Section 4

Western Region

4.1 Western Region overview

In the Western Region, regulated environmental flows can be delivered to the Wimmera River system, the Glenelg River and the Wimmera-Mallee wetlands. The Wimmera River system and Wimmera-Mallee wetlands are part of the Murray–Darling Basin.

Water for the environment in the Western Region is supplied from the Wimmera-Mallee headworks system. The Wimmera and Glenelg systems share an environmental entitlement and the VEWH works with the Wimmera and Glenelg CMAs to determine how the available allocation will be used in each river in a given year. Water for the environment available to the Wimmera-Mallee wetlands is supplied from a separate entitlement.

Environmental, social and economic values, recent conditions, environmental watering objectives and planned actions for each system in the Western Region are presented in the system sections that follow.

Traditional Owners in the Western Region

Traditional Owners and their Nations in western Victoria continue to have a deep and enduring connection to the region's rivers, wetlands and floodplains. The VEWH acknowledges the Traditional Owners of the Western Region and pays respect to their Elders past, present and future. It recognises that water has significant cultural importance and value for Traditional Owners and Aboriginal people.

Traditional Owner groups in and around western Victoria include the Bindjali, Bungandidj, Dja Wurrung, Djagurd Wurrung, Gunditjmara, Jaadwa, Jadawadjali, Jupagulk, Wamba Wemba, Wadawurrung, Wergaia, Wotjobaluk and Yupagail people among others. The Registered Aboriginal Parties (RAPs) in this region are Barengi Gadjin Land Council Aboriginal Corporation (BGLC), Dja Dja Wurrung Clans Aboriginal Corporation and Gunditj Mirring Traditional Owners Aboriginal Corporation (GMTOAC) and Martang Pty Ltd.

Two formal agreements with RAPs in the Western Region are in place under the *Traditional Owners Settlement Act 2010*:

- in 2005, the Victorian Government entered into a native title settlement agreement with BGLC
- in 2007 the Victorian Government entered into a native title settlement agreement with GMTOAC.

Both settlement agreements include cooperative management agreements to improve collaboration in the management of Traditional Owner Country in the Wimmera and Glenelg areas.

The Glenelg Hopkins CMA and the Wimmera CMA have been working with GMTOAC and BGLC to understand how management of water for the environment in the Glenelg and Wimmera rivers can better support Aboriginal aspirations, particularly around caring for Country and protecting important story places and cultural resources. The following two initiatives will support Traditional Owners' aspirations for water for the environment in western Victoria in 2018–19.

A trial watering is proposed for the Ranch Billabong near Dimboola, on land managed by BGLC. The intent is to pump water into the billabong system in winter or spring to restore native plant and animal habitats, control invasive weeds and improve amenity. The billabong is a place of high significance to the Traditional Owners and their Nations, and it was the home of many generations of Wotjobaluk peoples.

If climate and catchment conditions permit, a fresh may be delivered in autumn 2019 in the Glenelg River to again coincide with the Johnny Mullagh Cup, a cricket championship held at Harrow between the Gunditj Mirring and Barengi Gadjin Traditional Owners. Glenelg Hopkins CMA will liaise with Traditional Owners in the lead-up to the match about the feasibility of providing the fresh, which freshens the water for native plants and animals, improves the river's usability and amenity for the cricketers, spectators and others, and supports cultural heritage values (such as scarred trees and native plants, which are sources of traditional foods and medicines).

Community considerations

When planning to use water for the environment, the potential social, economic, Aboriginal-cultural and recreational benefits for communities which could arise from the water's use are considered.

A landmark study was conducted in 2017 to quantify the socioeconomic benefits of the Wimmera River and other waterways in the Wimmera and Southern Mallee area. Three of the sites surveyed along the Wimmera River (in Dimboola, Horsham and Jeparit) illustrated the enormous benefits the river and the water for the environment delivered provided to the community in 2016–17, including a $4.75 million contribution to the area's economy and $2.5 million in mental and physical health benefits. As well, residents that used the Wimmera River exceeded Australian government guidelines for physical activity.

Some scoped opportunities for shared community benefits of water for the environment in western Victoria for 2018–19 include:

- managing deliveries of water for the environment where possible in the Wimmera River to support the Horsham, Dimboola and Jeparit fishing competitions, waterskiing at the Kanamaroo festival, the Dimboola Regatta and Head of the Wimmera rowing competitions and the Horsham Triathlon
- improving water quality in the Glenelg River, which will improve amenity and provide more opportunities for swimming, fishing and canoeing at popular campgrounds in the upper reaches
- increasing opportunities for yabbying and birdwatching at some of the Wimmera-Mallee wetlands
- improving habitat for native fish species resulting in increased recreational fishing opportunities along the Glenelg, Wimmera and MacKenzie rivers and Burnt and Mt William creeks.

The ability of the VEWH and its partners to deliver these benefits will depend on the weather, on climate variations, on the available water and on the way the system is being operated to deliver water for other purposes (such as for home, farm and business use).

Environmental watering is also expected to have indirect benefits such as improving amenity at walking tracks in Horsham, Dimboola and Jeparit; at Dadswells Bridge along the Wimmera River and at Burnt and Mt William creeks; and along the Glenelg River including the River Walk at Harrow, the Kelpie Trail and the Glenelg River Walk at Casterton.

For more information about scoped opportunities for shared community benefits in 2018–19, contact the VEWH or the relevant waterway manager.

Integrated catchment management

Altered water regimes are one of many threats to the health of Victoria's waterways. To be effective, planning and releases of water for the environment need to be part of an integrated approach to catchment management. Many of the environmental objectives in this seasonal watering plan will not be fully met without also addressing issues such as excessive catchment erosion, barriers to fish movement, high nutrient loads, loss of stream bank vegetation and invasive species, to name just some issues.

Victorian and Australian government agencies, community groups and private landowners collectively implement programs and activities to protect and improve the environmental condition and function of land, soils and waterways throughout Victoria's catchments. Examples in the region of such programs and activities coordinated with environmental flows include:

- erosion control in the upper Wimmera catchment to improve water quality
- stock exclusion fencing along priority waterways throughout the Wimmera and Glenelg catchments to support the reestablishment of riparian and in-stream vegetation, with over 600 farming families involved along the Glenelg River alone
- major works to improve fish passage at Sandford Weir and Dergholm Gauge, in combination with delivery of water for the environment to facilitate the movement of migratory fish from the estuary to the upstream reaches of the Glenelg and Wannon rivers
- carp management activities in both the Wimmera and Glenelg systems to reduce the number of carp and to build understanding about their behaviour in both rivers to facilitate better environmental watering outcomes

Camping by the Glenelg River, by George Turner

- extensive snag installation in Glenelg River reach 2 using red gum trunks and root balls to restore complex habitat
- control of invasive species in the Wimmera-Mallee wetlands.

For more information about integrated catchment management programs in the Western Region refer to the Glenelg Hopkins, Wimmera, North Central and Mallee regional catchment strategies and waterway strategies.

Seasonal outlook 2018–19

The first few months of the 2017–18 water year were characterised by average rainfall, which generated natural flows to rivers, wetlands and system storages. In contrast, rainfall from late spring to the end of autumn was well-below average and temperatures were above average. Inflows to Wimmera-Mallee storages from July 2017 to April 2018 were 67,250 ML, which is 38 percent of the historic average of inflows.

The winter 2017 average conditions and water held in Wimmera-Mallee storages from 2016–17 meant that allocations against the environmental entitlement reached 81 percent by September 2017. There were no measurable inflows between November 2017 and April 2018, and as a result there were no further allocations to the environmental entitlement for the remainder of 2017–18. The CEWH did not receive any allocation in 2017–18, but water that was allocated to the CEWH in 2016–17 was carried over and used for the first time in the Wimmera system, to support environmental objectives in the Wimmera River through autumn/winter 2018.

Natural flows met most of the planned winter/spring 2017 environmental watering objectives for rivers, creeks and wetlands in the region, so little water for the environment was delivered between July and September. Passing flows in the Wimmera and Glenelg rivers were suspended at times during winter and spring 2017. In the Glenelg system, suspending the passing flows avoided exacerbating flood risks to downstream landowners in the Glenelg River. Passing flows in the Wimmera system were suspended as flow requirements were met by a combination of natural flows and operational water in the Wimmera system. Water that would have been delivered as passing flows was accrued and used later in the season to meet planned flow objectives when drier conditions returned. Water for the environment was used to meet remaining flow objectives once the accrued passing flows were exhausted.

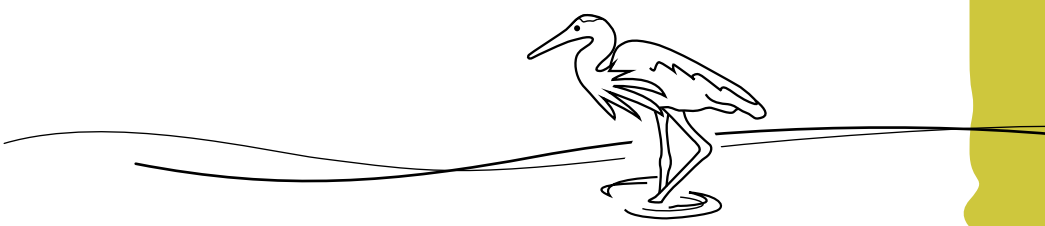
Below-average rainfall and higher-than-average temperatures are predicted for the Western Region through winter 2018. If dry conditions persist into 2018–19, environmental watering in the region will focus on protecting water quality to maintain habitat and build the resilience of in-stream native plants and animals. The carryover available going into 2018–19 will be particularly important in the drier climatic scenarios predicted, as allocation to the wetland entitlement is not expected to be made before October 2018, and may be very small or zero depending on inflows during winter and early spring. The VEWH's allocation is expected to remain below 60 percent, and no allocations to the CEWH entitlement are expected in 2018–19. If conditions become wetter and environmental allocations increase, priority will be given to reserving water for use in 2019–20 and delivering some larger winter/spring flows. The continuing focus of environmental watering in the Wimmera-Mallee wetlands will be to provide refuge and maintain habitat in the dry landscape to support local plants and animals.

