River system.

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.

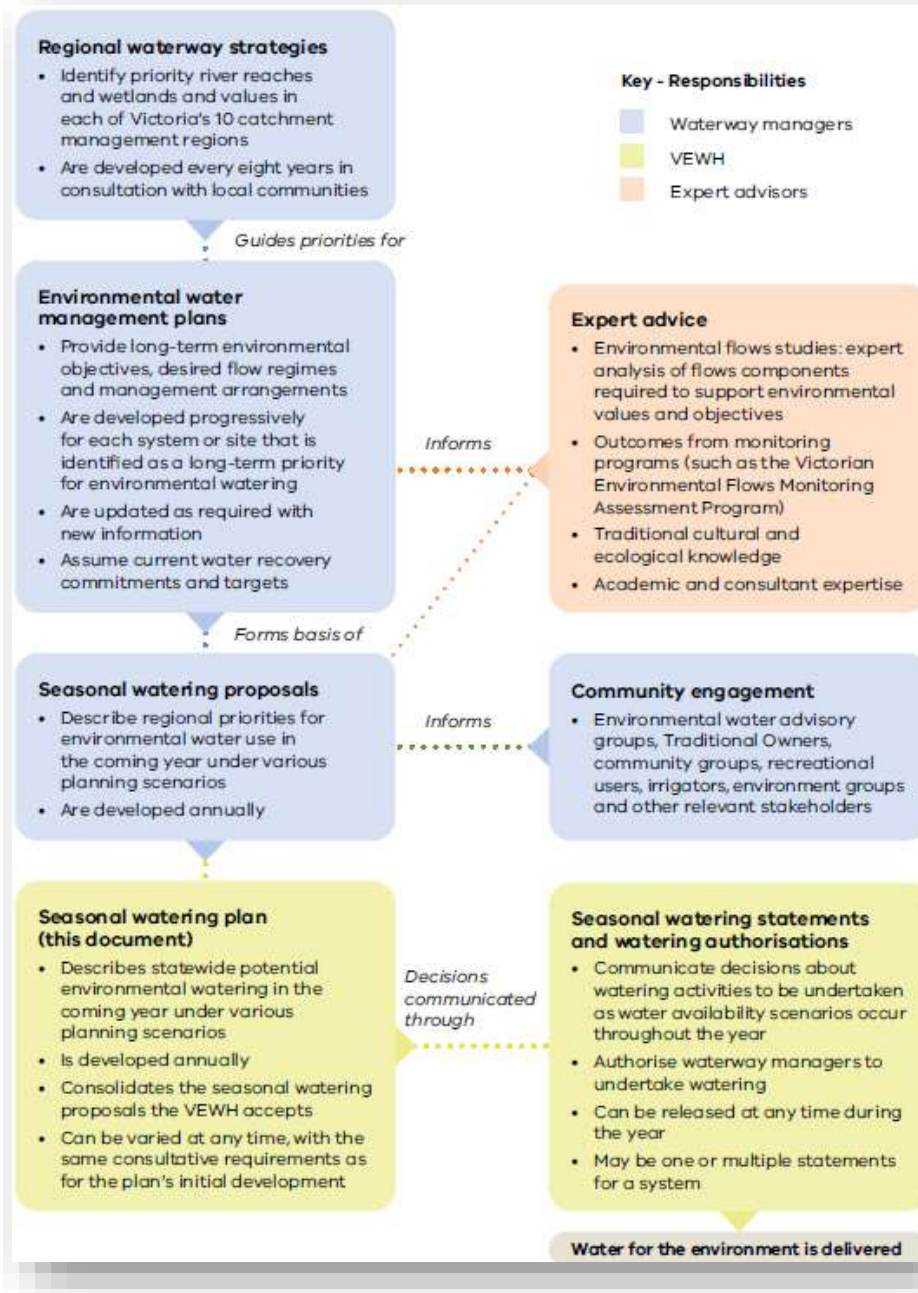


Figure 15. Victoria's annual environmental water planning process (VEWH, 2025a)

Inter-jurisdictional coordination occurs through the Southern Connected Basin Environmental Watering Committee (SCBEWC). SCBEWC was established in 2014 to coordinate the delivery of environmental water in the southern connected Basin by establishing a collaborative approach to delivery involving all environmental water holders. SCBEWC is also responsible for overseeing TLM program and for joint governments to approve the timing, use and allocation of jointly held water – TLM, River Murray Integrated Flows (RMIF) and River Murray Unregulated Flows (RMUF). SCBEWC has a particular focus on the southern connected basin – Murray River anabranches and tributaries, along with distributaries from NSW such as the Darling River, including the allocation and approval for using jointly held water (TLM, RMIF, RMUF). This water is managed by MDBA on behalf of joint governments, consistent with the Basin Plan Environmental Water Plan and its objectives, in order to meet the overall Basin Plan targets (outlined in section 1.1). Members include representation from agencies with environmental water responsibilities: the MDBA; Commonwealth Department of Climate Change, Energy, Environment and Water; CEWH; NSW Department of Climate Change, Energy, Environment and Water; SA Department for Environment and Water; VEWH; and Victorian DEECA. Murray Lower Darling Rivers Indigenous Nations (MLDRIN) are

members with an advisory role to support increased First Nation influence in water management, including environmental water, and sensitively incorporate cultural values and First Nations outcomes.

SCBEWC typically meets five times each year to coordinate environmental water planning, approximately:

- **February-March:** start of environmental water holders planning for the following water year, including discussing watering proposals for the southern connected Basin, including Living Murray Icon sites and broad plans for coordinated environmental watering actions.
- **April-May:** towards the end of the water year, watering actions undertaken to date are evaluated and an operational strategy for the following water year is developed that seeks to coordinate environmental water delivery for system outcomes. Basin and catchment annual environmental water proposals and priorities are fully drafted, and CEWH and SCBEWC produce their respective annual plans. Early approvals for jointly held water may occur (e.g. TLM, River Murray Increased Flows).
- **June:** water holders and partners plan for coordinated delivery of environmental water to contribute to system wide priorities and benefits (e.g. coordination of a multi-site spring pulse in the Murray); members re-evaluate proposed watering actions based on actual flow conditions and consider actions for the remainder of the water year. Approval of jointly held water, and of all TLM monitoring for the year ahead.

Additional meetings are held to check-in on watering actions, further coordinate and inform decisions during watering events and/or make decisions on the use of TLM portfolio, monitoring and the Indigenous Partnerships Program.

Increased collaboration is seeing environmental water managers combine their water to deliver larger and more effective events than would otherwise be possible. In 2017, the MDBA's evaluation of the Basin Plan found that by 2016-17, over a third (37%) of all environmental watering events in the basin were coordinated events involving multiple environmental water holders. SCBEWC's 2022-23 Annual Report states that environmental water management across the southern connected Basin has evolved from largely site-based to now include large-scale coordinated watering events that improve downstream and system-wide connectivity outcomes (SCBEWC, 2023). Increased collaboration is seeing environmental water managers combine their water to deliver larger and more effective events than would otherwise be possible.

The effectiveness of these cooperative coordination processes continues to increase through inclusion of a broader number of connected sites such as the Edward-Wakool system, targeted alignment with floodplain demands, whole of river monitoring projects (River Murray channel monitoring) and incorporation of lessons from past deliveries.

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 Northern Victoria water resource plan area and strategies to manage or overcome these.

'Bank full' and overbank flows that connect rivers to their floodplains are key flow components to support a healthy river and floodplain ecosystem. These higher flows are needed to restore the health of floodplain vegetation and reconnect wetlands, rejuvenating habitat for the diverse range of animals that depend on these areas, and provide an important productivity boost for rivers. The ability to provide these higher flows will contribute to achieving ecological objectives and targets for the priority ecological assets of the Northern Victoria Murray water resource plan area and are linked to the Basin Plan's Environmental Watering Plan objectives and the system-wide targets.

Modelling indicates that the additional environmental water recovered through the Basin Plan will allow low-lying floodplains, wetlands and anabranches to be watered (i.e. mainly at or below minor flood level), provided that physical, operational and capacity constraints are addressed to mitigate impacts to private land, (e.g. agricultural production, stock, private access roads), public infrastructure (e.g. roads, bridges and culverts) and other users. Watering the mid to upper floodplain would require significantly more water, which would also have greater third-party impacts. In many cases, the only way to water these areas will be by using environmental works to target high value sites (see section 8.6) or through moderate and major flood events that occur naturally.

Physical and operational (or management) constraints to environmental water delivery are defined 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 (refer to Basin Plan section 1.07). 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 overcoming an operational constraint is where water accounting frameworks in Victoria have been updated to allow crediting of return flows from environmental water use, permitting achievement of multi-site watering from a single water release.

7.1 Constraints Management Strategy 2013 to 2024

The MDBA's Constraints Management Strategy (CMS) 2013 to 2024 (MDBA, 2013) identified and prioritised physical and operational constraints across the Murray-Darling Basin, focusing on seven key areas including:

- Hume to Yarrawonga (Murray River)
- Yarrawonga to Wakool Junction (Murray River)
- Goulburn River (Victoria)
- Murrumbidgee River (NSW)
- Lower Darling River (NSW)
- Gwydir River (NSW)
- Lower Murray (SA).

The CMS (MDBA, 2013) looked at ways to address these constraints, including raising the height of bridges to maintain access at higher flows, improving flood warning systems and securing easements to enable private land to be watered. The process carried out to inform the development of the CMS (MDBA, 2013) is described further in Figure 16.

The outcomes that can be achieved in each reach will depend on the extent to which constraints can be addressed, and the links and interdependencies across these focus reaches. Projects to relax or overcome constraints in all key focus areas, except the Gwydir, are being delivered by the relevant Basin state governments. These projects, called 'constraints measures', are exploring the potential impacts of delivering higher flows and how these can be addressed to support local benefits and system-wide environmental outcomes through the reconnection of rivers to their floodplains. Working closely with affected communities will be critical to success.

In 2014, the MDBA, working with Basin states and communities, completed the first phase of the CMS — the pre-feasibility phase. This identified and prioritised important operational and management constraints, including their relationship to physical constraints, and set out to define and agree between the MDBA and each of the Basin governments the respective roles and responsibilities to progress priority operational and management constraints.

The CMS identified nine types of operational and management constraints for further consideration, and identified four that were considered to make the most significant difference to achieving environmental outcomes. These nine constraints are listed below, with the four priority constraints shown in bold:

1. **delivery of environmental water on top of other instream flows**
2. **channel capacity sharing**
3. timing of water availability
4. planned environmental water
5. **environmental water can be used throughout the length of a river**
6. **protection of environmental flows from extraction and re-regulation**
7. substitution of held environmental water with other water
8. coordinated planning and delivery of water delivery
9. current river management practices.

Figure 16. Pre-feasibility assessment of operational and management constraints in the CMS (MDBA, 2013)

7.2 Constraints affecting the Northern Victoria water resource plan area

The operational and management constraints affecting the Northern Victoria water resource plan area can be broadly grouped into the following types, associated with:

- Channel/watercourse capacity (i.e. the constraints due to insufficient flow capacity to meet both environmental and consumptive demands at key watering times).
- Consumptive water entitlement framework (i.e. the constraints imposed by the procedures and policies of the water supply system (which was designed to supply water for consumptive use)).
- Co-operative management (i.e. the constraints due to existing governance arrangements that have often been developed independently of environmental watering arrangements).
- Excess consumptive demand (i.e. the constraints preventing environmental water managers from reducing stream flow to environmental desirable levels at the expense of fulfilling consumptive demands).
- Geomorphic impacts (i.e. the constraints controlling rates of rise and fall which are designed to prevent degradation of the physical form of waterways).
- Travel time and attenuation (i.e. the long travel time and attenuation experienced by environmental flows, which constrains the ability to readily 'piggy-back' on other flows in the target reach).
- Flooding (i.e. the constraints arising from inundation of private land or public infrastructure).

- Outlet release capacity (i.e. constraints due to insufficient flow capacity through reservoir release valves).
- Storage capacity (i.e. constraints due to insufficient storage in weir pool to store, re-regulate and later release flows).
- Availability of irrigation assets during the non-irrigation period (when works are being undertaken on infrastructure, delivery of water may not be possible or limited between 15 May and 15 August each year).

Of the types of constraints listed above, those associated with outlet release capacity and the consumptive water entitlement framework are most numerous (DELWP, 2019a).

7.3 Strategies to manage or overcome constraints

7.3.1 Policy measures

According to the CMS, the most notable operational constraints affecting the southern connected Basin were the policy measures outlined in the Basin Plan (c7.15 (2)) to:

- Credit environmental return flows for downstream environmental use.
- Allow the call of HEW from storage during unregulated flow events.

The MDBA considered that implementation of these two policy measures would resolve a number of operational and management constraints and would be required to achieve the desired objectives of the Basin Plan and this LTWP. Provisions in the VEWH's bulk and environmental entitlements and obligations on Goulburn-Murray Water in its bulk entitlements enable the above two policy measures and addresses these constraints. These arrangements allow use of environmental water to get the best environmental outcomes without impacting the security of supply to other entitlement holders. The MDBA has accepted that implementation of these policy measures is enduring, operational and transparent in Victoria.

7.3.2 Victoria's Constraints Measures Program

Victoria's Constraints Measures Program includes two separate constraints measures:

- the Hume to Yarrawonga project, a joint proposal with NSW; and
- the Goulburn project where Victoria is the sole proponent.

A feasibility study was completed in 2024 focussing on the benefits and risks of addressing constraints in the Goulburn and Murray rivers (DEECA, 2024d).