The Basin Plan 2012

The Wimmera system forms part of the larger Murray–Darling Basin and water diversions and deliveries of water for the environment in this region are also subject to the requirements of the *Basin Plan 2012*.

The VEWH's environmental planning and delivery is consistent with the requirements of the Basin Plan. The potential environmental watering outlined in section 4 fulfils Victoria's obligations under section 8.26 of the plan to identify annual environmental watering priorities for Victoria's water resource areas.

Refer to section 5 for further information about the Basin Plan.



4.2 Glenelg system

Waterway manager – Glenelg Hopkins Catchment Management Authority

Storage manager – GWMWater

Environmental water holder – Victorian Environmental Water Holder

Glenelg River system: *The Glenelg River, known as 'Bochara' in the Dhawurd Wurrung language, features in creation stories from the south-west Victoria region and is a traditional boundary between the Gunditjmara, Boandik and Jadawadjali people.*

Source: Glenelg Hopkins CMA

The Glenelg River rises in the Grampians and flows west through Harrow and then south to Casterton and Dartmoor for over 500 km, making it one of the longest rivers in Victoria. A short stretch of the estuary winds through South Australia before returning to Victoria and flowing into the sea at Nelson.

The Glenelg River continues to be an important place for Traditional Owners and their Nations. The Registered Aboriginal Parties (RAPs) in the Glenelg River catchment are the Gunditj Mirring Traditional Owner Aboriginal Corporation and the Barengi Gadjin Land Council. Representatives from both RAPs were engaged during the preparation of the Glenelg system seasonal watering proposal.

Environmental values

The lower section of the Glenelg River has been recognised as one of Australia's 15 national biodiversity hotspots due to the aquatic life it supports, including the endangered Glenelg freshwater mussel and Glenelg spiny crayfish. It is also home to platypus and populations of native fish including river blackfish, estuary perch, tupong and several species of pygmy perch. Some of these fish species migrate long distances upstream from the Glenelg River estuary to complete their lifecycles. Frasers Swamp is another important feature of the upper Glenelg system, and is home to a healthy growling grass frog population.

The Glenelg River supports a variety of riparian vegetation communities including the endangered Wimmera bottlebrush. Riparian and floodplain vegetation is comprised of river red gum woodlands with paperbark, bottlebrush and tea tree understorey.

Social and economic values

The Glenelg system is highly valued by recreational anglers and several fishing competitions are held on the river throughout the year along with high profile events such as an Australian Bream Tournament and the Victorian Fisheries Authority's annual 'great perch search', where volunteer anglers catch broodfish perch. Other recreational activities including walking, sightseeing boat cruises, canoeing, birdwatching and camping are popular along parts of the river. Many landholders rely on the Glenelg River for stock water, and they use the productive floodplains for grazing. The river provides tourism opportunities and supports businesses in Balmoral, Harrow, Casterton, Dartmoor and Nelson, among other towns.

Environmental watering objectives in the Glenelg system

	Promote in-stream and riverside plants to flower, set seed and germinate Maintain and increase the health of in-stream and riparian vegetation (such as river red gums and Wimmera River bottlebrush)
	Protect and increase populations of native fish Cue fish movement and spawning to increase the recruitment of species such as the short-finned eel, black bream, estuary perch and tupong
	Maintain a wide range and large number of waterbugs to provide energy, break down organic matter and support the river's food chain
	Maintain and increase the resident platypus population by providing places to rest, breed and feed, as well as opportunities for juveniles to disperse to the lower sections of the river
	Move built-up sand on the river bed to provide healthy habitat pools for native fish, platypus, the critically endangered Glenelg freshwater mussel and the endangered Glenelg spiny crayfish
	Maintain water quality for fish, waterbugs, aquatic vegetation and other water-dependent animals

System overview

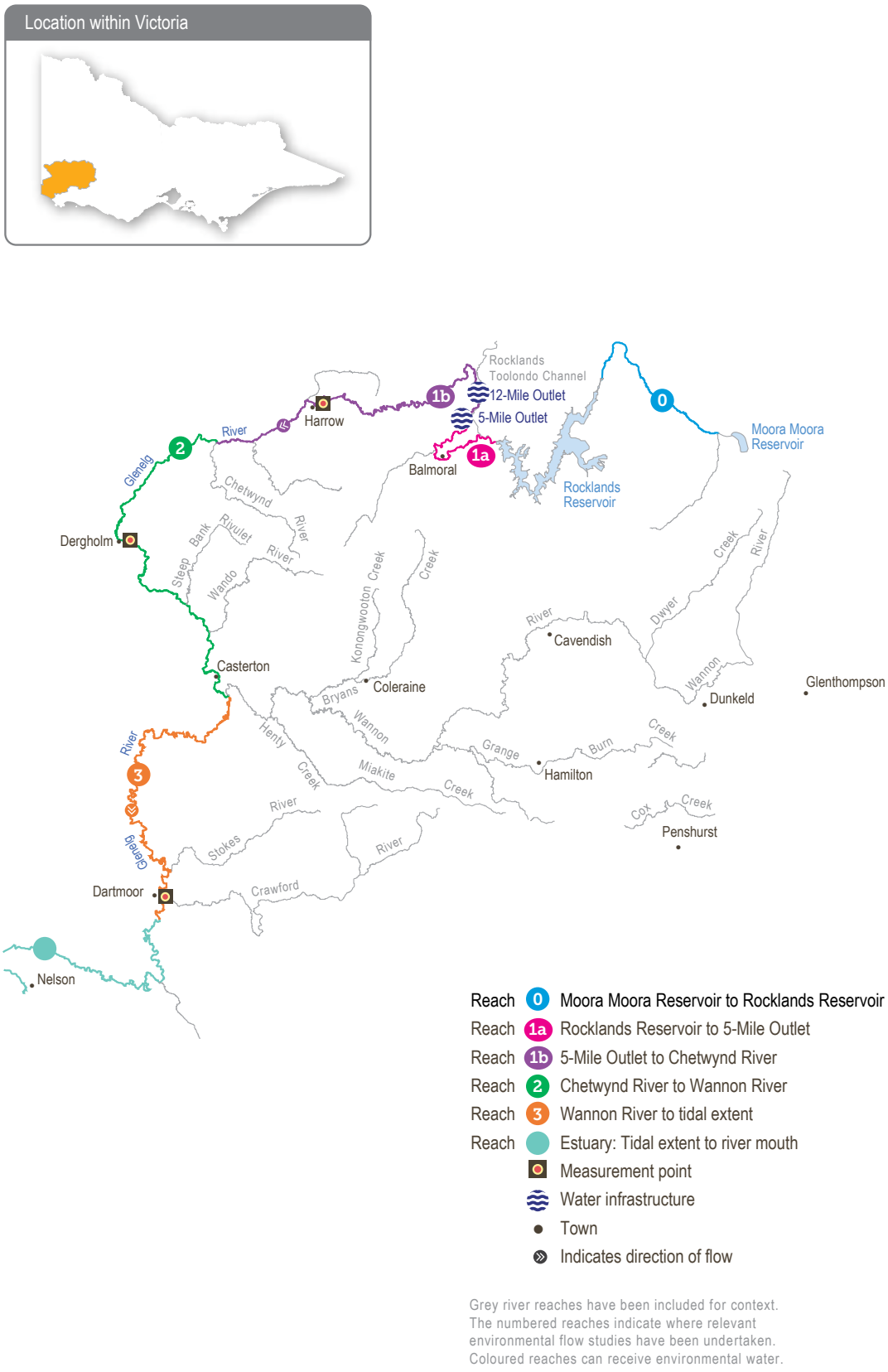
The Glenelg River is an integral part of the Wimmera-Mallee headworks system, which supplies towns and properties across the Western Region. Moora Moora Reservoir and Rocklands Reservoir, in the upper Glenelg catchment and three weirs on the upper Wannon River, are all used to divert water from the Glenelg system to the Wimmera catchment. Water for the environment is actively managed in the main stem of the Glenelg River between Moora Moora Reservoir and Rocklands Reservoir and below Rocklands Reservoir. Passing-flow rules are in place for the Glenelg River and upper Wannon River.

The priority reaches of the Glenelg River that can be targeted by environmental flow releases are Moora Moora Reservoir to Rocklands Reservoir (reach 0), Rocklands Reservoir to 5-Mile Outlet (reach 1a), 5-Mile Outlet to the confluence with the Chetwynd River (reach 1b) and Chetwynd River to the Wannon River (reach 2). Water for the environment in the Glenelg system is released from Rocklands Reservoir for reach 1a via the reservoir wall outlet and for reach 1b via the 5-Mile and 12-Mile outlets. Releases are made at these points to meet objectives in these reaches as well as reach 2. The Glenelg River reach 3 and estuary benefit from releases of water for the environment to upstream reaches, but releases are not currently targeted at these reaches.

The Glenelg River above Rocklands Reservoir (reach 0) runs mostly through the Grampians National Park and retains significant environmental values. Flows through this reach are affected by the operation of Moora Moora Reservoir and work is continuing in 2018–19 to confirm its flow requirements. Work is also continuing to better understand the role environmental releases from Rocklands Reservoir play in the health of the Glenelg River estuary, which is listed as a heritage river reach and which has just been listed as a site of international significance under the Ramsar Convention.

Glenelg River estuary, by Paulina Ramos

Figure 4.2.1 The Glenelg system



Recent conditions

Average rainfall during winter 2017 contributed to high natural flows in the Glenelg catchment. The high flows met many of the environmental flow objectives for winter and spring, and it eliminated the need for managed environmental flow releases. Passing flows were also suspended at various times during winter and spring to reduce the flood risk to communities downstream of Rocklands Reservoir. Water accumulated as a result of the suspended passing flows was used to help meet environmental objectives in summer.

The high natural flows during winter/spring and the provision of water for the environment during the summer/autumn period maintained connectivity from Rocklands Reservoir to the estuary at Nelson throughout 2017–18. Seasonal fluctuations in flows and water levels throughout the year provided opportunities for aquatic plants and animals to disperse between river reaches and to also access a variety of habitats throughout the system. The flows also supported the health of riparian vegetation and the transfer of nutrients and debris from the riverbanks into the river channel. Continuous low flows maintained the quality and quantity of water in riffle-pool habitats. Occasional freshes reduced salinity and water temperature and increased dissolved oxygen concentrations in deeper pools along the river system.

The natural and managed flows in the Glenelg River during 2017–18 provided habitat for native fish and opportunities for fish dispersal, migration and spawning. Young-of-year tupong and estuary perch were recorded more than 40 km upstream of the estuary in summer 2017–18. Strong migration of these fish species from the estuary corresponds with managed releases of water for the environment, which trigger migration and facilitate movement across habitats that are impassable at lower flows.

Allocations to the environment reached 81 percent in September 2017, based on water reserves from the wet 2016–17 season and good inflows into storages during early winter 2017. Conditions turned to dry during spring, with below-average rainfall and no inflow to storages between November 2017 and April 2018. As a result, there were no additional allocations to the environment after September 2017. Accumulated passing flows were used to meet environmental demands between late spring and mid-January 2018. Water allocated to the environmental entitlement was used to meet demand after that.

In November 2017, the first-ever release of water for the environment was delivered to reach 0 from Moora Moora Reservoir. The release aimed to improve understanding of water movement in the reach and how water can be delivered from the reservoir. Temporary gauges installed in reach 0 showed a significant rise of the river level following the release, but due to a significant rainfall event the full extent of the flow could not be measured accurately. Despite the measurement uncertainty, the trial release improved understanding of the potential for releases of water for the environment to support the important environmental values in reach 0 in the future.

Scope of environmental watering

Table 4.2.1 shows potential environmental watering actions and their environmental objectives

Table 4.2.1 Potential environmental watering actions and objectives for the Glenelg system

Potential environmental watering	Environmental objectives
Summer/autumn freshes targeting reach 1a (2 freshes of 60 ML/day for 2–3 days each in December–May)	• Maintain or increase the abundance and variety of waterbugs • Scour sand from pools to increase the quality and quantity of fish habitat • Maintain the condition of emergent vegetation on the lower banks • Flush pools to improve water quality and lower temperatures to improve habitat for Glenelg spiny crayfish, waterbugs and fish
Summer/autumn freshes targeting reaches 1b (2 freshes of 100 ML/day for 2–3 days each in December–May)	
Summer/autumn freshes targeting reach 2 (2 freshes of 150 ML/day for 2–3 days each in December–May)	
Summer/autumn low flows targeting reach 1a (10 ML/day or natural in December–May)[1]	• Protect against rapid water-quality decline over low-flow period • Maintain edge habitats, pools and shallow-water habitat for fish, waterbugs and platypus • Maintain a near-permanent inundated stream channel to prevent excessive in-stream terrestrial species growth and promote in-stream vegetation
Summer/autumn low flows targeting reach 1b (15 ML/day or natural in December–May)[1]	
Summer/autumn low flows targeting reach 2 (25 ML/day or natural in December–May)[1]	

Table 4.2.1 Potential environmental watering actions and their environmental objectives *continued*

Potential environmental watering	Environmental objectives
Winter/spring freshes targeting reach 1b (1–5 freshes of 250 ML/day for 1–5 days in June–November)[2]	• Wet benches to the improve condition of emergent vegetation and to maintain habitat diversity • Provide adequate depth for fish passage and cue fish movement • Support platypus habitat and breeding including triggers for burrow selection • Scour sand from pools to improve the quality of fish habitat • Maintain or increase vegetation diversity in the river and on channel benches
Winter/spring freshes targeting reach 2 (1–5 freshes of 300 ML/day for 1–5 days in June–November)	
Winter/spring low flows targeting reach 1a (60 ML/day or natural in June–November)[1, 3]	• Maintain water quality for fish, waterbugs and aquatic vegetation • Maintain shallow-water habitat for fish, waterbugs and platypus
Winter/spring low flows targeting reach 1b (100 ML or natural per day in June–November)[1, 3]	
Winter/spring low flows targeting reach 2 (160 ML/day or natural in June–November)[1, 3]	
Trial release to reach 0 (up to 50 ML/day over a 4 to 5 day period)	• Develop an operational understanding of our ability to deliver environmental flows to support values in this reach including the capacity of infrastructure, metering and safety considerations

1 *Cease-to-flow events occur naturally in the Glenelg system and may be actively managed with deliveries of water for the environment to reduce stress on environmental values. In the most-recent flows study, the recommendation is that cease-to-flow events should occur as infrequently as possible and not exceed the duration of events that might have occurred naturally. Cease-to-flow events ideally should be followed with a fresh event.*

2 *Winter/spring freshes in reach 1a are important to the health of the Glenelg River but due to operational constraints and potential flooding risks they can only be achieved through natural events.*

3 *Passing flows provided under the environmental entitlement generally provide winter/spring low flows. However, if passing flows are reduced, managed releases of water for the environment may be required to supplement them or to ensure appropriate rates of rise and fall and provide appropriate conditions in freshes.*

Scenario planning

Table 4.4.2 outlines the potential environmental watering and expected water use under a range of planning scenarios. While the actions are similar in each climatic scenario, the magnitude, duration and/or frequency differ between scenarios, so the volume required under each scenario also differs.

Under a drought or dry scenario, there may be periods of cease-to-flow in summer. Where possible, the duration of these cease-to-flow periods will be carefully managed and monitored to minimise adverse impacts. The priority is to protect water quality and refuge pools to ensure habitat is available for native fish and other animals (such as platypus and Glenelg spiny crayfish) in the warmer months when the risks are highest. Under a drought or dry scenario, low flows will be provided for some periods in reach 1b and reach 2, but they may not be delivered to reach 1a. Summer/autumn freshes will be used to maintain some pool habitats in reach 1a.

Under a wet climate scenario, the priority will be to increase the magnitude, frequency and duration of planned watering actions through summer and autumn and to deliver more of the recommended winter/spring flows. Natural river flows and passing flows are likely to help meet many of the environmental flow objectives in a wet year. Reserving water for carry over into the 2019–20 water year will be a priority under all scenarios.

Under dry to average climate scenarios, a second trial release to reach 0 from Moora Moora Reservoir is planned, to better understand the feasibility of delivering water for the environment to support environmental values in this reach. In wet seasonal conditions, no trial release is planned as natural catchment inflows could make data about the effects of environmental flows in reach 0 unreliable.