Due to the complex nature of cross-border issues in managing the River Murray, an Independent Advisory Panel has been established to advise Basin Ministers on the merits, risks, costs and community sentiment of addressing constraints. The Panel is required to report to Ministers in December 2026.

Progressing constraints will be guided by the Basin Ministers once they have considered the Independent Panel's report.

7.3.3 Improving system-wide coordination

The former Enhanced Environmental Water Delivery (EEWD) project was being jointly delivered by Victoria, NSW and SA, working closely with the MDBA as the project delivery partner, prior to funding being suspended in October 2025. The EEWD project was designed to complement the cross-jurisdictional program of constraints relaxation described above. EEWD aimed to help river operators and environmental water holders through development of tools and improvements to planning, forecasting and delivery to better coordinate managed flows at the southern connected Basin scale.

EEWD looked to both optimise environmental outcomes under existing flow limits, and provide the tools to enable even greater benefits if higher flows can be delivered through implementation of constraints relaxation projects.

Even with constraints relaxed to targeted levels and improved tools to coordinate managed flows, many high value sites in Northern Victoria are located even higher on the floodplain and cannot be watered effectively without using environmental works (see section 8.6).

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 Northern Victoria water resource plan. Victoria has also developed a prospectus which provides rationale for a range of complementary measures across all of northern Victoria (DEECA, 2025a).

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 Northern Victoria water resource plan area this includes the Upper Ovens project in the North East CMA region, the Strathbogie Streams and Walking Together with Waring Flagship projects in the Goulburn Broken CMA region, and the Caring for the Campaspe River project in the North Central CMA region (now complete with monitoring in place). Many flagship waterway projects integrate a range of complementary actions to achieve their objectives such as invasive weed removal, environmental water management and fencing off waterways to limit livestock access.

Further information about complementary actions in the Northern Victoria water resource plan area are detailed in the relevant CMA regional waterway strategies (NECMA, 2014; GBCMA, 2014; NCCMA, 2014). These are currently being updated, due for finalisation by 2027.

8.2 Traditional Owners delivering complementary actions

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 through overarching policies and frameworks such as the Victorian Aboriginal Affairs Framework 2018 -2023 (Aboriginal Victoria, 2018) and 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 (DELWP, 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 outlined below.

An example of this is the [Healthy Coliban Catchment project](#). In partnership with Dja Dja Wurrung Clans Aboriginal Corporation, the North Central CMA, Coliban Water, Landcare and North Central Waterwatch are working to protect the highly valued waterways and future water supplies of the Coliban catchment by boosting habitat connectivity and building cultural and lifestyles values.

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 Instream 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.

The Victorian government has invested in projects to enable fish movement and improve connectivity at priority sites, such as fish passage at high priority barriers in Gunbower Creek and the Lower Loddon River to improve flows, habitat and connectivity to support recovery of regional native fish populations.

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, flat-headed galaxias have been translocated from north-east Victoria to several locations in the North Central CMA region helping to double the known populations of the species (NCCMA, 2025).

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 (DELWP, 2013a) 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 (GBCMA, 2014; NCCMA, 2014; and NECMA, 2014).

8.6 Environmental works and measures

In many cases, environmental works like flow regulators, pumps and channels 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 infrastructure like 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 (see 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 roads⁶.

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 include:

- investment in facilities, like walking tracks and canoe launch sites to help the community enjoy their waterways.
- 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 Private land watering

Sites on private land also play an important role in supporting aquatic ecosystems and biodiversity. In Victoria, the state water entitlement framework enables the VEWH and CEWH to deliver environmental entitlement water to public land (see section **Error! Reference source not found.** Victorian frameworks). Outside of this framework, watering of additional sites on private land is also occurring in the Northern Victoria water resource plan area, supported by not-for-profit organisations.

The Murray Darling Wetlands Working Group waters a number of private wetlands in the Northern Victoria water resource plan area with water made available by the Environmental Water Trust. These sites include O'Kanes Swamp, The Plain Paddock, Thompson's Wetland, Yambuna Lagoon, and Weston's Wetland in the Goulburn Broken CMA region; and O'Brien's Wetland and Circle T Wetland in the North Central CMA region.

⁶ Environmental watering risks are managed under policy in the Victorian Waterway Management Strategy (DEPI, 2013a)

8.9 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, 2025b). 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, 2025c):

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.

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 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 objectives 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, which are outlined below.

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 VEWL coordinates annual shared risk identification and assessment workshops with CMAs across Victoria, held in mid-late February. The workshops are attended by relevant program partners such as environmental 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 partner agencies, identify key risks that may impact on the ability to achieve environmental watering objectives in preparing Environmental Water Management Plans (EWMPs) for priority environmental assets, and as part of regional waterway strategies. These are documented in the CMA's EWMPs, along with risk management measures.

In developing Victoria's North and Murray Water Resource Plan (DELWP 2019a), a risk assessment was completed at the water resource plan scale by the Department to meet requirements of Part 9 of Chapter 10 of the Basin Plan. This included assessing environmental water 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 5. More than 95 percent of the high and medium risks identified by the risk assessment were found to be associated with:

- causes such as climate change, extreme drought and land use practices if there is a failure to proceed with existing strategies and improved management programs
- threats such as suspended sediment and nutrients, salinity, other water quality issues and a reduction in the volume of water available
- lack of information about the availability (or absence) of water for Aboriginal use, either for cultural flows or for Aboriginal environmental outcomes as proposed by the Murray Darling Basin Authority.

The above long-term processes have been used 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 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, cultural, social and economic values. Management measures to address the risks identified in Figure 17 are presented in Appendix F. It should be noted that failure to provide sufficient water through the bulk entitlement process was addressed in Victoria's North and Murray Water Resource Plan (DELWP 2019a, as per Basin Plan clause 10.41).

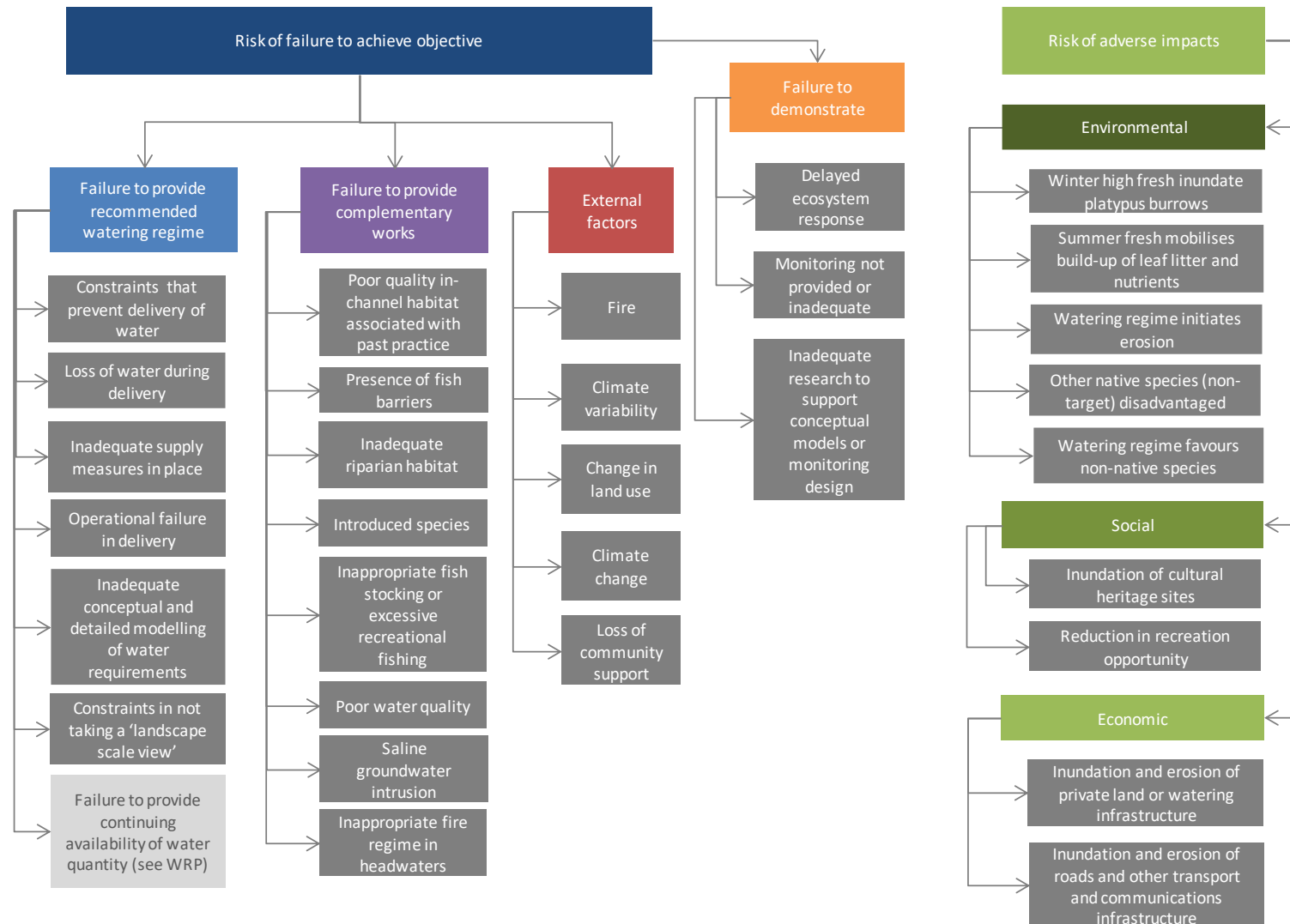


Figure 17. Risk types identified for this LTWP

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 17 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 Victoria's Northern and Murray 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 Northern and Murray Water Resource Plan linked causal factors and their manifestation as threats, with limitations on the use and beneficial outcomes associated with the asset being considered (Figure 18). Threats were then ranked from very low to very high risk based on assessment rubrics of consequence and likelihood (Figure 19):

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

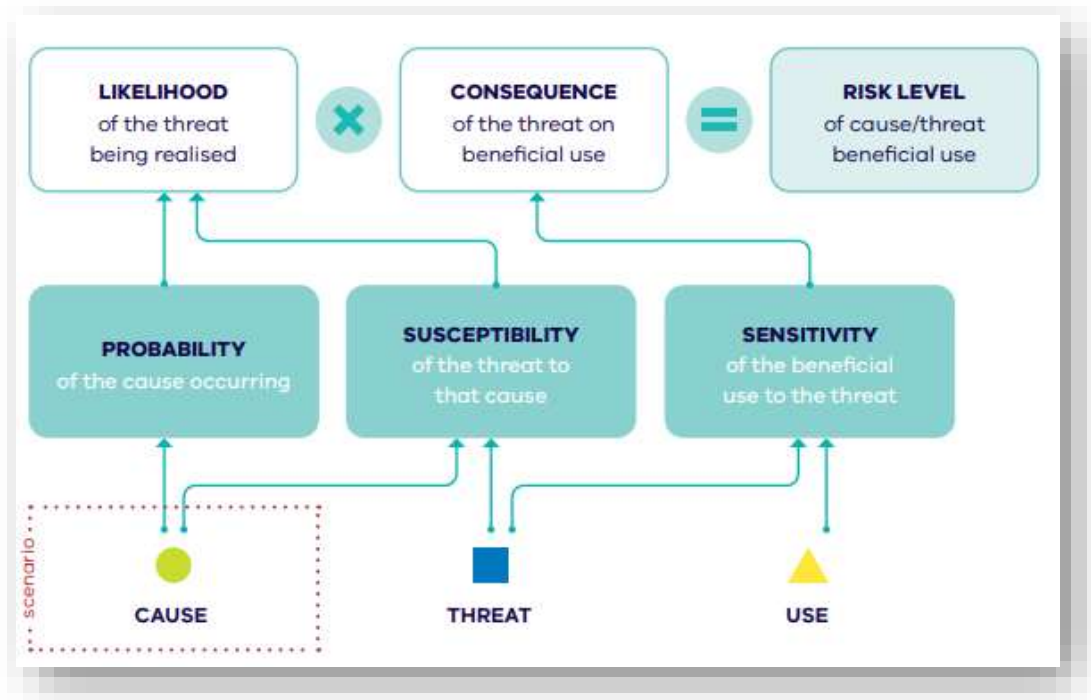


Figure 18. Overview of the risk assessment matrix, including cause-threat-use relationships for the Northern Victoria water resource plan area (from DELWP, 2019a)

		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 19. Risk matrix comprising the combination of likelihood and consequence (Alluvium, 2016)

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):

- 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.

The high priority risks to address (i.e. causes and associated threats listed as 'very high' and 'high' risk to the environment (Table 16) include:

- Climate change
- Extreme drought
- Earth resource development
- Changes to the timing and locations of demand.

Table 16. Northern Victoria water resource plan area summary of risks to priority environmental assets (DELWP, 2019a)

Cause	Threat	Risk to Rivers	Risk to Wetlands
Climate change	Loss or decline in longitudinal connectivity	Very high risk	High risk
	Loss or decline in lateral connectivity	High risk	Very high risk
	Loss or decline in instream physical habitat	Very high risk	Very high risk
Extreme drought	Loss or decline in longitudinal connectivity	High risk	Medium risk
	Loss or decline in lateral connectivity	Medium risk	High risk
	Loss or decline in instream physical habitat	Medium risk	Medium risk
Failure to continue to invest in best practice land use initiatives	Loss or decline in longitudinal connectivity	Medium risk	Medium risk
	Loss or decline in lateral connectivity	Medium risk	Medium risk
	Loss or decline in instream physical habitat	Medium risk	Medium risk
Earth resource development	Loss or decline in longitudinal connectivity	Medium risk	Medium risk

Cause	Threat	Risk to Rivers	Risk to Wetlands
	Loss or decline in instream physical habitat	Very high risk	Very high risk
Pests and weeds	Loss or decline in longitudinal connectivity	Medium risk	Medium risk
	Loss or decline in instream physical habitat	Medium risk	Medium risk
Changes to the timing and location of demands	Loss or decline in instream physical habitat	Very high risk	Very high risk

Deliverability risks in the lower Goulburn River

In 2017-18 and 2018-19, there were large volumes of water delivered down the Goulburn River in an unseasonal pattern with sustained high flows over summer, which caused damage to riverbanks, loss of vegetation and reduced native fish habitat.