Table 4.4.2 Potential environmental watering for the Glenelg system under a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected availability of water for the environment[1]	• 32,100 ML carryover • 14,196 ML allocation • 46,296 ML total	• 32,100 ML carryover • 23,525 ML allocation • 55,625 ML total	• 32,100 ML carryover • 32,854 ML allocation • 64,954 ML total	• 32,100 ML carryover • 40,560 ML allocation • 72,660 ML total
Expected river conditions	• Some passing, compensation and low unregulated flows, particularly in winter/spring	• Some passing, compensation and low unregulated flows, particularly in winter/spring	• Some passing, compensation and unregulated flows, particularly in winter/spring	• Passing flows and unregulated flows meet some watering requirements in winter/spring
Potential environmental watering – tier 1 (high priorities)	• Summer/autumn freshes reach 1b • Summer/autumn freshes reach 2 • Summer/autumn low flows reach 1b • Summer/autumn low flows reach 2 • Winter/spring freshes reach 1b • Winter/spring freshes reach 2 • Summer/autumn freshes reach 1a	• Summer/autumn freshes reach 1b • Summer/autumn freshes reach 2 • Summer/autumn low flows reach 1b • Summer/autumn low flows reach 2 • Winter/spring freshes reach 1b • Winter/spring freshes reach 2 • Summer/autumn freshes reach 1a	• Summer/autumn freshes reach 1b • Summer/autumn freshes reach 2 • Summer/autumn low flows reach 1a • Summer/autumn low flows reach 1b • Summer/autumn low flows reach 2 • Winter/spring freshes reach 1b • Winter/spring freshes reach 2 • Summer/autumn freshes reach 1a • Winter/spring low flows reach 1a • Trial release reach 0	• Summer/autumn low flows reach 1a • Summer/autumn low flows reach 2 • Summer/autumn freshes reach 1a • Summer/autumn freshes reach 1b • Summer/autumn freshes reach 2 • Summer/autumn low flows reach 1b • Winter/spring freshes 1b • Winter/spring low flows reach 1a
Potential environmental watering – tier 2 (additional priorities)	• Summer/autumn low flows reach 1a • Winter/spring low flows reach 1a • Winter/spring low flows reach 1b • Winter/spring low flows reach 2 • Trial release reach 0	• Summer/autumn low flows reach 1a • Winter/spring low flows reach 1a • Winter/spring low flows reach 1b • Winter/spring low flows reach 2 • Trial release reach 0	• Winter/spring low flows reach 1b • Winter/spring low flows reach 2	• Winter/spring low flows reach 1b • Winter/spring low flows reach 2 • Winter/spring freshes reach 2 • Trial release reach 0
Possible volume of water for the environment required to achieve objectives[2]	• 9,880 ML (tier 1) • 11,910 ML (tier 2)	• 12,280 ML (tier 1) • 10,370 ML (tier 2)	• 27,810 ML (tier 1) • 25,480 ML (tier 2)	• 27,010 ML (tier 1) • 20,930 ML (tier 2)

[1] *Water for the environment in the Wimmera–Glenelg system is shared between the Glenelg and Wimmera systems. The volumes specified show the likely availability of the VEWH environmental entitlement for both systems. A prioritisation process will be undertaken in consultation with the Wimmera and Glenelg Hopkins CMAs to determine the potential watering actions that will be undertaken in each system in the 2018–19 year.*

[2] *Water for the environment requirements for tier 2 actions are additional to tier 1 requirements.*

Risk management

Environmental watering program partners have considered and assessed risks and identified mitigating strategies relating to environmental flows in 2018–19. Risks and mitigating actions are continually reassessed by program partners throughout the water year (see section 1.3.6).

Engagement

Table 4.2.3 shows the partners, stakeholder organisations and individuals with which Glenelg Hopkins CMA engaged when preparing the Glenelg system seasonal watering proposal.

Seasonal watering proposals are informed by longer-term regional catchment strategies, regional waterway strategies, environmental flow studies, water management plans and other studies. These incorporate a range of environmental, cultural, social and economic perspectives and longer-term integrated catchment and waterway management objectives. For further details, refer to the *Glenelg Hopkins Regional Catchment Management Strategy* and *Glenelg Hopkins Waterway Strategy* for further details.

Table 4.2.3 Partners and stakeholders engaged in developing the Glenelg system seasonal watering proposal

Partner and stakeholder engagement
• Aboriginal groups (Gunditj Mirring Traditional Owner Corporation and Barengi Gadjin Land Council) • Community members and landholders • Department of Environment, Land, Water and Planning • Environment groups: Glenelg River User Group and Friends of the Glenelg River • Fisheries Victoria • Glenelg Hopkins CMA Advisory Group including representatives of stakeholder groups and landholders in the region • GWMWater • Local tourism and sand extraction businesses and community service organisations based in Balmoral, Coleraine, Winnap, Nelson and the western Grampians • Parks Victoria • Recreational groups: Balmoral Angling Club, Casterton Angling Society, Dartmoor Angling Club, VRFish, Fishcare Victoria, the South West Fishing Report, individual anglers • Victorian Environmental Water Holder • Wimmera CMA

4.3 Wimmera system

Waterway manager – Wimmera Catchment Management Authority

Storage manager – GWMWater

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

The Wimmera River rises in the Pyrenees Range near Elmhurst and flows through Horsham, Dimboola and Jeparit before terminating at Lake Hindmarsh, which is Victoria's largest freshwater lake and the first of a series of terminal lakes. The Wimmera receives flows from several regulated tributaries including the MacKenzie River and the Mount William and Burnt creeks. These tributaries, Bungalally Creek and the Wimmera River downstream of Mount William Creek can receive environmental water. In exceptionally wet periods, Lake Hindmarsh may overflow into Outlet Creek and on to Lake Albacutya, an internationally recognised Ramsar-listed wetland. There are several wetlands beyond Lake Albacutya as well.

The waterways in the Wimmera system hold significance for Traditional Owners and their Nations. The Registered Aboriginal Parties (RAPs) in the Wimmera River catchment are the Barengi Gadjin Land Council Aboriginal Corporation (BGLC) and Martang Pty Ltd. Representatives of the BGLC were engaged during the preparation of this section. A trial watering is proposed for the Ranch Billabong near Dimboola, on land managed by BGLC. The intent is to provide a more-natural flooding regime in the billabong system to restore native plant and animal habitats that have been disconnected by levies and changed watering regimes in the Wimmera River. Ranch Billabong is also very significant to the Traditional Owners and their Nations, and it was the home of many generations of Wotjobaluk peoples.

Environmental values

The Wimmera system is home to many plant and animal species. It supports populations of native fish including one of Victoria's few self-sustaining populations of freshwater catfish, as well as flat-headed gudgeon, carp gudgeon, river blackfish, southern pygmy perch and Australian smelt. It also has the critically endangered Wimmera bottlebrush.

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

The MacKenzie River contains the only self-sustaining population of platypus in the Wimmera and supports populations of native fish, including river blackfish, waterbugs, threatened Glenelg spiny crayfish and turtles. During dry periods, the middle and upper reaches of the MacKenzie River maintain regular flow (due to managed releases from Lake Wartook) and provide refuge for these populations.

Vegetation along Burnt and Bungalally creeks provide habitat corridors for terrestrial and riparian wildlife and upper Burnt Creek contains an important native fish community and a population of threatened western swamp crayfish. Mount William Creek supports regionally important populations of river blackfish, southern pygmy perch and threatened western swamp crayfish.

Dock Lake is a natural wetland that was modified and used as part of the Wimmera-Mallee headworks system. When it is inundated, Dock Lake supports large populations of feeding and breeding waterbirds. It also supports frogs and small-bodied native fish. It is no longer used for water storage and is frequently dry.

Social and economic values

The Wimmera system offers many popular recreational activities including walking, boating, rowing, waterskiing, fishing and camping, and it provides important amenity for local communities. Events held on waterways throughout the Wimmera catchment include waterskiing at the annual Kanamaroo Festival in Horsham, the Horsham Triathlon, the Dimboola Rowing Regatta and the Horsham, Jeparit and Dimboola fishing competitions.

Environmental watering objectives in the Wimmera system

	Protect and increase populations of native fish, including one of Victoria's few self-sustaining populations of freshwater catfish
	Maintain and improve water quality to provide suitable conditions for waterbugs, native fish and other water-dependent plants and animals
	Maintain and increase the resident platypus population by providing places to rest, breed and feed, as well as opportunities for juveniles to disperse
	Improve the condition, abundance and diversity of aquatic, emergent and riparian vegetation
	Increase the abundance and diversity of waterbugs, which break down dead organic matter and support the waterway's food chain

System overview

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

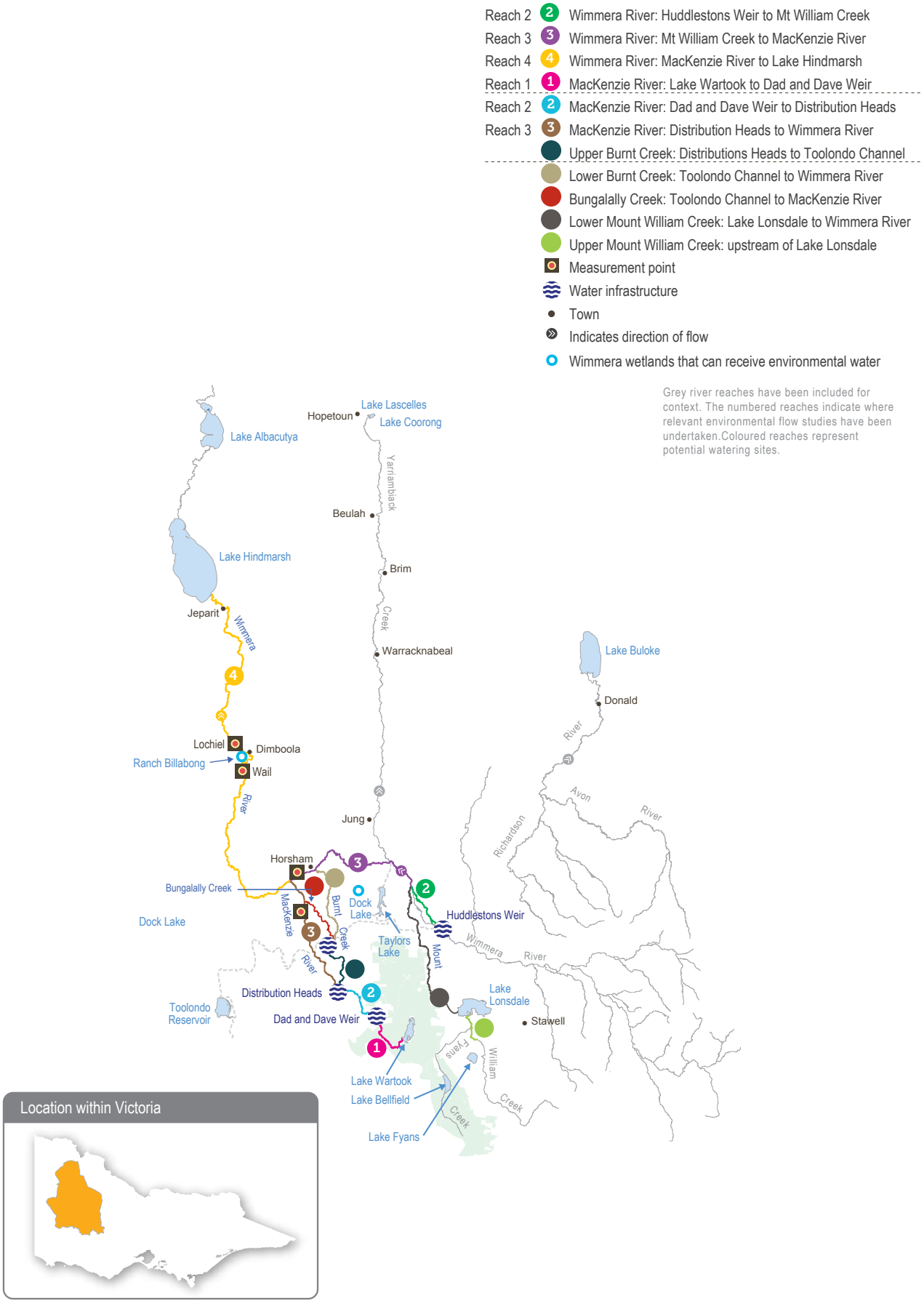
Priority reaches for environmental watering in the Wimmera system are Wimmera River reach 4, MacKenzie River reaches 2 and 3, upper and lower Mount William Creek, upper and lower Burnt Creek and Bungalally Creek.

Yarriambiack Creek is a distributary of the upper Wimmera River that would have naturally received some flows during high-flow events. Modifications to the Yarriambiack Creek offtake increase flow rates in Yarriambiack Creek, but potentially reduce the transfer of water for the environment to the high-priority reaches of the Wimmera River. In line with past practice during dry years, flows entering Yarriambiack Creek may be blocked to ensure watering objectives in the Wimmera River are not compromised.

Dock Lake, one of the Wimmera's large terminal lakes near Horsham, would have naturally filled when the nearby Green Lake filled and overflowed. Modifications in the 1930s changed the way water flowed into Dock Lake, when the wetland became to be used as a water storage for irrigation supply in the Wimmera-Mallee system. Dock Lake was removed from the supply system after 1999, and as such no water has been delivered to the wetland. In late 2016, large-scale flooding in the catchment partially filled Dock Lake when Green Lake filled and overflowed. Managed water deliveries can now only be delivered through a small channel from Green Lake, when there is enough water in Green Lake to gravity-feed Dock Lake.

Mount William Creek refuge pool, by John Tiddy

Figure 4.3.1 The Wimmera system



Recent conditions

Average rainfall during winter 2017 led to modest, unregulated flows in the Wimmera River's western tributaries, although rainfall in the eastern catchment was below average. During winter and spring, many of the environmental flow objectives in the Wimmera system were met naturally due to unregulated flows or through releases of water from Lake Wartook. Passing flows that were available at Lake Lonsdale were temporarily suspended and released later in the year to meet Wimmera River flow objectives.

Allocations to the environmental entitlement reached 81 percent in September 2017, based on water reserves set aside during the wet conditions during the 2016–17 season. Spring, summer and autumn 2017–18, had below-average rainfall and little-to-no inflow to storages; as a result, there were no additional allocations to the environment after September 2017. Accumulated passing flows were used to meet environmental demand between late spring and mid-January 2018. Water allocated to the environmental entitlement was used to meet demand after that.

The CEWH did not receive any allocation in 2017–18. The water that was allocated to the CEWH in 2016–17 was carried over to 2017–18 and used for the first time in the Wimmera system to support environmental outcomes in the Wimmera River and Mount William Creek.

The wet conditions in winter and spring 2017–18 and deliveries of water for the environment have improved the condition of the rivers and creeks in the Wimmera system.

Fish monitoring in the Wimmera River in March 2017 showed that populations of golden perch and freshwater catfish have been maintained along all reaches, and there is a healthy population of small-bodied native fish. Fish surveys in the MacKenzie River and Burnt Creek showed that southern pygmy perch successfully recruited in summer 2017–18. In autumn 2018, high abundances of young-of-year fish were found at many sites, which coincided with priority reaches that had received environmental flows. Other native fish identified include river blackfish, flat-headed gudgeon, Australian smelt, obscure galaxiids and carp gudgeon. The threatened western swamp crayfish was also found in MacKenzie River and Burnt Creek in 2017. Platypus surveys in MacKenzie River in both 2017 and 2018 also showed the platypus population is slowly increasing in abundance, with three young individuals caught for the first time.

Scope of environmental watering

Table 4.3.1 shows potential environmental watering actions and their environmental objectives.

Table 4.3.1 Potential environmental watering actions and objectives for the Wimmera system

Potential environmental watering	Environmental objectives
Wimmera River (reach 4)	
Summer/autumn low flows (15–30 ML/day or natural[1] in December–May)	• Maintain in-stream habitat to support native fish populations and waterbugs • Maintain near-permanent inundated stream channel for riparian vegetation and to prevent the growth of terrestrial plants in the stream bed
Winter/spring low flows (15–30 ML/day in June–November)	• Provide flow variability to maintain various habitat types
Summer/autumn freshes (1–3 freshes of 70 ML/day for 2–7 days in December–May)	• Flush pools to improve water quality and maintain habitat for fish and waterbugs • Provide fish passage to allow fish to move through the reach
Winter/spring freshes (1–5 freshes of 70 ML/day for 1–4 days in June–November)	• Stimulate fish movement and provide fish passage to allow fish to move through the reach • Maintain water quality to support fish populations
Winter/spring freshes (1–3 freshes of 200 ML/day for 1–3 days in June–November[2])	• Wet lower benches to entrain organic debris and promote habitat diversity
Winter/spring freshes (1–2 freshes of up to 1,300 ML/day for 2–3 days in June–November)	• Flush surface sediments from hard substrates to improve habitat quality and support waterbugs • Wet higher benches to entrain organic debris and promote habitat diversity • Maintain the quality, diversity and extent of submerged and emergent aquatic vegetation for fish habitat

Table 4.3.1 Potential environmental watering actions and objectives for the Wimmera system *continued*

Potential environmental watering	Environmental objectives
MacKenzie River (reach 2 and 3)	
Year-round low flows (of 2–27 ML/day or natural, year-round)[1]	• Maintain edge habitats and deeper pools and runs for waterbugs • Maintain near-permanent inundated stream channel for riparian vegetation and to prevent the growth of terrestrial plants including the Wimmera bottlebrush in the stream bed, and support growth of aquatic vegetation for fish habitat • Maintain sufficient area of pool habitat for native fish populations • Facilitate the annual dispersal of juvenile platypus into the Wimmera River
Summer/autumn freshes (3–4 freshes of 5–50 ML/day for 2–7 days each in December–May)	• Provide variable flows during the low-flow season for waterbugs, for fish movement and to maintain water quality and habitat diversity
Winter/spring freshes (5 freshes of 35–55 ML/day for 2–7 days in June–November)	• Stimulate fish movement and maintain water quality and habitat diversity
Winter/spring freshes (1–5 freshes of up to 130–190 ML/day for 1–4 days in June–November)	• Stimulate fish movement and maintain water quality • Flush sediments from hard substrates to support waterbugs • Wet higher benches to entrain organic debris and promote habitat diversity
Burnt Creek	
Year-round low flows targeting upper Burnt Creek (1 ML/day or natural, year-round)[1]	• Maintain edge habitats and shallow-water habitat for waterbugs • Maintain the inundated stream channel to protect riparian vegetation and prevent excessive streambed colonisation by terrestrial vegetation species • Maintain a sufficient area of pool habitat for native fish populations
Summer/autumn freshes targeting upper Burnt Creek (3 freshes of 30 ML/day for 2–7 days each in December–May)	• Prevent a decline in water quality by flushing pools during low flows
Winter/spring freshes targeting upper Burnt Creek (1–5 freshes of 55 ML/day for 3–7 days in June–November)	• Allow fish to move throughout the reach • Flush sediments from hard substrates to increase biofilm production and food for waterbugs
Winter/spring freshes targeting upper Burnt Creek (1–3 freshes of up to 160 ML/day for 1–3 days in June–November)	• Disturb biofilms present on rocks or woody debris to stimulate new growth and provide food for waterbugs
Year-round fresh targeting lower Burnt Creek (1 fresh of 45 ML/day or natural for 2 days at any time)	• Inundate riparian vegetation to maintain condition and facilitate recruitment • Move organic debris in the channel to support waterbugs • Maintain the structural integrity of the channel
Lower Burnt Creek bankfull (any time)[3]	• Inundate riparian vegetation to maintain its condition and to facilitate recruitment • Move organic debris in the channel to support waterbugs • Maintain the structural integrity of the channel

Table 4.3.1 Potential environmental watering actions and objectives for the Wimmera system *continued*