In 2022, DEECA completed the Goulburn to Murray Trade Review and the Minister for Water published the long-term operating rules for the lower Goulburn River. The operating rules keep flows lower and more variable over summer and autumn and limit the volume of traded water that can be delivered from the Goulburn to the Murray to within the environmental tolerances of the lower Goulburn River. Environmental tolerances do not represent the environmentally or bio-culturally lowest risk option for protecting the health of the lower Goulburn River, but one that aims to prevent the type of damage seen during 2017-19 and to provide for a trajectory of environmental recovery, acknowledging that there is a balance of several management objectives aimed to be achieved in the sustainable management of the lower Goulburn River.

The rules are holistic and apply to all regulated water delivered through the lower Goulburn River all year round.

For more information on the lower Goulburn River operating rules and the technical assessments that informed their development, see the [Lower Goulburn River Operating Rules - Fact Sheet](#) as well as supporting information on [Victoria's Water Register](#) website.

10.4 Strategies for management

Management actions to address the high priority risks listed above are presented in Table 17. 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 pests and weeds, can also provide mutual benefits by addressing threats that are high level risks to consumptive, recreational and Traditional Owner values of water. For example, investment in best practice land use initiatives could help mitigate excessive sediment and contaminants in runoff before it reaches waterways and consumptive water supplies.

Table 17. Summary of high priority environmental risks and related management actions (adapted from DELWP 2019a)

Risk level	Risk cause	Risk threat	Risk impact on uses	Confidence in risk assessment	Potential management actions
There is a very high risk	That climate change	Leads to a loss or decline in longitudinal connectivity	which results in adverse impacts on environment - rivers water uses/users.	This risk has a moderate level of confidence in its assessment.	• Deliver long-term watering plans • Environmental water management in a changing climate (refer section 10.5) • Implement Ministerial Guidelines for Groundwater Licensing and the Protection of High Value Groundwater Dependent Ecosystems • Improving our understanding of climate science and how it applies to water management • Improving public reporting on water availability and use: • user-focused information and reporting • Improving rural water supply planning • Improving state-wide water resource planning and risk assessment • Leading climate change adaptation across Victoria's water system • Managing groundwater related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks • Managing water quality events • Monitoring and reporting on the benefits of environmental watering • Planning the take of Victoria's Share Guidance - consideration of climate change and climate variability in setting groundwater resource limits • Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria • Protecting water quality - compliance with Environment Protection Act and regulations • Provide long-term investment to improve waterway health • Recognising and managing for Aboriginal values
There is a high risk	That climate change	Leads to a loss or decline in longitudinal connectivity	Which results in adverse impacts on environment - wetlands water uses/users.	This risk has a moderate level of confidence in its assessment.	
There is a high risk	That climate change	Leads to a loss or decline in lateral connectivity	Which results in adverse impacts on environment - rivers water uses/users.	This risk has a moderate level of confidence in its assessment.	
There is a very high risk	That climate change	Leads to a loss or decline in lateral connectivity	which results in adverse impacts on environment - wetlands water uses/users.	This risk has a moderate level of confidence in its assessment.	
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 environment - rivers water uses/users.	This risk has a moderate level of confidence in its assessment.	
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 environment - wetlands water uses/users.	This risk has a moderate level of confidence in its assessment.	

Risk level	Risk cause	Risk threat	Risk impact on uses	Confidence in risk assessment	Potential management actions
					Water resource information supports planning and decisions
There is a high risk	That extreme drought	leads to a loss or decline in longitudinal connectivity	Which results in adverse impacts on environment - rivers water uses/users.	This risk has a moderate level of confidence in its assessment.	- Deliver long-term watering plans - Improving our understanding of climate science and how it applies to water management
There is a high risk	That extreme drought	Leads to a loss or decline in lateral connectivity	Which results in adverse impacts on environment - wetlands water uses/users.	This risk has a moderate level of confidence in its assessment.	- Improving public reporting on water availability and use: - user-focused information and reporting - Improving rural water supply planning - Improving state-wide water resource planning and risk assessment - Leading climate change adaptation across Victoria's water system - Managing groundwater related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks - Managing salinity, waterlogging and water quality including issues arising from an extreme wet period - Managing water quality events - Monitoring and reporting on the benefits of environmental watering - Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algae blooms, flooding, major asset failure) - Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria - Protecting water quality - compliance with Environment Protection Act and regulations - Provide long-term investment to improve waterway health - Recognising and managing for Aboriginal values - Water resource information supports planning and decision

Risk level	Risk cause	Risk threat	Risk impact on uses	Confidence in risk assessment	Potential management actions
There is a very high risk	That earth resources development	Leads to a loss or decline in instream physical habitat	Which results in adverse impacts on environment - rivers water uses/users.	This risk has a moderate-high level of confidence in its assessment.	- Managing risks from earth resources development - Protecting water quality - compliance with Environment Protection Act and regulations
There is a very high risk	That earth resources development	Leads to a loss or decline in instream physical habitat	Which results in adverse impacts on environment - wetlands water uses/users.	This risk has a moderate-high level of confidence in its assessment.	
There is a very high risk	that the timing and locations of demands ¹	lead to a loss or decline in instream physical habitat	which results in adverse impacts on environment – river water uses / users.	This risk has a moderate level of confidence in its assessment	- Delivery of long-term watering plans - Environmental water management in a changing climate - Improving public reporting on water availability and use - User-focused information and reporting - Maximising the effectiveness of the grid and markets across the state - Implementation of Lower Goulburn River Operating Rules¹
There is a very high risk	that the timing and locations of demands ¹	lead to a loss or decline in instream physical habitat	which results in adverse impacts on environment – wetland water uses/users.	This risk has a moderate level of confidence in its assessment	

1. Since the Risk Assessment was completed for the water resource plan, new operating rules have been put in place for the lower Goulburn River to support environmental outcomes (refer to section 10.3 'Deliverability risks in the lower Goulburn River '). Risks remain the same for other systems in the Northern Victoria water resource plan area.

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, 2025b) 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 20 below indicates modelled changes to environmental entitlement allocation.

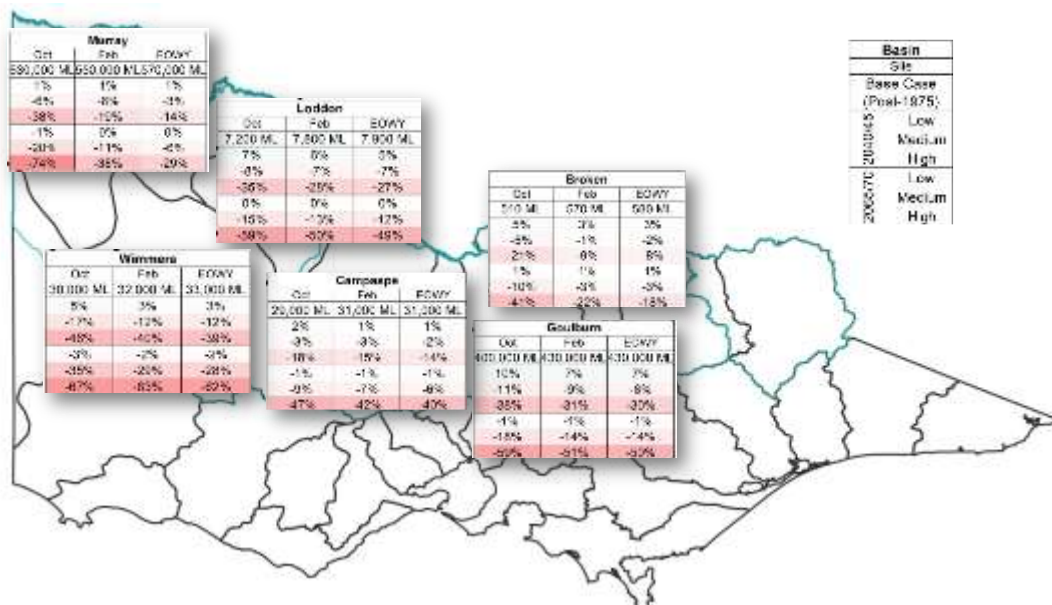


Figure 20. Percentage change in average allocation of environmental entitlements under climate change – inflows and seasonal determination for high and low reliability water shares (adapted from HARC, 2025)

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 8.9) in addition to the seasonally adaptive approach (outlined in section **Error! Reference source not found.**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 VEWH'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, 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).

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 (11.1 below)
- *Collaborate* with the VEWH and CMAs, who have provided material and guidance for the LTWP (11.2 below)
- *Consult* with the water corporations, land managers, the MDBA, CEWH, and upstream and downstream states, who provided information where relevant and feedback on the content (11.3 below).

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 environmental 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.

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

In developing the first Traditional Owner-led seasonal watering proposal, Taungurung Land and Waters Council engaged with local community members about aspirations for management of Molesworth Billabongs via a community meeting and individual conversations.

11.2 Working Group for the long-term watering plan

During the development of the original LTWPs in 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 included 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 plan's original development and via review of its updates. The original LTWP was reviewed by representatives from VEW, North East CMA, Goulburn Broken CMA, North Central CMA, Mallee CMA, CEWH, MDBA, NSW and SA Environmental Water Working Group members, Goulburn-Murray Water, Lower Murray Water, MLDRIN, and Parks Victoria.

MDBA provided feedback which was incorporated into the 2015 and 2020 iterations. DELWP (DEECA) also commissioned a review of Victoria's LTWPs in 2019, and many of those recommendations were incorporated into the 2021 iteration.

The 2026 update has worked with and/or involved CMAs, VEW, Traditional Owners, MDBA, NSW DCCEW, SA DEW, CEWH, Parks Victoria, and water corporations. CMAs and VEW 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 (DELWP, 2022a) 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 North and Murray WRP (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 Bangerang, Barapa Barapa, Dhudhuroa, Waywurru, Yaitmathang, Dja Dja Wurrung, First People of Millewa Mallee (Nations of the Nyeri Nyeri, Ngintait and Latji Latji), Tati Tati Wadi Wadi, Taungurung, Wadi Wadi, Wamba Wemba, Weki Weki and Yorta Yorta⁷.

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. Taungurung Land and Waters Council reviewed the Northern Victorian LTWP draft including content for the Molesworth Billabongs priority environmental asset.

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.

⁷ 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, with one of those updates being a Northern Victoria priority environmental asset. Updates include revision of ecological objectives to better align with Basin Plan. In 2025, the first Traditional Owner seasonal watering plan was also developed for a new watering site, Molesworth Billabongs.

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.

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 compliance

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

The table below 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 18. 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 and 4 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 HEW, 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
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 4⁹.	8.19 (5)	Section 10 EWMPs also provide important asset-based information for LTWP requirements regarding risks.
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 EWMPs also provide important asset-based information for LTWP requirements regarding constraints.

Topic	Basin Plan obligations	Clause	Relevant sections of LTWP
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 HEW; 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 EWMPs also provide important asset-based information for LTWP requirements regarding community consultation.
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)	Section 3 Appendix A and Appendix I. Throughout. Table 21.
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

(b) Basin Plan environmental watering plan Division 6 principles

The table below 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 19. Basin Plan Environmental Watering Plan Division 6 Principles

Principle	Where addressed in the 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 VEWL 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 the Northern Victoria 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 HEW 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 (below). Annual watering priorities are established via seasonal watering proposals for individual assets, which in turn are prioritised through the annual VEWL Seasonal Watering Plan (see section 1.6.5).	Other environmental water co-ordination mechanisms to which DELWP is a party includes: • Southern Connected Basin Environmental Water Committee (SCBEWC)

Principle	Where addressed in the 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	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 DELWP 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 Victoria's North and Murray Water Resource Plan.
(g) enables information to be shared between the Authority, the Commonwealth, Basin States, holders of HEW 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 section 1.6.5 and section 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	EWMEP, and programs such as The Living Murray and FLOW-MER, contribute to Victoria's Schedule 12 Matter 8 reporting.

Principle	Where addressed in the LTWP or elsewhere	Comment
	the Murray-Darling Basin Plan in Chapters 5 and 8, Schedules 7 and 8.	
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 North and Murray 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 VEWHP seasonal watering plan and its criteria for prioritising environmental watering actions (see section 1.6.5). - <u>Water for Victoria</u> (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
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) (below).	Refer chapter 3 of the <u>Victorian Waterway Management Strategy</u> (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	Community engagement, including with First Nations, is addressed in section 11.	See also individual EWMPs for engagement undertaken at the asset scale (Appendix B).

Principle	Where addressed in the LTWP or elsewhere	Comment
(b) persons materially affected by the management of environmental water.		
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 <u>Victorian Waterway Management Strategy</u> (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.	International agreements are considered with Ramsar-listed wetlands are included as priority environmental assets, and priority assets being managed to support values under JAMBA, CAMBA, ROKAMBA, and the Bonn Convention (see section 3 Table 3).	
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 <i>Water Act 1989</i> (Vic), HEW 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 environmental 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 environmental 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 environmental 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 environmental objectives and watering requirements.

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

The table below lists the EWMPs for priority environmental assets in the Northern Victoria water resource plan area where further details can be found on all aspects of management of environmental watering.