Potential environmental watering	Environmental objectives
Mount William Creek	
Top-up of upper Mount William Creek pools	• Maintain habitat for native fish and waterbugs
Year-round low flows targeting lower Mount William Creek (5 ML/day or natural, year-round) [1]	• Maintain edge habitats and shallow-water habitat for waterbugs and endemic fish • Maintain near-permanent inundated stream channel for riparian vegetation and to prevent the growth of terrestrial plants in the stream bed
Summer/autumn freshes targeting lower Mount William Creek (3 freshes of 20–30 ML/day for 2–7 days in December–May)	• Prevent a decline in water quality by flushing pools during low flows • Provide variable flows during the low-flow season for waterbugs, for fish movement and to maintain water quality and habitat diversity
Winter/spring freshes targeting lower Mount William Creek (1–5 freshes of up to 100 ML/day for 1–7 days in June–November)	• Wet benches, entrain organic debris and promote habitat diversity • Flush surface sediments from hard substrates to support waterbugs
Winter/spring freshes targeting lower Mount William Creek (1–3 freshes of up to 500 ML/day for 1–3 days in June–November)	• Wet the highest benches, entrain organic debris and promote habitat diversity
Bungalally Creek	
Bankfull (any time)[3]	• Inundate the riparian zone to maintain its condition and facilitate the recruitment of riparian vegetation communities • Maintain the structural integrity of the channel and prevent the loss of channel capacity
Dock Lake	
Partial fill (winter/spring)	• Maintain and improve the diversity and abundance of wetland vegetation • Support feeding and breeding habitat for waterbirds, frogs, waterbugs and turtles
The Ranch Billabong	
Fill (winter/spring/summer)	• Maintain and improve wetland vegetation diversity and abundance

[1] *Cease-to-flow events occur naturally in the Wimmera system and may be actively managed with deliveries of water for the environment to reduce stress on environmental values. In the most-recent flow study, the recommendation is that cease-to-flow events should occur as infrequently as possible and not exceed the duration of events that might have occurred naturally. Cease-to-flow events ideally should be followed with a fresh event.*

[2] *Depending on catchment conditions, the timing of this fresh may vary to optimise environmental outcomes.*

[3] *These actions will only occur if on-ground works have been completed to prevent third-party impacts potentially caused by bankfull events in these creeks.*

Scenario planning

Table 4.3.2 outlines the potential environmental watering and expected water use under a range of planning scenarios. While the type of actions is similar in each climate scenario, the magnitude, duration and frequency of specific watering actions may differ within and between each climate scenario. What may be a low-priority action in a dry climate scenario may become a high priority in a wet scenario when there is ample water — unregulated flows and/or allocation to the entitlement — to meet larger flow objectives, and vice versa. Therefore, the volume required differs under each climate scenario. For example, in Wimmera River reach 4, one summer/autumn fresh of 70 ML per day for 2–7 days is proposed under extreme drought and dry climate scenarios, but under a wet scenario the recommendation is to deliver three freshes. In upper Burnt Creek, summer/autumn low flows in the extreme drought and very dry scenarios allow for four periods of cease-to-flows, but in wet scenarios no cease-to-flows are to occur.

Under most scenarios, there will likely be periods of cease-to-flow in all the target environmental flow reaches. The priority is to protect water quality and refuge pools in rivers and creeks to ensure habitat is available for native fish and aquatic animals (such as platypus) during the warmer months, when the risks are highest.

Natural unregulated flows and increased allocations of water for the environment will allow more environmental water objectives to be met under an average or wet climate scenario. The priority under these scenarios will be to increase the magnitude, frequency and duration of planned watering actions throughout summer and autumn and to deliver recommended flows in winter/spring. Natural river flows and passing flows are also likely to contribute to achieving these objectives.

In lower Burnt Creek and Bungalally Creek, a bankfull flow is planned in average and wet seasonal conditions to maintain channel structure, support aquatic plants and animals and freshen deeper pool habitats. Water for the environment will be used to fill the pools in these creeks before larger releases.

A partial fill of Dock Lake is planned in average or wet seasonal conditions, to build on the outcomes from water diverted to Dock Lake by GWMWater during the 2016–17 floods. This would be the first time water for the environment would be delivered to Dock Lake. It is likely that water for the environment would be delivered when the adjoining Green Lake had filled, to manage system losses and maximise delivery rates to Dock Lake.

Under dry, average and wet climate scenarios, water for the environment may be delivered to the Ranch Billabong near Dimboola to support wetland and riparian vegetation. This would be the first time that water for the environment would have been delivered to Ranch Billabong, which has been isolated from Wimmera River flows by levee banks.

Reserving water to carry over into the 2019–20 water year will be a priority under all scenarios.

Bungalally Creek, by Chloe Wiesenfeld

Table 4.3.2 Potential environmental watering for the Wimmera system under a range of planning scenarios

Planning scenario	Extreme drought	Very dry	Dry	Average	Wet
Expected river conditions	• No passing flows or unregulated flows	• Some passing flows but no unregulated flows	• Some passing flows but no unregulated flows	• Passing and unregulated flows particularly in winter/spring	• Passing flows and unregulated flows
Expected availability of water for the environment entitlements [1, 2]	• 34,100 ML VEWH carryover • 7,200 ML CEWH carryover • 8,112 ML VEWH • 0 ML CEWH • 50,412 ML total	• 34,100 ML VEWH carryover • 7,200 ML CEWH carryover • 14,196 ML VEWH • 0 ML CEWH • 55,496 ML total	• 34,100 ML VEWH carryover • 7,200 ML CEWH carryover • 23,525 ML VEWH • 0 ML CEWH • 64,825 ML total	• 34,100 ML VEWH carryover • 7,200 ML CEWH carryover • 32,854 ML VEWH • 0 ML CEWH • 74,154 ML total	• 34,100 ML VEWH carryover • 7,200 ML CEWH carryover • 40,560 ML VEWH • 0 ML CEWH • 81,860 ML total
Potential environmental watering – tier 1 (high priorities)[3]					
MacKenzie River reaches 2 & 3	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)
Wimmera River reach 4	• Summer/ autumn low flows • Summer/ autumn freshes (1 event) • Winter/spring low flows • Winter/spring freshes (1 event)	• Summer/ autumn low flows • Summer/ autumn freshes (1 event) • Winter/spring low flows • Winter/spring freshes (1 event)	• Summer/ autumn low flows • Summer/ autumn freshes (2 events) • Winter/spring low flows • Winter/spring freshes (3 events)	• Summer/ autumn low flows • Summer/ autumn freshes (2 events) • Winter/spring low flows • Winter/spring freshes (5 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)

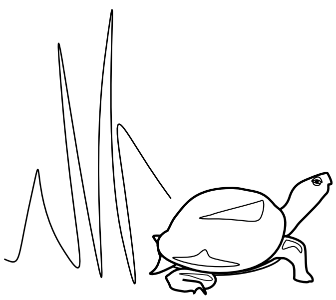


Table 4.3.2 Potential environmental watering for the Wimmera system under a range of planning scenarios *continued*

Planning scenario	Extreme drought	Very dry	Dry	Average	Wet
Upper Burnt Creek	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (1 event)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (1 event)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (3 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)
Upper Mt William Creek	• Top-ups	• Top-ups	• Top-ups	• N/A	• N/A
Lower Mt William Creek	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (1 event)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (1 event)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (3 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)	• Summer/ autumn low flows • Summer/ autumn freshes (3 events) • Winter/spring low flows • Winter/spring freshes (5 events)
Lower Burnt Creek	• N/A	• N/A	• N/A	• Bankfull	• Bankfull
Bungalally Creek	• N/A	• N/A	• N/A	• Bankfull	• Bankfull
Dock Lake	• N/A	• N/A	• N/A	• Partial fill	• Partial fill
Ranch Billabong	• N/A	• N/A	• Fill	• Fill	• Fill
Potential environmental watering – tier 2 (additional priorities)					
MacKenzie River reaches 2 & 3	• N/A	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes • Additional winter/spring low flows	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes • Increased duration winter/spring low flows	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes • Increased duration winter/spring low flows	• Increased duration summer/ autumn freshes • Increased duration winter/spring low flows

Table 4.3.2 Potential environmental watering for the Wimmera system under a range of planning scenarios *continued*

Planning scenario	Extreme drought	Very dry	Dry	Average	Wet
Wimmera River reach 4	• N/A	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes • Increased duration winter/spring low flows • Increased duration winter/spring freshes • winter/spring low flows (reach 3)	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes • Increased duration winter/spring low flows • Increased duration winter/spring freshes • Winter/spring low flows (reach 3)	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes • Winter/spring low flows (reach 3)	• Increased duration summer/ autumn freshes • Winter/spring low flows (reach 3)
Upper Burnt Creek	• N/A	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes	• Increased duration summer/ autumn freshes
Lower Mount William Creek	• N/A	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes	• Increased duration summer/ autumn low flows • Increased duration summer/ autumn freshes	• Increased duration summer/ autumn freshes
Possible volume of water for the environment required to achieve objectives[4]	• 24,295 ML (tier 1)	• 24,450 ML (tier 1) • 23,810 ML (tier 2)	• 25,675 ML (tier 1) • 23,395 ML (tier 2)	• 27,970 ML (tier 1) • 26,775 ML (tier 2)	• 29,435 ML (tier 1) • 28,705 ML (tier 2)

[1] *Water for the environment in the Wimmera–Glenelg system held by the VEWH is shared between the Glenelg and Wimmera systems. The VEWH volumes specified show the likely availability of the VEWH's environmental entitlement for both systems.*

[2] *Water for the environment held by the Commonwealth Environmental Water Holder is only available for use in the Wimmera system.*

[3] *A prioritisation process will be undertaken in consultation with the Wimmera and Glenelg Hopkins CMAs to determine the potential watering actions that will be undertaken in each system in the 2018–19 year, taking into consideration both VEWH and CEWH environmental entitlements.*

[4] *Water for the environment requirements for tier 2 actions are additional to tier 1 requirements.*

Risk management

Environmental watering program partners have considered and assessed risks and identified mitigating strategies relating to environmental flows in 2018–19. Risks and mitigating actions are continually reassessed by program partners throughout the water year (see section 1.3.6).

Engagement

Table 4.3.3 shows the partners and stakeholder organisations with which Wimmera CMA engaged when preparing the Wimmera system seasonal watering proposal. Other stakeholders and individuals are consulted throughout the year to help the Wimmera CMA implement the seasonal watering plan.

Seasonal watering proposals are informed by longer-term regional catchment strategies, regional waterway strategies, environmental flow studies, water management plans and other studies. These incorporate a range of environmental, cultural, social and economic perspectives and longer-term integrated catchment and waterway management objectives. For further details, refer to the *Wimmera Regional Catchment Strategy* and the *Wimmera Waterway Strategy*.

Wimmera CMA holds its annual Environmental Water Management Forum, where community groups and agencies with an interest in water for the environment in the region provide feedback about the effectiveness of environmental watering, drought actions and other issues.

Table 4.3.3 Partners and stakeholders engaged in developing the Wimmera system seasonal watering proposal

Partner and stakeholder engagement
• Barengi Gadjin Land Council Aboriginal Corporation
• Commonwealth Environmental Water Holder
• Dimboola and Jeparit town committees
• Dimboola Fishing Classic, Wimmera Anglers' Association, Jeparit Anglers' Club, Native Fish Australia (Wimmera), Murtoa Angling Club, Dimboola Anglers' Club, Warracknabeal Angling Club, Mid-Northern Association of Angling Clubs and Horsham Fishing Competition Committee
• Dimboola Rowing Club, Horsham Triathlon Committee
• Friends of Bungalally Creek, Friends of Burnt Creek, Lake Lonsdale Action Group
• Glenelg Hopkins CMA
• GWMWater
• Hindmarsh Shire Council, Horsham Rural City Council, Northern Grampians Shire Council and Yarriambiack Shire Council
• Natimuk Field and Game
• Natimuk Lake Water Ski Club, Dimboola Water Ski Club, Hindmarsh Ski Club
• Parks Victoria
• Victorian Environmental Water Holder
• VRFish
• Victorian Fisheries Authority

Sunrise over the Wimmera River at Horsham, by David Fletcher

4.4 Wimmera-Mallee wetlands

Waterway managers – Mallee, North Central and Wimmera catchment management authorities

Storage manager – GWMWater

Environmental water holder – Victorian Environmental Water Holder

The Wimmera-Mallee wetlands include 51 wetlands on public and private land spread across north-west Victoria.

The Wimmera-Mallee wetlands continue to hold significance for the Traditional Owners and their Nations. The Registered Aboriginal Parties (RAPs) in the region are the Barengi Gadjin Land Council Aboriginal Corporation and Dja Dja Wurrung Clans Aboriginal Corporation. Representatives of the RAPs were engaged during the preparation of the Wimmera-Mallee wetlands seasonal watering proposal.

Environmental values

There are a wide range of wetland types in the Wimmera-Mallee wetlands system including freshwater meadows, open freshwater lakes and freshwater marshes. This diversity is important to provide a range of different wetland habitats for plants and animals in the western part of the state. The wetlands also vary in size, consist of many different vegetation communities and are home to native waterbird populations including brolgas, egrets, blue-billed ducks, freckled ducks, Australian painted snipes and glossy ibis. The wetlands are used by the vulnerable growling grass frog, turtles and many other native animals that rely on them as drought refuges and drinking holes. Rare and vulnerable vegetation species (such as spiny lignum, ridged water milfoil and cane grass) are also present in some wetlands.

Social and economic values

The Wimmera-Mallee wetlands are highly valued by the community and provide places for recreational activities including canoeing, camping, yabbying, duck and quail hunting and birdwatching.

Environmental watering objectives in the Wimmera-Mallee wetlands

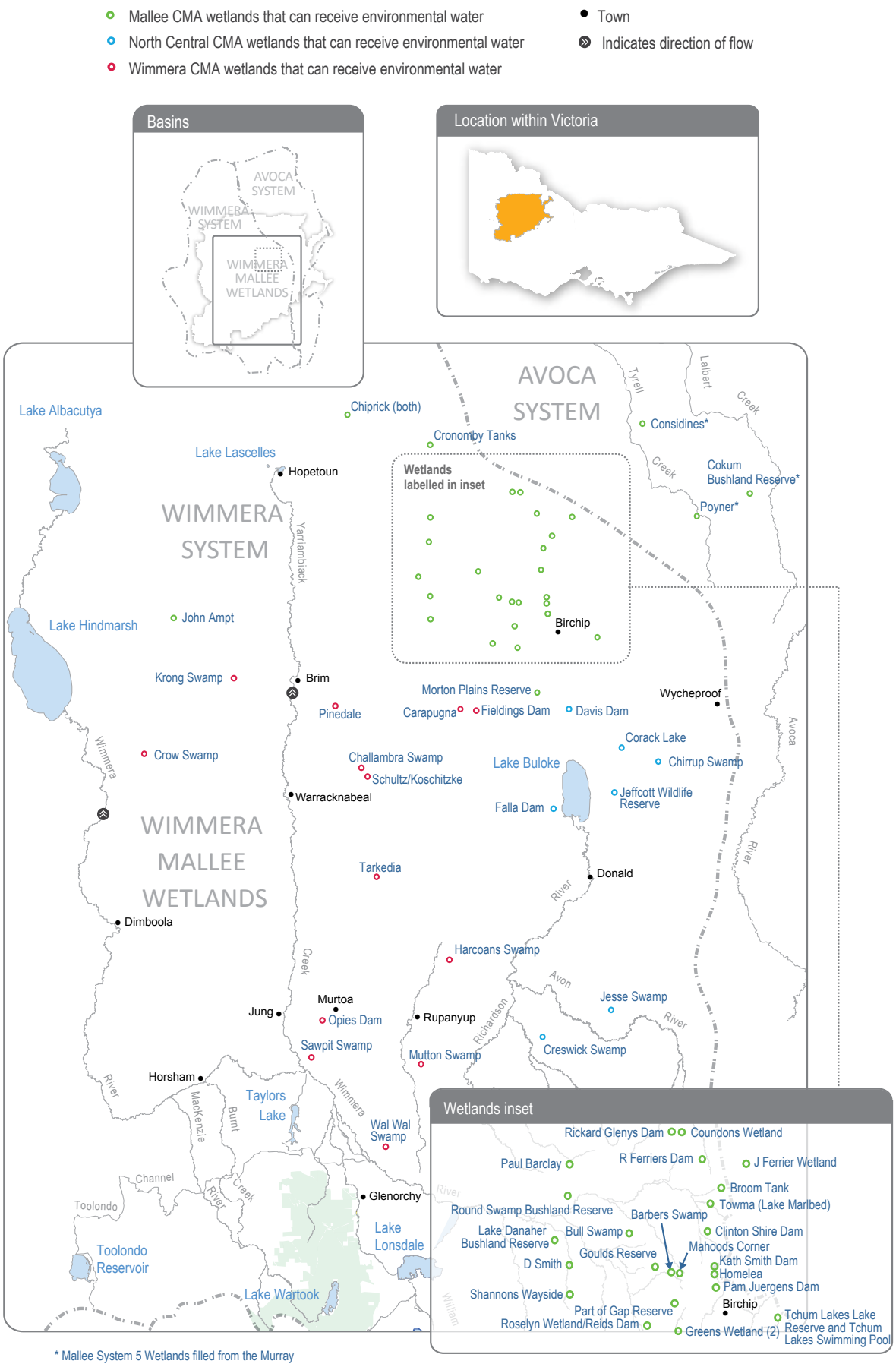
	Maintain and improve plant life in and around the wetlands including fringing lignum, river red gum and black box communities
 	Provide habitat and food to maintain frogs and turtles
	Provide resting, feeding and breeding habitat for waterbirds and other native birds

System overview

Historically, the wetlands received water most years from the open channels associated with the Wimmera Stock and Domestic Supply System. The Wimmera-Mallee Pipeline Project (WMPP) replaced stock and domestic supply dams with tanks, and the open-channel distribution system with pipelines, to improve water efficiency. The WMPP saved a lot of water, which was partly converted to an environmental entitlement to improve the condition of the area's flow-stressed rivers, creeks and wetlands and partly used to create regional development opportunities. The WMPP also reduced the amount of open-water habitat in areas that were formerly supplied by the open-channel system, so a separate 1,000 ML environmental entitlement was created to water a selection of wetlands that were previously supplied through the channel system. In 2011, a project identified priority wetlands for receiving water from the new environmental entitlement, and 51 wetlands have been connected to the Wimmera-Mallee pipeline system to receive that water.