Table 20. EWMPs for priority environmental assets, including ecosystem function objectives, in the Northern Victoria water resource plan area

Asset Name	Manager	EWMP (or other document)	Year
Birch's (Bullarook) Creek	NCCMA	Environmental Water Management Plan for the Birch's (Bullarook) Creek System	2015
Broken River	GBCMA	Broken River environmental watering plan	2013
Campaspe River	NCCMA	Environmental Water Management Plan for the Campaspe River System	2015
Coliban River	NCCMA	Environmental Water Management Plan for the Coliban River	2015
Doctors Swamp	GBCMA	Doctors Swamp Environmental Water Management Plan	2011
Gaynor Swamp	GBCMA	Gaynor Swamp Environmental Water Management Plan	2012
Goulburn River	GBCMA	Kaiela (Lower Goulburn River) Environmental Flows Study	2015
Horseshoe Lagoon	GBCMA / Taungurung Land & Waters Council	Horseshoe Lagoon, Trawool Environmental Water Management Plan	2019
Kanyapella Basin	GBCMA	Kanyapella Basin Environmental Water Management Plan	2012
Lake Boort	NCCMA	Lake Boort Environmental Water Management Plan Final Draft	2012
Lake Leaghur	NCCMA	Lake Leaghur Environmental Water Management Plan	2018
Lake Yando	NCCMA	Lake Yando Environmental Water Management Plan	2016
Loch Garry	GBCMA	Loch Garry Environmental Water Management Plan	2019
Loddon River	NCCMA	Loddon River System Environmental Water Management Plan	2015
Meran Lakes complex (Lake Meran and Little Lake Meran)	NCCMA	Meran Lakes Complex Environmental Water Management Plan	2016
Molesworth Billabong	Taungurung Land & Waters Council	VEWH Seasonal Watering Plan	2025
Moodie Swamp	GBCMA	Moodie Swamp Environmental Water Management Plan	2023
Ovens River (including Mullinmur Wetland, King and Buffalo Rivers)	NECMA	Ovens River Environmental Water Management Plan	2015
Pyramid Creek	NCCMA	Loddon River System Environmental Water Management Plan	2015
Reedy Swamp	GBCMA	Reedy Swamp EWMP	2012
Serpentine Creek	NCCMA	Loddon River System Environmental Water Management Plan	2015
Tullaroop Creek	NCCMA	Loddon River System Environmental Water Management Plan	2015

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Asset Name	Manager	EWMP (or other document)	Year
Twelve Mile Creek	NCCMA	<u>Loddon River System Environmental Water Management Plan</u>	2015
Upper Broken Creek	GBCMA	<u>Upper Broken Creek Flows Study</u>	2017

Appendix C Determining objectives, targets and watering requirements

This appendix describes the approach used to develop ecological objectives and targets for the Northern Victoria water resource plan area and this LTWP. The overall process is shown in Figure 21 below 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.

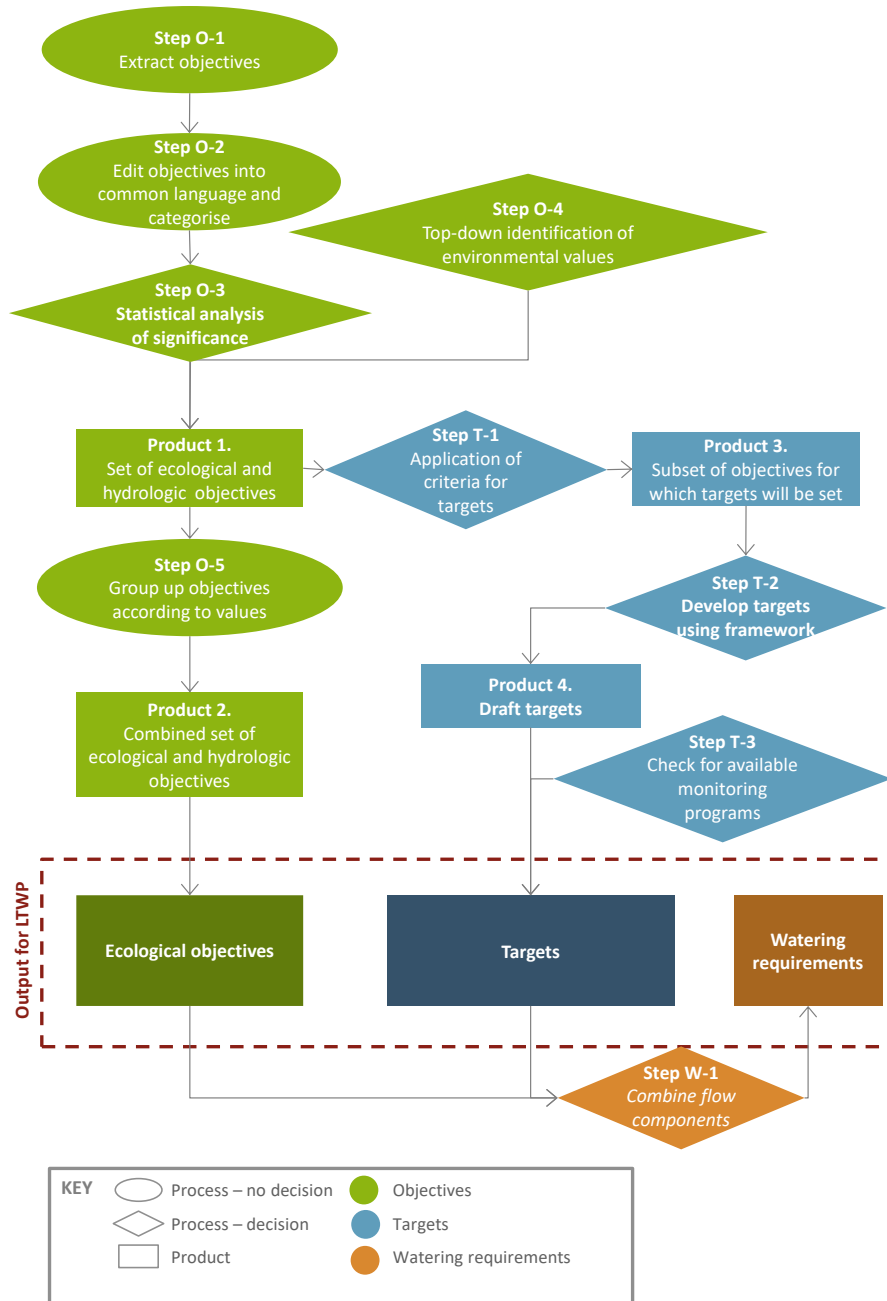


Figure 21. Overview of process for developing objectives and targets

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 22.

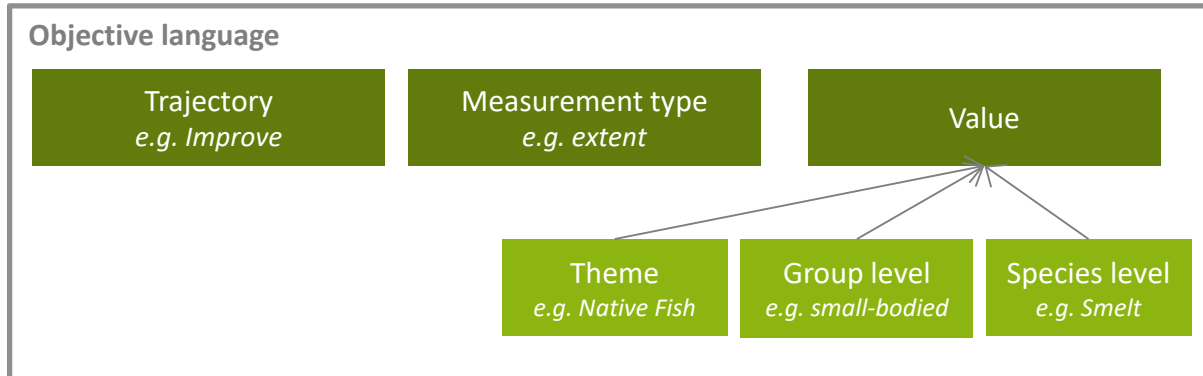


Figure 22. Objective language used to standardise objectives and categorise them

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 VEWB 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.

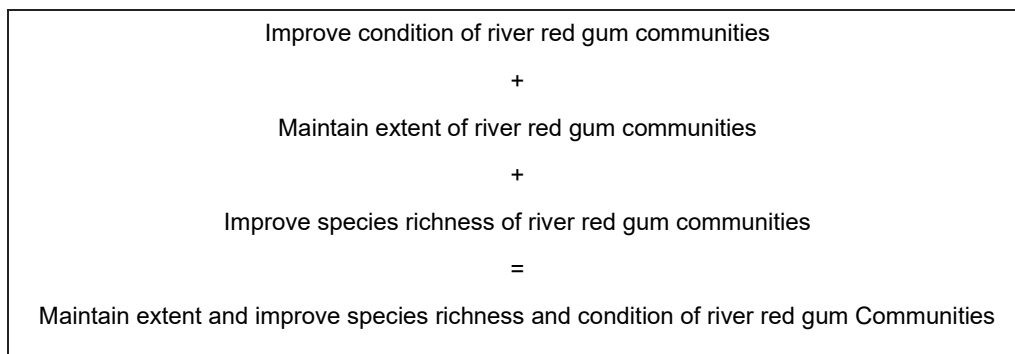
One identified objective that is not covered by individual asset objectives relates to the maintenance or improvement of the suite of wetland types (number and type based on water regime) across each water resource plan area.

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 23)

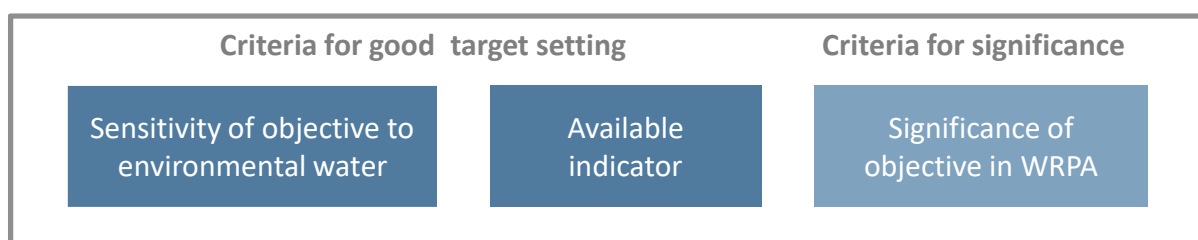


Figure 23. Criteria for target setting

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 flow 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 24). 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.

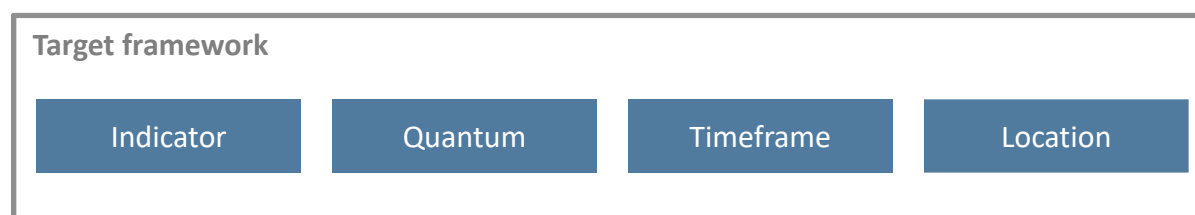


Figure 24. Framework for developing targets

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 21 below lists management goals and ecological objectives for each priority environmental asset in the Northern Victoria 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 relevant EWMPs.

Table 21. Management goals and objectives for each priority environmental assets in the Northern Victoria water resource plan area

Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
Birch's Creek (Bullarook)	NCCMA	To establish resilient breeding populations of Platypus and small to medium bodied native fish including River Blackfish and provide opportunities for these animals to disperse to Creswick and Tullaroop Creeks. To maintain and increase a diverse mosaic of in-stream, fringing and riparian native vegetation communities.						
			P1: Increase abundance and diversity of native fish such as River Blackfish, Mountain Galaxias, Flatheaded Gudgeon and Australian Smelt.	Native Fish	NV17	F1, F2, F4, F5, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b) 8.07,3
					NV18	F1, F2, F4, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5 8.06,6(a)
			P2: Provide conditions that consistently support widespread successful breeding by Platypus to increase population resilience to future drought and floods and to provide surplus juveniles that can disperse to Creswick Creek and Tullaroop Creek.	Other Fauna	NV22	N/A	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
			Provide habitat and flow conditions that will allow River Blackfish to re-establish in Reaches 1 & 2.	Native Fish	NV19	F2 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a) 8.06,6(b) 8.07,3
			S1: Maintain and increase overall abundance, diversity and productivity of macroinvertebrates and macroinvertebrate functional feeding groups to drive productive and dynamic food webs.	Other Fauna	NV26	N/A	2.6, 2.7, 2.8	8.06,6(b) 8.07,3
					NV27	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	First Nations objectives (BWS)	EWMP objectives
Broken River and Upper Broken Creek	GBCMA	Not specified	S3: Maintain water quality that is able to support aquatic biota and ecological processes. Specifically: · Limit nutrient concentrations to prevent excessive algal growth and blooms. · Maintain dissolved oxygen levels above 2 mg/L in dry periods. · Prevent water temperature declining below 160C during late Spring/Early Summer.	Functions	NV2	N/A	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			S4: Maintain (Reach 3) and improve (Reaches 1 & 2) diversity and abundance of instream aquatics such as Triglochin procerum, Myriophyllum verrucosum, Potamogeton crispus, P. ochreatus and Vallisneria americana.	Vegetation	NV9	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			S5: Reduce dominance of exotic instream aquatics such as Elodea (especially in Reaches 1 and 2)	Vegetation	NV14	N/A	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.07,5
			S6: Maintain and improve abundance and diversity of emergent fringing vegetation such as Bolboschoenus medianus spp., Phragmites australis and Typha domingensis on benches and edges of channel, but limit their encroachment into the middle of the channel.	Vegetation	NV7, NV9	V7, V8, V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			S7: Maintain (Reach 3) and restore (Reaches 1 & 2) adult riparian woody vegetation (e.g. Swamp Gum, Manna Gum, River Red Gum) and facilitate recruitment.	Vegetation	NV11	V2 - V4	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
Broken River and Upper Broken Creek	GBCMA	Not specified						

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Maintenance of riffle, run and pool habitat, surface water area and refugia for macroinvertebrates and native fish during extended periods of low flow;	Other Fauna	NV3, NV19, NV26	FC1, F2-F9, F17	2.1, 2.5, 2.2, 2.5, 2.6, 2.7	8.06,4, 8.06,6(a), 8.06,6(b), 8.07,3
			Maintenance of the frequency and duration of floodplain/wetland inundation events to provide organic matter (to drive productivity) and habitat for invertebrates;	Functions	NA	FC5	2.2, 2.3, 2.9	8.06,3(b)(ii), 8.06,7
			Maintenance of the frequency or magnitude of flows required to maintain or improve in-channel geomorphic and habitat diversity	Functions	NV3	FC1	2.1, 2.5	8.06,4
			Maintenance of the frequency, depth and duration of events required to inundate floodplain and wetland areas and associated threatened EVC or plant species	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Provision of flow cues to stimulate the movement of native fish;	Native Fish	NV20	F3, F4, F6, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(b)
			Provision of sufficient depth to allow the movement of fish along their natural range	Native Fish	NV20	F3, F4, F6, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(b)
			The maintenance of baseflow to provide habitat for instream aquatic and emergent vegetation, which in turn provides habitat for invertebrates and fish;	Vegetation	NV5	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
Campaspe River	NCCMA	To rehabilitate the Campaspe River's highly valued and ecologically important River Red Gum communities, native fish populations and facilitate its connection to the Murray River through the provision of an appropriate water regime.						
			Control salinity and stratification in deep pools	Functions	NV2	NA	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			Facilitate recolonisation by native fish species that have been presumed to be lost e.g. Trout Cod, River Blackfish and Macquarie Perch	Native Fish	NV17	F1, F2, F4, F5, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Increase extent/maintain aquatic plants (e.g. Water Ribbons, Eel Grass)	Vegetation	NV6	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			Increase extent/maintain emergent littoral macrophytes (e.g. Phragmites, rushes, reeds and sedges) on benches and edges of channel, but limit their encroachment into the middle of the channel	Vegetation	NV6	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			Maintain/improve connectivity between the Campaspe River reaches and between the Campaspe River and the Murray River	Functions	NV1	FC1, FC2, FC3, FC5, FC6, FC7	2.1, 2.2, 2.3, 2.5, 2.10	8.06,3(a), 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,3(f), 8.06,6(b), 8.07,6
			Maintain/increase diversity and productivity of macroinvertebrates and macroinvertebrate functional feeding groups	Other Fauna	NV26	N/A	2.6, 2.7, 2.8	8.06,6(b) 8.07,3
					NV27	N/A	2.6, 2.7, 2.8	8.06,6(b) 8.07,3
			Platypus: Maintain/increase resident breeding population by facilitating successful recruitment at least every second year and promote safe dispersal by juveniles	Other Fauna	NV22	N/A	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
			To increase the population size, with an appropriate age structure of small and large-bodied native fish known to occur in the Campaspe River e.g. Golden Perch, Murray Cod and Murray-Darling Rainbowfish	Native Fish	NV17	F1, F2, F4, F5, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b) 8.07,3
					NV18	F1, F2, F4, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5 8.06,6(a)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			To maintain adult River Red Gum trees and facilitate successful recruitment	Vegetation	NV11	V2 - V4	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
Coliban River	NCCMA	To rehabilitate resilient breeding populations of Platypus and small-bodied native fish in the upper half of the Coliban River through maintaining and increasing the cover and diversity of in-stream, fringing and riparian native vegetation communities, and to provide opportunities for these animals to disperse throughout the lower half of the river and beyond.						
			Clean substrates including rocks, submerged wood and macrophytes	Functions	NV3	FC1	2.1, 2.5	8.06,4
			Increase abundance and diversity of opportunistic small-bodied native fish such as Australian Smelt, Flat-headed Gudgeon and Mountain Galaxias.	Native Fish	NV18	F1, F2, F4, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5 8.06,6(a)
			Limit the risk of blackwater events	Functions	NV2		2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			Maintain adult riparian woody vegetation (e.g. River Red Gum, Callistemon sieberi, Leptospermum lanigerum, and Acacia provincialis) and facilitate recruitment	Vegetation	NV10	V1	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
					NV11	V2 - V4	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
			Maintain and increase abundance and diversity of emergent fringing vegetation such as Triglochin procerum, Myriophyllum varrifolium and Potamogeton spp. on benches	Vegetation	NV6	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5,

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			and edges of channel, but limit their encroachment into the middle of the channel.		NV9	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,6(a), 8.06,7 8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Maintain and increase overall abundance, diversity and productivity of macroinvertebrates and macroinvertebrate functional feeding groups to drive productive and dynamic foodwebs.	Other Fauna	NV26	N/A	2.6, 2.7, 2.8	8.06,6(b) 8.07,3
					NV27	N/A	2.6, 2.7, 2.8	8.06,6(b) 8.07,3
			Maintain channel form, replenish benches and scour pools to maintain their depth	Functions	NV3	FC1	2.1, 2.5	8.06,4
			Maintain water quality that is able to support aquatic biota and ecological processes. Specifically: • Limit nutrient concentrations to prevent excessive algal growth and blooms. • Maintain dissolved oxygen levels above 2 mg/L in dry periods. • Prevent water temperature rising to dangerous levels and electrical conductivity rising above 3,000 EC	Functions	NV2	NA	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			Maintain Water rats as a component of the system and accept their numbers will fluctuate between drought and non-drought conditions	Other Fauna	NV23	N/A	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
			Provide conditions that consistently support widespread successful breeding of Platypus to increase its resilience to future drought and floods and to provide surplus juveniles that can disperse to and colonise other suitable waterways.	Other Fauna	NV22	N/A	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
			Provide habitat and flow conditions that will allow River Blackfish to re-establish	Native Fish	NV17	F1, F2, F4, F5, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b) 8.07,3

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			V1 Maintain and increase cover and diversity of instream aquatics such as Triglochin procerum, Myriophyllum varrifolium and Potamogeton spp.	Vegetation	NV5	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
					NV6	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
					NV7	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
Doctors Swamp	GBCMA	To provide a watering regime that supports Red Gum Swamp and Plains Grassy Wetland EVCs and provides breeding opportunities for a diverse range of native wetland biota						
			Achieve a diversity of native wetland flora species consistent with Red Gum Swamp and Plains Grassy Wetland EVC benchmark	Vegetation	NV12	V2 - V4	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
			Provide opportunities for native frog breeding at least one in three years.	Other Fauna	NV24	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			Provide opportunities for waterbird breeding.	Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			Reduce the cover and diversity of exotic flora species.	Vegetation	NV14	N/A	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.07,5
Gaynor Swamp	GBCMA	To provide a more natural hydrological regime that supports Red Gum Swamp and Freshwater Lignum Cane Grass Swamp EVCs and habitat for significant waterbird and flora species”						

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Maintain or increase the diversity and abundance of frog species supported by the wetland during flood events.	Other Fauna	NV25	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			Provide opportunities for waterbird breeding especially Brolga during flood events.	Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			Reduce the cover and diversity of exotic and/or highly invasive native flora species.	Vegetation	NV14	N/A	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.07,5
			Reinstate populations of Spiny Lignum and Salt Paperbark	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Reinstate the diversity of native wetland flora species to be consistent with Red Gum Swamp and Freshwater Lignum – Cane Grass Swamp EVC benchmarks.	Vegetation	NV12	V2 - V4	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
Goulburn River	GBCMA	Maximise native floral biodiversity; maximise native faunal biodiversity; maximise self-sustaining populations of icon faunal species; promote community health and wellbeing through connection to river.						
			Maximise self-sustaining populations of opportunistic fish -	Native Fish	NV18 NV19 NV20	F1-F9, F17	2.2, 2.5, 2.6, 2.7	8.06,5 8.06,6(a) 8.06,6(b) 8.07,3
			(a) Support population survival	Water Quality	NV2		2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			(b) Support population recruitment					
			(c) Support population movement					
				Macroinvertebrates	NV27		2.6, 2.7, 2.8	8.06,6(b) 8.07,3
				Connectivity	NV1	FC1, FC2, FC3, FC5, FC6, FC7	2.1, 2.2, 2.3, 2.5, 2.10	8.06,3(a), 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,3(f),

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
								8.06,6(b), 8.07,6
			Maximise self-sustaining populations of periodic fish -	Native Fish	NV17 NV19 NV20	F1-F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b) 8.07,3
			(a) Support population survival					
			(b) Support population recruitment	Water Quality	NV2		2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			(c) Support population movement	Macroinvertebrates	NV27		2.6, 2.7, 2.8	8.06,6(b) 8.07,3
				Connectivity	NV1	FC1, FC2, FC3, FC5, FC6, FC7	2.1, 2.2, 2.3, 2.5, 2.10	8.06,3(a), 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,3(f), 8.06,6(b), 8.07,6
			Maximise self-sustaining populations of equilibrium fish -	Native Fish	NV17 NV19	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a) 8.06,6(b) 8.07,3
			(a) Support population survival					
			(b) Support population recruitment	Water Quality	NV2		2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			(c) Support population movement	Macroinvertebrates	NV27		2.6, 2.7, 2.8	8.06,6(b) 8.07,3
				Connectivity	NV1	FC1, FC2, FC3, FC5, FC6, FC7	2.1, 2.2, 2.3, 2.5, 2.10	8.06,3(a), 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,3(f), 8.06,6(b), 8.07,6
			Maximise self-sustaining populations of platypus	Other Fauna	NV22 NV23		2.1, 2.2, 2.3, 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	First Nations objectives (BWS)	EWMP objectives
			(a) Ensure suitable conditions for reproduction (b) Support development of body condition and enhance survival (c) Ensure quality of burrow habitat	Macroinvertebrates	NV26		2.6, 2.7, 2.8	8.06,6(b) 8.07,3
			Maximise self-sustaining populations of turtles (a) Ensure suitable conditions for reproduction (b) Support environment to enhance body condition (c) Support conditions for nesting habitat (d) Support conditions for nesting habitat (e) Ensure suitable population protection from hazards	Other Fauna	NA		2.9, 2.10	8.05,3(a) 8.05,3(b) 8.06,6(b) 8.07,3 8.07,5 8.07,6
			Maximise structural complexity and diversity of floodplain vegetation, including wetlands (a) Maximize germination and establishment of young plants (b) Minimize negative impacts of logging	Vegetation	NV8, NV1, NV11, NV12	V1-V4, V9	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
			Maximise structural complexity and diversity of bank vegetation (a) Maximize abundance and diversity of littoral vegetation (b) Maximize abundance and diversity of mid-bank vegetation (c) Maximize reproduction of extant vegetation (d) Maximize germination and establishment of young plants	Vegetation	NV5, NV7, NV9	V7-V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5 8.06,6(a), 8.06,7
Horseshoe Lagoon	GBCMA	Provide a watering regime at Horseshoe Lagoon that protects and restores ecosystem functions, and provides vital habitat needed to support the life cycles of water-dependent plants and animals over the longer term.						
			AB1: Protect turtle populations by providing the feeding and breeding habitat needed to support life cycle processes, assessed by the	Other Fauna	-	NA	2.9, 2.10	8.05,3(a), 8.05,3(b), 8.06,3(a), 8.06,5,

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			presence of priority species in 50% years to 2025.					8.06,6(b), 8.07,6
			AB2: Protect the diversity of frog species in 80% of years to 2025	Other Fauna	NV25	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			V1: Protect diversity, recruitment and regeneration of target EVCs from the 2012 - 2019 benchmark by 2025.	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			V2: Ensure the protection of threatened plant species by establishing benchmark condition by 2024 and setting an objective by 2025.	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			WB1: Protect waterbird species diversity, through improved access to feeding and roosting habitat, assessed by the presence of all expected guilds in 50% of years to 2025.	Waterbirds	NV16	B1 - B4	2.2, 2.9	8.06,6(b)
Kanyapella Basin	GBCMA	To provide a more natural hydrological regime that supports a mosaic of EVCs and habitat for significant waterbird and flora species						
			Protect and enhance the diversity of native wetland flora species consistent with the relevant EVC ((including EVC 803 Plains Woodland - Black Box dominated)	Vegetation	NV8, NV13	V1, V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7 8.06,3(b)(ii), 8.06,6(a) 8.06,6(b)
			Provide opportunities for waterbird breeding especially Royal Spoonbills and Ibis.	Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			Reduce the cover and diversity of exotic and/ or highly invasive native flora species within the Basin area.	Vegetation	NV14	N/A	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.07,5
Lake Boort	NCCMA	To provide a water regime that supports the recruitment and maintenance of River Red Gum habitats, and ensures opportunities for waterbird foraging, nesting and breeding.						

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Maintain current extent and restore health of Black Box vegetation surrounding the high water mark of Lake Boort (EVC 803: Plains woodland). Support the provision of open woodland consisting primarily of Black Box trees at approximately 15 trees per hectare (as per the EVC benchmark).	Vegetation	NV13	V1	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Restore and rehabilitate vegetation species diversity typical of aquatic and semi-aquatic environments when the wetland is inundated.	Vegetation	NV8	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Restore the distribution of live River Red Gums and associated floristic community (EVC 292) across the bed of Lake Boort. The number of live River Red Gums should be approximately ten per hectare with 10% canopy cover (as per the EVC benchmark) in the areas that are currently dominated by dead trees (~60% of wetland bed). Reinstate populations of non-tufted graminoids typical of EVC 292 such as Southern Cane Grass and Common Spike-sedge.	Vegetation	NV10	V1	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
Lake Leaghur	NCCMA	To provide a water regime that supports flora and fauna that are typical of a Deep Freshwater Marsh, in particular providing key waterbird habitat (breeding and nesting) within a Red Gum Swamp (EVC 292).						
			1.1 Maintain the health and restore the distribution of River Red Gum vegetation (EVC 292) • Maintain health of existing trees • Provide opportunities for recruitment across the wetland bed	Vegetation	NV10	V1	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
					NV11	V2 - V4	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

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			1.2 Restore Cane Grass populations	Vegetation	NV7	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			1.3 Establish breeding opportunities for waterbirds, frogs: e.g. Little Pied Cormorants, Ducks, Great Egret1, Spotted Marsh Frog.	Other Fauna	NV24	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
				Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			2.1 Restore diverse aquatic and amphibious plant communities in the wet phase and endemic plant communities associated with exposed lake bed and banks during the dry phase.	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
					NV6	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
					NV7	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
					NV8	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			3.2 Ensure adequate biomass of macroinvertebrate functional feeding groups and zooplankton to support ecological processes and wetland foodwebs.	Other Fauna	NV26	N/A	2.6, 2.7, 2.8	8.06,6(b) 8.07,3
					NV27	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	First Nations objectives (BWS)	EWMP objectives
Lake Yando	NCCMA	To provide a water regime that maintains existing mature river red gums (<i>Eucalyptus camaldulensis</i>), supports the recruitment of new river red gums and promotes the growth of a diverse range of aquatic and amphibious plant species that offer habitat for waterbirds, reptiles and amphibians.						
			Maintain and where necessary rehabilitate the abundance and diversity of waterbirds using the wetland when it is full and as it draws down.	Waterbirds	NV16	B1 - B4	2.2, 2.9	8.06,6(b)
			Maintain the health and increase the distribution of vegetation associated with Riverine chenopod woodland (EVC 103) · Maintain health of existing black box trees · Provide opportunities for recruitment of black box and understorey species	Vegetation	NV13	V1	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.06,3(b)(ii), 8.06,6(a) 8.06,6(b)
			Maintain the health and restore the distribution of river red gum and understorey species (such as tangled lignum) associated with Intermittent swampy woodland EVC	Vegetation	NV10	V1	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
					NV11	V2 - V4	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
			Rehabilitate EVCs 107 (Lake bed herbland), 653 (Aquatic herbland) and 949 (Dwarf floating aquatic herbland) to benchmark condition · Provide a water regime that supports these EVCs and allows species to complete their lifecycles (i.e. set seed) · Maintain a viable seed bank for these EVCs	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Rehabilitate macroinvertebrate and zooplankton production to levels expected in healthy freshwater swamps.	Other Fauna	NV26	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	First Nations objectives (BWS)	EWP objectives
Loch Garry	GBCMA	Provide a watering regime at Loch Garry that protects ecosystem functions and provides the vital habitat needed to support the life cycles of water dependent plants and animals over the longer term.	A1: Protect the diversity of frog species in 80% of years to 2025	Other Fauna	NV25	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			AB1: Protect refugia to support the long-term survival and resilience of waterbirds and turtles, to allow for re-colonisation beyond the refugia following dry periods, assessed by the presence of priority species.	Other Fauna				
				Waterbirds	NV16	B1 - B4	2.2, 2.9	8.06,6(b)
			F1: Protect the diversity of wetland fish species by restoring self-sustaining population and expanding the range of species known to occur in the lower Goulburn system by 2035	Native Fish	NV21	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a)
			V1: Restore diversity, recruitment and regeneration of target EVCs from the 2015 - 2019 benchmark by 2025.	Vegetation	NV8	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			V2: Ensure the protection of threatened plant species by establishing benchmark condition by 2024 and setting an objective by 2025.	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
Loddon River (upper)	NCCMA	Promote a widespread and diverse aquatic fauna community particularly native fish and Platypus						
			Re-establish deep pools in areas that have been affected by sand slugs, maintain existing pools in other areas and replenish benches within the channel.	Functions	NV3	FC1	2.1,2,5	8.06,4
			Flush accumulated silt and sediment from substrates including rocks, submerged wood and macrophytes	Functions	NV3	FC1	2.6	8.06,2
			Maintain water quality at a level that is able to support fish and macroinvertebrates. In particular maintain adequate concentrations of	Functions	NV2	-	2.1,2,2,2,6,2,8, 2.10	8.06,2, 8.07,5

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			dissolved oxygen, prevent salinity levels rising above 3,000 EC and prevent excessive water temperatures during low flow periods.					
			Increase diversity and appropriate spatial extent of native emergent fringing non woody vegetation along the banks and in floodrunners or anabranches.	Vegetation	NV6, NV9	V7-V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			Maintain adult riparian woody vegetation (e.g. River Red Gum, Black Box, Bottlebrush, Tea Tree, Melaleuca and Tangled Lignum – species composition will vary between reaches) and facilitate recruitment adjacent to the river channel and in low lying floodplain areas that are watered via floodrunners	Vegetation	NV7, NV10	V1, V7-V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,3(b)(ii), 8.06,5, 8.06,6(a), 8.06,6(b), 8.06,7
			Maintain and increase spatial extent of instream vegetation	Vegetation	NV5, NV6	V7-V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			Maintain low lying floodplain vegetation communities. These communities are characterised by a River Red Gum overstorey and grassy, sedge or lignum understorey	Vegetation	NV12	V2-V4	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
			Enhance natural recruitment and dispersal of stocked Murray Cod populations in disconnected impoundments e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie	Native fish	NV17	F1, F2, F4, F5, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b) 8.07,3

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Reservoir and Serpentine Creek (Durham Ox weir pool).					
			Increase population size (with appropriate age structure) and distribution of River Blackfish and facilitate re-colonisation of Reach 1 via Laanecoorie Reservoir.	Native fish	NV20	F3, F4, F6, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(b)
			Increase population size (with appropriate age structure) of small-bodied native fish species including Murray-Darling Rainbowfish, Flathead Gudgeon, Carp Gudgeon, and Australian Smelt.	Native fish	NV18, NV21	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,5 8.06,6(a)
			Maintain habitat for stocked populations of Golden Perch in disconnected reaches e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie Reservoir and Serpentine Creek	Native fish	NV19	F2 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a) 8.06,6(b) 8.07,3
			To increase the population size, with an appropriate age structure, and the diversity of native fish species, in the connected mid and lower Loddon River System	Native fish	NV17, NV18	F1, F2, F4, F5, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a), 8.06,6(b) 8.07,3
			To increase the population size, with an appropriate age structure, of native fish species in the impounded Loddon River System reaches	Native fish	NV21	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a)
			Increase size of resident breeding Platypus populations and facilitate dispersal of surplus juveniles that can colonise other reaches of the Loddon River and connected catchments.	Other Fauna	NV22, NV23	-	2.9, 2.10	8.05,3(a),8.0 5,3(b), 8.06,6(b),8.0 7,6
			Maintain/Increase aquatic biota such as Freshwater turtles, native frogs and water rats	Other Fauna	NV23, NV25	-	2.1, 2.2, 2.3, 2.5, 2.6, 2.9	8.06,6(b) 8.07,3
			Maintain/increase diversity and productivity of macroinvertebrates and macroinvertebrate functional feeding groups to drive productive and dynamic foodwebs.	Other Fauna	NV27	-	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	First Nations objectives (BWS)	EWMP objectives
Meran Lakes Complex (Lake Meran and Little Meran)	NCCMA	A hydrologically diverse wetland complex comprising permanent, intermittent and episodic freshwater wetlands that supports: healthy Aquatic Herbland, Lake bed Herbland and Intermittent Swampy Woodland vegetation classes; a high diversity and periodically high abundance of wetland birds; and regionally significant breeding populations of freshwater turtles (e.g. Murray River Turtle).						
			Maintain open water and associated mud-flat habitats for sufficient periods during flooding and drying cycles to drive aquatic food webs and support wetland bird feeding and breeding.	Waterbirds	NV16	B1 - B4	2.2, 2.9	8.06,6(b)
			Maintain refuge for and successful recruitment and survival of freshwater turtles, in particular Murray River Turtles	Other Fauna	NA	-	2.2, 2.9, 2.10	8.05,3(a), 8.05,3(b), 8.06,5, 8.06,6(b)
			Maintain the extent of emergent aquatic vegetation associated with Tall Marsh EVC 821 (including Typha spp., Juncus spp. and Eleocharis spp.), in the southern basin and higher levels of the mid basin of Lake Meran	Vegetation	NV6	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			Rehabilitate and increase the extent of Aquatic Herbland EVC 653 vegetation toward benchmark condition (e.g. Myriophyllum spp., Vallisneria spp. Triglochin spp., Potamogeton spp.)	Vegetation	NV4, NV6	V7-V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			Rehabilitate and increase the extent of Lake Bed Herbland EVC 107 vegetation towards benchmark condition (e.g. FFG listed Hoary Scurf-pea and Downy Swainson-pea) on exposed wetland bed.	Vegetation	NV6	V7 - V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6(a), 8.06,7
			Rehabilitate Aquatic Herbland EVC 653) vegetation toward benchmark condition (e.g. Myriophyllum spp., Triglochin spp., Potamogeton spp.)	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Rehabilitate feeding and breeding opportunities for a high diversity of wetland birds (e.g. White-bellied Sea-eagles, Cormorants and Australian Darter, Black Swans and Grebes)	Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			Rehabilitate feeding and breeding opportunities for a high diversity of wetland birds of various feeding guilds, (e.g. ducks, fish eating birds, deep water foragers, and migratory wading waterbirds)	Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			Rehabilitate macroinvertebrate communities to ensure that all expected functional groups (e.g. grazers, shredders, filter feeders etc.) are present and have sufficient biomass to support ecological processes and food webs.	Other Fauna	NV27	N/A	2.6, 2.7, 2.8	8.06,6(b) 8.07,3
			Rehabilitate the abundance of large-bodied fish species known to have historically occurred at the site and small-bodied fish species common to the region.	Native Fish	NV17, NV18	F1, F2, F4, F5, F6, F7, F8, F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b) 8.07,3
			Rehabilitate the condition of Intermittent Swampy Woodland (EVC 821) towards benchmark condition by: 5.2.1 maintaining the health of adult and recently recruited River Red Gum and Black Box trees 5.2.2 increasing the extent of River Red Gum 5.2.3 rehabilitating the associated understorey species such as River Coobah (Acacia stenophylla), Tangled Lignum (Duma florulenta) and various herbs and graminoids.	Vegetation	NV10, NV11, NV12	V1-V4	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
			Rehabilitate the condition of Intermittent Swampy Woodland towards EVC benchmark condition by: 2.4.1 maintain the health of adult and recently recruited River Red Gum and Black Box trees (within the wetted area) and	Vegetation	NV8, NV10, NV11, NV12, NV13	V1-V4, V9	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

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
Molesworth Billabongs	GBCMA region	Taungurung Land & Waters Council manage environmental water at this asset. An overarching management goal has not been made public.	2.4.2 increase the extent of River Red Gum Trees 2.4.3 rehabilitate the associated understorey species such as River Coobah (<i>Acacia stenophylla</i>), Tangled Lignum (<i>Duma florulenta</i>) and various herbs and graminoids.					
			Rehabilitate the diversity and abundance of native frog populations to support at least common species in the region such as Pobblebonks, Marsh Frogs, Perons Tree Frog	Other Fauna	NV25	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			Increase the diversity and cover of native wetland plant species consistent with their ecological vegetation class benchmarks	Vegetation	NV, 7NV8	V7-V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,2, 8.06,3(a), 8.06,5, 8.06,6, 8.06,7
			Maintain fish populations and provide suitable habitat for them	Native fish	NV21	F1-F9, F17	2.2,2.5,2.6,2.7	8.06,6(a)
Moodie Swamp	GBCMA	Maintain and/ or improve the biological values, functioning and resilience of Moodie Swamp by providing a more natural wetting and drying regime.	Reduce the cover and diversity of invasive plants	Vegetation	NV14	-	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.07,5
			MS1 Maintain the presence of water-dependent nationally threatened species recorded at Moodie Swamp by 2030	Other Fauna	-	-	-	-
			MS2 Maintain the diversity of native wetland flora species to be consistent with cane grass wetland/ Aquatic Herbland complex EVC benchmark Swamp.	Vegetation	NV4	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWP objectives
			MS3 By 2030, support waterbird breeding and feeding at Moodie Swamp at least five times in ten years.	Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			MS4 Improve breeding of frogs at Moodie Swamp to 80% of years in which water is present by 2030.	Other Fauna	NV24	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			MS5 Maintain and provide opportunities for Brolga breeding.	Waterbirds	NV15	B1, B2, B4	2.2, 2.9	8.06,6(a)
			MS6 Reduce the cover and diversity of exotic water-dependent flora species at Moodie Swamp by 2030.	Vegetation	NV14	N/A	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.07,5
Ovens River (King and Buffalo Rivers)	NECMA	Use the environmental water reserve, and water management of the Ovens River, to build viable populations of iconic native fish and ensure that they are resilient						
			Increase / maintain production of larvae of target fish species	Native Fish	NV21	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a)
			Maintain condition of more adult fish of target species (large-bodied fish)	Native Fish	NV19	F2 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a) 8.06,6(b) 8.07,3
			Maintain survival rates of juveniles of target fish species	Native Fish	NV21	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(a)
Pyramid Creek	NCCMA	see Pyramid Creek in the Victorian Murray LTWP						
Reedy Swamp	GBCMA	To provide a more natural hydrological regime that supports waterbird breeding and improves the condition of existing mosaic of EV Cs as well as providing a designated primary drought refuge during times of regional need						
			Improve the diversity of native wetland flora species consistent with the mosaic of EVC benchmarks	Vegetation	NV8	V9	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWP objectives
			Maintain habitat for colonial waterbird refuge and breeding including Australian White Ibis, Straw-necked Ibis, Royal Spoonbills (v) and Yellow-billed Spoonbills.	Waterbirds	NV16	B1 - B4	2.2, 2.9	8.06,6(b)
			Maintain or increase diversity and abundance of frog species supported by the wetland during flood events.	Other Fauna	NV25	N/A	2.3, 2.5, 2.6, 2.9	8.06,6(b), 8.07,3
			Provide feeding habitat for significant waterbird species such as Eastern Great Egret, Intermediate Egret, Glossy Ibis and Latham's Snipe during flood events.	Waterbirds	NV16	B1 - B4	2.2, 2.9	8.06,6(b)
			Reduce the cover and diversity of exotic and/or highly invasive native flora species.	Vegetation	NV14	N/A	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.07,5
Serpentine Creek	NCCMA	Promote a widespread and diverse aquatic fauna community particularly native fish and Platypus, by providing high quality breeding and feeding habitat and where possible facilitating movement throughout the Mid-Murray Floodplain System. Rehabilitate riparian River Red Gum vegetation communities along the river and where possible connect floodplain habitats through the provision of an appropriate flow regime.						
			Enhance natural recruitment and dispersal of stocked Murray Cod populations in disconnected impoundments e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie Reservoir and Serpentine Creek (Durham Ox weir pool).	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Enhance natural recruitment of Murray Cod population and allow fish to disperse and colonise suitable habitats in the Mid-Murray floodplain system.	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Extend available critical habitat to facilitate recolonisation of large bodied fish such as Silver Perch and Golden Perch populations in the Mid-Murray floodplain system	Native Fish	VM18	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Flush accumulated silt and sediment from substrates including rocks, submerged wood and macrophytes	Functions	NV3	FC1	2.1, 2.5	8.06,4
			Increase diversity and appropriate spatial extent of native emergent fringing non woody vegetation along the banks and in floodrunners or anabranches.	Vegetation	NV9	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Increase population size (with appropriate age structure) and distribution of River Blackfish and facilitate re-colonisation of Reach 1 via Laanecoorie Reservoir.	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Increase population size (with appropriate age structure) of small-bodied native fish species including Murray-Darling Rainbowfish, Flathead Gudgeon, Carp Gudgeon, and Australian Smelt.	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			Increase population size and diversity (with appropriate age structure) of small-bodied native fish species including Murray-Darling Rainbowfish, Flathead Gudgeon, Carp Gudgeon, and Australian Smelt.	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			Increase size of resident breeding Platypus populations and facilitate dispersal of surplus juveniles that can colonise other reaches of the Loddon River and connected catchments.	Other Fauna	NV22, NV23	-	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
			Maintain adult riparian woody vegetation (e.g. River Red Gum, Black Box, Bottlebrush, Tea Tree, Melaleuca and Tangled Lignum – species composition will vary between reaches) and facilitate recruitment adjacent to the river channel and in low lying floodplain areas that are watered via floodrunners	Vegetation	VM6	V1, V2, V3, V4	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
					VM7	V1, V2, V3, V4	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),

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
								8.06,6(b), 8.06,7
					VM8	V5, V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,5, 8.06,7
			Maintain and increase spatial extent of instream vegetation	Vegetation	VM4	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Maintain biofilm productivity, especially on coarse woody debris.	Functions	-	-	2.5	8.05,2(c), 8.06,7
			Maintain habitat for stocked populations of Golden Perch in disconnected reaches e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie Reservoir and Serpentine Creek	Native Fish	VM17	F1, F2, F3, F4, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.05,3(a), 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Maintain low lying floodplain vegetation communities. These communities are characterised by a River Red Gum overstory and grassy, sedge or lignum understorey.	Vegetation	VM6	V1, V2, V3, V4	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
					VM8	V5, V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,5, 8.06,7
			Maintain water quality at a level that is able to support fish and macroinvertebrates. In particular maintain adequate concentrations of dissolved oxygen, prevent salinity levels rising above 3,000 EC and prevent excessive water temperatures during low flow periods.	Functions	VM26	Not specified	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			Maintain/Increase aquatic biota such as Freshwater turtles, native frogs and water rats	Other Fauna	VM22	N/A	2.3, 2.5, 2.6, 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	First Nations objectives (BWS)	EWMP objectives
			Maintain/increase diversity and productivity of macroinvertebrates and macroinvertebrate functional feeding groups to drive productive and dynamic foodwebs.	Other Fauna	VM25	Not specified	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			Re-establish deep pools in areas that have been affected by sand slugs, maintain existing pools in other areas and replenish benches within the channel.	Functions	-	-	2.5	8.06,3(a), 8.06,4
			To increase the population size, with an appropriate age structure, and the diversity of native fish species, in the connected mid and lower Loddon River System	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			To increase the population size, with an appropriate age structure, of native fish species in the impounded Loddon River System reaches	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
Tullaroop Creek	NCCMA	Promote a widespread and diverse aquatic fauna community particularly native fish and Platypus, by providing high quality breeding and feeding habitat and where possible facilitating movement throughout the Mid-Murray Floodplain System. Rehabilitate riparian River Red Gum vegetation communities along the river and where possible connect floodplain habitats through the provision of an appropriate flow regime.						
			Enhance natural recruitment and dispersal of stocked Murray Cod populations in disconnected impoundments e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie Reservoir and Serpentine Creek (Durham Ox weir pool).	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Enhance natural recruitment of Murray Cod population and allow fish to disperse and colonise suitable habitats in the Mid-Murray floodplain system.	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Extend available critical habitat to facilitate recolonisation of large bodied fish such as Silver Perch and Golden Perch populations in the Mid-Murray floodplain system	Native Fish	VM18	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWP objectives
			Flush accumulated silt and sediment from substrates including rocks, submerged wood and macrophytes	Functions	NV3	FC1	2.1, 2.5	8.06,4
			Increase diversity and appropriate spatial extent of native emergent fringing non woody vegetation along the banks and in floodrunners or anabranches.	Vegetation	NV9	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Increase population size (with appropriate age structure) and distribution of River Blackfish and facilitate re-colonisation of Reach 1 via Laanecoorie Reservoir.	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Increase population size (with appropriate age structure) of small-bodied native fish species including Murray-Darling Rainbowfish, Flathead Gudgeon, Carp Gudgeon, and Australian Smelt.	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			Increase population size and diversity (with appropriate age structure) of small-bodied native fish species including Murray-Darling Rainbowfish, Flathead Gudgeon, Carp Gudgeon, and Australian Smelt.	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			Increase size of resident breeding Platypus populations and facilitate dispersal of surplus juveniles that can colonise other reaches of the Loddon River and connected catchments.	Other Fauna	NV22, NV23	-	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
			Maintain adult riparian woody vegetation (e.g. River Red Gum, Black Box, Bottlebrush, Tea Tree, Melaleuca and Tangled Lignum – species composition will vary between reaches) and facilitate recruitment adjacent to the river channel and in low lying floodplain areas that are watered via floodrunners	Vegetation	VM6	V1, V2, V3, V4	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
					VM7	V1, V2, V3, V4	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),

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
								8.06,6(b), 8.06,7
					VM8	V5, V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,5, 8.06,7
			Maintain and increase spatial extent of instream vegetation	Vegetation	VM4	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Maintain biofilm productivity, especially on coarse woody debris.	Functions	-	-	2.5	8.05,2(c), 8.06,7
			Maintain habitat for stocked populations of Golden Perch in disconnected reaches e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie Reservoir and Serpentine Creek	Native Fish	VM17	F1, F2, F3, F4, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.05,3(a), 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Maintain low lying floodplain vegetation communities. These communities are characterised by a River Red Gum overstory and grassy, sedge or lignum understorey.	Vegetation	VM6	V1, V2, V3, V4	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
					VM8	V5, V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,5, 8.06,7
			Maintain water quality at a level that is able to support fish and macroinvertebrates. In particular maintain adequate concentrations of dissolved oxygen, prevent salinity levels rising above 3,000 EC and prevent excessive water temperatures during low flow periods.	Functions	VM26	Not specified	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			Maintain/Increase aquatic biota such as Freshwater turtles, native frogs and water rats	Other Fauna	VM22	N/A	2.3, 2.5, 2.6, 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	First Nations objectives (BWS)	EWP objectives
			Maintain/increase diversity and productivity of macroinvertebrates and macroinvertebrate functional feeding groups to drive productive and dynamic foodwebs.	Other Fauna	VM25	Not specified	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			Re-establish deep pools in areas that have been affected by sand slugs, maintain existing pools in other areas and replenish benches within the channel.	Functions	-	-	2.5	8.06,3(a), 8.06,4
			To increase the population size, with an appropriate age structure, and the diversity of native fish species, in the connected mid and lower Loddon River System	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			To increase the population size, with an appropriate age structure, of native fish species in the impounded Loddon River System reaches	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
Twelve Mile Creek	NCCMA	Promote a widespread and diverse aquatic fauna community particularly native fish and Platypus, by providing high quality breeding and feeding habitat and where possible facilitating movement throughout the Mid-Murray Floodplain System. Rehabilitate riparian River Red Gum vegetation communities along the river and where possible connect floodplain habitats through the provision of an appropriate flow regime.						
			Enhance natural recruitment and dispersal of stocked Murray Cod populations in disconnected impoundments e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie Reservoir and Serpentine Creek (Durham Ox weir pool).	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Enhance natural recruitment of Murray Cod population and allow fish to disperse and colonise suitable habitats in the Mid-Murray floodplain system.	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Extend available critical habitat to facilitate recolonisation of large bodied fish such as Silver Perch and Golden Perch populations in the Mid-Murray floodplain system	Native Fish	VM18	F1 - F9, F17	2.2, 2.5, 2.6, 2.7	8.06,6(b)

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
			Flush accumulated silt and sediment from substrates including rocks, submerged wood and macrophytes	Functions	NV3	FC1	2.1, 2.5	8.06,4
			Increase diversity and appropriate spatial extent of native emergent fringing non woody vegetation along the banks and in floodrunners or anabranches.	Vegetation	NV9	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Increase population size (with appropriate age structure) and distribution of River Blackfish and facilitate re-colonisation of Reach 1 via Laanecoorie Reservoir.	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3
			Increase population size (with appropriate age structure) of small-bodied native fish species including Murray-Darling Rainbowfish, Flathead Gudgeon, Carp Gudgeon, and Australian Smelt.	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			Increase population size and diversity (with appropriate age structure) of small-bodied native fish species including Murray-Darling Rainbowfish, Flathead Gudgeon, Carp Gudgeon, and Australian Smelt.	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			Increase size of resident breeding Platypus populations and facilitate dispersal of surplus juveniles that can colonise other reaches of the Loddon River and connected catchments.	Other Fauna	NV22, NV23	-	2.1, 2.2, 2.3, 2.9	8.06,6(b) 8.07,3
			Maintain adult riparian woody vegetation (e.g. River Red Gum, Black Box, Bottlebrush, Tea Tree, Melaleuca and Tangled Lignum – species composition will vary between reaches) and facilitate recruitment adjacent to the river channel and in low lying floodplain areas that are watered via floodrunners	Vegetation	VM6	V1, V2, V3, V4	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
					VM7	V1, V2, V3, V4	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),

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Asset name	CMA	Management goal	EWMP Objectives	Theme	LTWP Objective no.	BWS EEO	First Nations objectives (BWS)	EWMP objectives
								8.06,6(b), 8.06,7
					VM8	V5, V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,5, 8.06,7
			Maintain and increase spatial extent of instream vegetation	Vegetation	VM4	V8	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,3(a), 8.06,5, 8.06,7
			Maintain biofilm productivity, especially on coarse woody debris.	Functions	-	-	2.5	8.05,2(c), 8.06,7
			Maintain habitat for stocked populations of Golden Perch in disconnected reaches e.g. Laanecoorie Reservoir, Serpentine Weir pool, Loddon Weir pool, and large pools between Laanecoorie Reservoir and Serpentine Creek	Native Fish	VM17	F1, F2, F3, F4, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.05,3(a), 8.06,3(b)(i), 8.06,3(b)(ii), 8.06,6(a), 8.06,6(b)
			Maintain low lying floodplain vegetation communities. These communities are characterised by a River Red Gum overstory and grassy, sedge or lignum understorey.	Vegetation	VM6	V1, V2, V3, V4	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
					VM8	V5, V6	2.1, 2.2, 2.3, 2.5, 2.8, 2.9, 2.10	8.05,3(b), 8.06,5, 8.06,7
			Maintain water quality at a level that is able to support fish and macroinvertebrates. In particular maintain adequate concentrations of dissolved oxygen, prevent salinity levels rising above 3,000 EC and prevent excessive water temperatures during low flow periods.	Functions	VM26	Not specified	2.1, 2.2, 2.6, 2.8, 2.10	8.06,2, 8.07,5
			Maintain/Increase aquatic biota such as Freshwater turtles, native frogs and water rats	Other Fauna	VM22	N/A	2.3, 2.5, 2.6, 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	First Nations objectives (BWS)	EWP objectives
			Maintain/increase diversity and productivity of macroinvertebrates and macroinvertebrate functional feeding groups to drive productive and dynamic foodwebs.	Other Fauna	VM25	Not specified	2.6, 2.7, 2.8	8.06,6(b), 8.07,3
			Re-establish deep pools in areas that have been affected by sand slugs, maintain existing pools in other areas and replenish benches within the channel.	Functions	-	-	2.5	8.06,3(a), 8.06,4
			To increase the population size, with an appropriate age structure, and the diversity of native fish species, in the connected mid and lower Loddon River System	Native Fish	VM16	F1, F2, F5, F6, F17	2.2, 2.5, 2.6, 2.7	8.06,5, 8.06,6(a)
			To increase the population size, with an appropriate age structure, of native fish species in the impounded Loddon River System reaches	Native Fish	VM15	F1, F2, F5, F7, F8	2.2, 2.5, 2.6, 2.7	8.06,6(a), 8.06,6(b), 8.07,3

Appendix E Roles and responsibilities

Table 22 below outlines the range of agencies and authorities that are involved in managing and delivering environmental water.

Table 22. Responsible Minister and agencies

Minister / Agency	Responsibilities
Minister for Water	Oversee Victoria's environmental water management policy framework Oversee 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. Administer 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 (Mallee, North Central, Goulburn Broken and North East 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	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 (Goulburn-Murray Water)	Manage irrigation districts, 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.

Minister / Agency	Responsibilities
Formally recognised Traditional Owner groups in the Northern Victoria water resource plan area: • Dja Dja Wurrung Clans Aboriginal Corporation • Taungurung Land and Waters Aboriginal Corporation • Yorta Yorta Nations 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 Agreement Act 2010</i>)⁸. 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 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.
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.

⁸ A Recognition and Settlement Agreement is negotiated by Traditional Owners with the Victorian Government. Native title is determined by the Federal Court of Australia or, on appeal by the High Court. Determinations and Agreements may differ for each group.

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 23 relates to risks that result in failure to achieve objectives.

Table 24 relates to risks that arise from the provision of environmental water.

Table 23. 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 water resource plan area	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 water resource plan area	The provision of water can be complemented with: Monitoring watering regime and ecological response
	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 water resource plan area	- Liaison with water authorities, land holders, other stakeholders and the broader community - 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 water resource plan area	- Monitoring watering regime and ecological response - Update conceptual model with latest research - Undertake research to fill knowledge gaps
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

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Risk category	Threat	Implication	Themes and related objectives at risk	Management options
	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
	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

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Risk category	Threat	Implication	Themes and related objectives at risk	Management options
	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
	Monitoring not provided			Ongoing research into ecosystem response to environmental water
	Inadequate research to support conceptual models or monitoring design			

Table 24. Risks 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
	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 25 and Table 26 below provide the groundwater dependency of priority river and wetland assets respectively in the Northern Victoria water resource plan area, and the risk posed to the assets by groundwater use, as identified by Groundwater Logic (2019). Reaches classed as medium risk from groundwater use are managed through local management plans. The Ovens River also has a baseflow-related target for environmental watering.

Note - a number of priority wetlands were unable to be assessed by the Groundwater Logic method due to size.

Table 25. Groundwater-dependent riverine assets in the Northern Victoria water resource plan area.

PEA name	PEA reach	Index of Stream Condition Basin-Reach	Surface water SDL resource unit	Groundwater dependent features (confidence)	Risk posed by groundwater use
Broken River	Broken River	4-1	SS5 (Broken)	H	L
	Broken River	4-2	SS5 (Broken)	H	L
	Broken River	4-3	SS5 (Broken)	non-GDE	na
	Broken River	4-4	SS5 (Broken)	H (lower reach)	L
	Broken River	4-4	SS5 (Broken)	L (upper reach)	L
Campaspe River	Campaspe River	6-1	SS7 (Campaspe)	H	L
	Campaspe River	6-2	SS7 (Campaspe)	H	L
	Campaspe River	6-3	SS7 (Campaspe)	non-GDE	na
	Campaspe River	6-4	SS7 (Campaspe)	non-GDE	na
	Campaspe River	6-5	SS7 (Campaspe)	M	L
Coliban River	Coliban River	6-18	SS7 (Campaspe)	M	L
	Coliban River	6-19	SS7 (Campaspe)	M	L
Goulburn River	Goulburn River	5-1	SS6 (Goulburn)	H	L
	Goulburn River	5-2	SS6 (Goulburn)	H	L
	Goulburn River	5-3	SS6 (Goulburn)	non-GDE	na
	Goulburn River	5-4	SS6 (Goulburn)	H	L
	Goulburn River	5-5	SS6 (Goulburn)	H	L
	Goulburn River	5-6	SS6 (Goulburn)	H	L
	Goulburn River	5-7	SS6 (Goulburn)	H	L
	Goulburn River	5-8	SS6 (Goulburn)	H	L
	Goulburn River	5-9	SS6 (Goulburn)	L	L
	Goulburn River	5-10	SS6 (Goulburn)	H	L
	Goulburn River	5-11	SS6 (Goulburn)	M	L
	Goulburn River	5-12	SS6 (Goulburn)	H	L

PEA name	PEA reach	Index of Stream Condition Basin-Reach	Surface water SDL resource unit	Groundwater dependent features (confidence)	Risk posed by groundwater use
Loddon River	Goulburn River	5-13	SS6 (Goulburn)	H	L
	Goulburn River	5-14	SS6 (Goulburn)	H	L
	Loddon River	7-3	SS8 (Loddon)	non-GDE	na
	Loddon River	7-4	SS8 (Loddon)	H	L
	Loddon River	7-5	SS8 (Loddon)	H	L
	Loddon River R6	7-6	SS8 (Loddon)	non-GDE	na
	Loddon River R7	7-7	SS8 (Loddon)	H	L
	Loddon River R8	7-8	SS8 (Loddon)	M	L
	Tullaroop Creek	7-18	SS8 (Loddon)	M	L
	Serpentine Creek	7-11	SS8 (Loddon)	non-GDE	na
	Twelve Mile Creek	na	SS8 (Loddon)	non-GDE	na
	Birch's (Bullarook) Creek	7-21	SS8 (Loddon)	H	L
Ovens River	Ovens River	3-1	SS4 (Ovens)	H	L
	Ovens River	3-2	SS4 (Ovens)	H	L
	Ovens River	3-3	SS4 (Ovens)	L	L
	Ovens River	3-4	SS4 (Ovens)	H	M
	Ovens River	3-4	SS4 (Ovens)	L	M
	Buffalo River	3-33	SS4 (Ovens)	H	L
	King River	3-21	SS4 (Ovens)	M	L
	King River	3-22	SS4 (Ovens)	M	L
	King River	3-23	SS4 (Ovens)	M	L
	King River	3-24	SS4 (Ovens)	M	L

Table 26. Groundwater-dependent wetland assets in the Northern Victoria water resource plan area

PEA Name	Index of Wetland Condition ID	Surface water SDL resource unit	Groundwater-dependent features (confidence)	Risk posed by groundwater use
Moodies Swamp	67053	SS5 (Broken)	M	L

Appendix H Waterway representativeness

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

Table 27. ANAE wetland types of priority environmental assets in the Northern Victoria water resource plan area

Asset Name	ANAE type	Area (ha)
Doctors Swamp	Pt2.3.2: Freshwater meadow	224.6
Gaynor Swamp	Pt2.3.2: Freshwater meadow	300.8
Horseshoe Lagoon	Pt1.1.2: Temporary river red gum swamp	20.0
Kanyapella Basin	Lt1.1: Temporary lake	181.5
	Pt1.2.2: Temporary black box swamp	214.3
Lake Boort	Pt1.1.2: Temporary river red gum swamp	404.9
Lake Leaghur	Lp1.1: Permanent lake	63.7
Lake Yando	Pt1.7.2: Temporary lignum swamp	82.9
Loch Garry	Pt1.1.2: Temporary river red gum swamp	328.4
Loddon River	F1.4: River red gum woodland riparian zone or floodplain	3.0
	Rp1.4: Permanent lowland stream	12.6
	Rt1.4: Temporary lowland stream	1.4
Meran Lakes complex (Lake Meran and Little Meran)	Lp1.1: Permanent lake	175.0
	Pt1.1.2: Temporary river red gum swamp	27.2
Molesworth Billabong	Pt1.1.2: Temporary river red gum swamp	14.5
Moodie Swamp	Pt2.3.2: Freshwater meadow	181.4
Reedy Swamp	Pt2.2.2: Temporary sedge/grass/forb marsh	130.5

Table 28. ANAE riverine types of priority environmental assets in the Northern Victoria water resource plan area

Asset Name	ANAE type	Lengths (km)
Birch's Creek (Bullarook)	Rt1.1: Temporary high energy upland stream	62.28
	Rt1.2: Temporary transitional zone stream	115.35
	Rt1.3: Temporary low energy upland stream	15.66
	Rt1.4: Temporary lowland stream	0.12
Broken River and Upper Broken Creek	Rp1.1: Permanent high energy upland stream	3.11
	Rp1.2: Permanent transitional zone stream	4.58
	Rp1.4: Permanent lowland stream	388.24
	Rt1.1: Temporary high energy upland stream	11.87
	Rt1.2: Temporary transitional zone stream	49.79
	Rt1.4: Temporary lowland stream	173.99
Campaspe River	Rp1.2: Permanent transitional zone stream	7.79
	Rp1.4: Permanent lowland stream	257.55

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Asset Name	ANAE type	Lengths (km)
Coliban River	Rt1.2: Temporary transitional zone stream	33.09
	Rt1.4: Temporary lowland stream	109.20
	Rp1.2: Permanent transitional zone stream	77.21
	Rp1.4: Permanent lowland stream	58.21
Goulburn River	Rt1.2: Temporary transitional zone stream	96.94
	Rt1.4: Temporary lowland stream	1.97
	Rp1.1: Permanent high energy upland stream	1.61
	Rp1.2: Permanent transitional zone stream	21.93
Ovens River (including Mullinmur Wetland, King and Buffalo Rivers)	Rp1.4: Permanent lowland stream	1031.51
	Rt1.1: Temporary high energy upland stream	23.63
	Rt1.2: Temporary transitional zone stream	107.17
	Rt1.4: Temporary lowland stream	360.03
Pyramid Creek	(blank)	0.53
	Rp1.2: Permanent transitional zone stream	143.25
	Rp1.4: Permanent lowland stream	564.21
	Rt1.1: Temporary high energy upland stream	36.49
Serpentine Creek	Rt1.2: Temporary transitional zone stream	116.15
	Rt1.4: Temporary lowland stream	241.74
	(blank)	0.28
	Rp1.4: Permanent lowland stream	1.16
Tullaroop Creek	Rt1.2: Temporary transitional zone stream	8.51
	Rt1.4: Temporary lowland stream	362.30
	Rp1.2: Permanent transitional zone stream	7.14
	Rp1.4: Permanent lowland stream	155.89
Twelve Mile Creek	Rt1.4: Temporary lowland stream	83.89
	Rp1.2: Permanent transitional zone stream	12.43
	Rp1.4: Permanent lowland stream	54.32
	Rt1.2: Temporary transitional zone stream	21.43
	Rt1.4: Temporary lowland stream	6.83
	Rp1.4: Permanent lowland stream	11.24
	Rt1.2: Temporary transitional zone stream	1.18
	Rt1.4: Temporary lowland stream	49.23

Appendix I Basin Plan objectives

Table 29. Basin Plan objectives – Chapter 8 environmental watering plan.

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.

EWP objective code	EWP objective
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).
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) Expected Environmental Outcomes relevant to Northern Victoria water resource plan area

Ecological themes	Types	Scale	BWS ID	Expected environmental outcomes	Page of BWS	Relevance to NV WRP
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	
	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	

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Ecological themes	Types	Scale	BWS ID	Expected environmental outcomes	Page of BWS	Relevance to NV WRPA
Native vegetation	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	
		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	✓
	Forest and woodlands	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	✓
		Basin-wide	V6	Improvement in the condition of lignum shrublands.	22	✓
	Non-woody vegetation	Basin-wide	V7	To maintain the extent of non-woody vegetation.	22	✓

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Ecological themes	Types	Scale	BWS ID	Expected environmental outcomes	Page of BWS	Relevance to NV WRP
Waterbirds	Waterbirds	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-nesting waterbirds to increase by up to 50% compared to the baseline scenario*.	24	✓
		Basin-wide	B4	Breeding abundance (nests and broods) for all of the other functional groups to increase by 30-40% compared to the	24	✓

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Ecological themes	Types	Scale	BWS ID	Expected environmental outcomes	Page of BWS	Relevance to NV WRP
Native fish	All native fish			baseline scenario*, especially locations where the Basin Plan improves over-bank flows.		
		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	
		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	✓
		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	✓
		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 80% of key sites, with at least 4 of these being 'strong' recruitment events.	27	✓
		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	✓

Ecological themes	Types	Scale	BWS ID	Expected environmental outcomes	Page of BWS	Relevance to NV WRPA
Estuarine species		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	
		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 mullet, including spawning aggregations at the Murray Mouth in 6 out of 10 years and recruitment in at least 5 out of 10 years.	28	

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Ecological themes	Types	Scale	BWS ID	Expected environmental outcomes	Page of BWS	Relevance to NV WRP
	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 (Basin-wide environmental watering strategy 2025)

ID	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 - Crayfish, yabbies and shrimp - Freshwater mussels

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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 refuge 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.
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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.