Delivery of water for the environment to the wetlands relies on there being sufficient capacity in the Wimmera-Mallee pipeline system, so supply to the wetlands can be affected by demand from other pipeline customers. The North Central, Mallee and Wimmera CMAs work closely with GWMWater and land managers (including Parks Victoria, the Department of Environment, Land, Water and Planning and private landowners) to take account of pipeline capacity constraints when managing environmental deliveries to wetlands.

Figure 4.4.1 The Wimmera-Mallee wetlands



* Mallee System 5 Wetlands filled from the Murray

Recent conditions

The Wimmera-Mallee received near-average rainfall in winter/spring 2017–18 and some of the wetlands filled naturally. The allocation to the wetland environmental entitlement increased to 25 percent in October 2017, but dry conditions through summer and autumn prevented further allocations for the year.

Water for the environment was delivered to 46 Wimmera-Mallee wetlands in 2017–18: 27 wetlands in the Mallee area, seven in the north-central area and 12 in the Wimmera area. Deliveries were made in winter/spring 2017 and autumn/winter 2018 to maintain and improve ecological outcomes from natural or managed flows in previous years. Some wetlands received water once during 2017–18, while others received multiple deliveries to maintain their water-dependent values.

Water for the environment delivered to the Wimmera-Mallee wetlands maintained and improved the health of native plants and provided feeding and breeding habitat for many animals (such as lace monitors, kangaroos, wallabies, turtles, carpet pythons, egrets, herons, ducks, grebes, stilts and other water and woodland birds, frogs, yabbies and eastern long-necked turtles). Aquatic and fringing plant communities in wetlands that received water (naturally or through managed deliveries) in 2017–18 have responded well, with flushes of new growth including of nardoo, water milfoil, water ribbons, black box, lignum and cane grass.

Water for the environment was delivered to the Tchum Lakes wetland for the first time in 2017–18. The autumn delivery caused thousands of waterbirds to flock to the wetland and many frogs used the wetland for feeding and breeding.

Scope of environmental watering

Table 4.4.1 shows potential environmental watering actions and their environmental objectives. Watering actions for the Wimmera-Mallee wetlands will typically be in winter/spring 2018 or autumn/winter 2019, but they may occur at any time of the year depending on environmental need, seasonal conditions and pipeline capacity.

Table 4.4.1 Potential environmental watering actions and objectives for the Wimmera-Mallee wetlands

Potential environmental watering	Environmental objectives
North Central wetlands	
Davis Dam	• Maintain black box and cane grass vegetation • Provide drought refuge and a watering point for waterbirds and terrestrial animals
Creswick Swamp	• Maintain and improve the range of native aquatic plants including reestablish threatened marbled marshwort • Provide refuge, feeding and breeding opportunities for frogs and turtles
Chirrup Dam	• Provide drought refuge and a watering point for animals (particularly frogs, birds and turtles) • Facilitate the recolonisation of Chirrup Swamp with frogs and turtles, when it is naturally inundated
Corack Lake	• Maintain and improve native aquatic plants • Provide refuge and nursery habitat for turtles and frogs • Provide a variety of feeding habitats for waterbirds
Falla Dam	• Maintain it as a drought refuge and a watering point for terrestrial species • Provide feeding and breeding habitat for turtles and frogs
Jeffcott Wildlife Reserve	• Maintain a range of native aquatic plants • Provide drought refuge, feeding and breeding habitats for frogs, waterbugs, turtles and waterbirds
Jesse Swamp	• Maintain and improve the range of native aquatic plants including reestablish threatened marbled marshwort • Provide feeding habitat for frogs and waterbirds, including brolga

Table 4.4.1 Potential environmental watering actions and objectives for the Wimmera-Mallee wetlands *continued*

Potential environmental watering	Environmental objectives
Wimmera wetlands	
Carapugna	• Provide feeding and breeding habitat for waterbirds, woodland birds and frogs • Maintain and improve the number and health of wetland plants including ridged water milfoil • Maintain the health of black box and spiny lignum
Challambra Swamp	
Crow Swamp	
Fieldings Dam	
Harcoans Swamp	
Krong Swamp	
Mutton Swamp	
Opies Dam	
Pinedale	
Sawpit Swamp	
Schultz/Koschitzke	
Tarkedia	
Wal Wal Swamp	
Mallee wetlands	
Barbers Swamp	• Maintain the health of lignum and black box communities • Provide suitable feeding and breeding habitat for waterbirds
Bull Swamp	
Cokum Bushland Reserve	
Morton Plains Reserve	
Tchum Lakes Lake Reserve (North Lake – Wetland)	
Tchum Lakes Swimming Pool (North Lake – Dam)	
Broom Tank	• Maintain the health of lignum and black box communities • Provide drought refuge and a watering point for animals including woodland birds, wallabies and reptiles
Clinton Shire Dam	
Considines	
Greens Wetland	
Pam Juergens Dam	
Poyner	
Roselyn Wetland	
Goulds Reserve	• Maintain the health of lignum and black box communities
Newer Swamp	
Part of Gap Reserve	
Towma (Lake Marlbed)	

Table 4.4.1 Potential environmental watering actions and objectives for the Wimmera-Mallee wetlands *continued*

Potential environmental watering	Environmental objectives
Mallee wetlands	
Coundons Wetland J Ferrier Wetland	• Maintain the health of lignum and black box communities • Provide drought refuge and a watering point for animals including woodland birds, wallabies and reptiles • Provide foraging, refuge and breeding habitat for turtles and frogs
Mahoods Corner Shannons Wayside	• Provide feeding and breeding habitat for waterbirds
Chiprick D Smith Wetland Homelea Wetland John Ampt Kath Smith Dam Paul Barclay R Ferriers Dam Rickard Glenys Dam	• Provide drought refuge and a watering point for animals including woodland birds, wallabies and reptiles
Cronomby Tanks Lake Danaher Bushland Reserve	• Maintain the health of wetland plants including lignum and black box • Provide refuge, feeding and breeding habitat for turtles and frogs

Scenario planning

Table 4.4.2 outlines the potential environmental watering and expected water use under a range of planning scenarios.

The wetlands considered for potential environmental watering in 2018–19 have been determined after assessing their water requirements and recent watering history, and considering climatic conditions, water availability and the expected capacity in the Wimmera-Mallee pipeline system.

Under drought conditions, small volumes of water may be delivered to wetlands to provide drought refuge for wetland plants and animals including waterbirds, turtles and frogs. Under average and wet climate scenarios, more water may become available through allocations to the environmental entitlement, and lower demand from stock and domestic customers may free up delivery capacity in the pipeline system. Natural inflows may partially or fully fill some wetlands, and increased water availability may be used to top-up, fill or over-top wetlands to improve wetland plant growth and provide additional habitat for waterbirds, frogs and turtles.

Allocations to the environmental entitlement to supply wetlands in the Wimmera-Mallee wetland system is highly variable, and the ability to carry over unused water from one year to other years allows waterway managers to effectively manage the systems in dry periods. The North Central, Mallee and Wimmera CMAs have determined that at least 145–152 ML should be carried over at the end of 2018–19 to support critical environmental demands in 2019–20.

Table 4.4.2 Potential environmental watering for the Wimmera-Mallee wetlands under a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected catchment conditions	• No catchment inflows to the wetlands are expected	• No catchment inflows to the wetlands are expected	• Some localised catchment inflows may increase water levels in some wetlands	• Catchment inflows are likely to increase water levels in most wetlands
Expected availability of water for the environment	• 1,000 ML carryover • 0 ML allocation • 1,000 ML available	• 1,000 ML carryover • 0 ML allocation • 1,000 ML available	• 1,000 ML carryover • 250 ML allocation • 1,250 ML available	• 1,000 ML carryover • 1,000 ML allocation • 2,000 ML available
Potential environmental watering	• Barbers Swamp • Bull Swamp • Carapugna • Challambra Swamp • Chiprick • Chirrup Swamp • Clinton Shire Dam • Cokum Bushland Reserve[1] • Considines[1] • Corack Lake • Creswick Swamp • Cronomby Tanks • Crow Swamp • D Smith Wetland • Fieldings Dam • Greens Wetland • Harcoans • J Ferrier Wetland • Jeffcott Wildlife Reserve • Jesse Swamp • John Ampt • Krong Swamp • Lake Danaher Bushland Reserve • Mahoods Corner • Morton Plains Reserve • Mutton Swamp • Newer Swamp • Opies Dam • Paul Barclay • Pinedale	• Barbers Swamp • Broom Tank • Bull Swamp • Carapugna • Challambra Swamp • Chiprick • Chirrup Swamp • Clinton Shire Dam • Cokum Bushland Reserve[1] • Considines[1] • Corack Lake • Creswick Swamp • Cronomby Tanks • Crow Swamp • D Smith Wetland • Davis Dam • Falla Dam • Fieldings Dam • Greens Wetland • Harcoans • J Ferrier Wetland • Jeffcott Wildlife Reserve • Jesse Swamp • John Ampt • Krong Swamp • Lake Danaher Bushland Reserve • Mahoods Corner • Morton Plains Reserve • Mutton Swamp • Newer Swamp	• Barbers Swamp • Broom Tank • Bull Swamp • Carapugna • Challambra Swamp • Chiprick • Chirrup Swamp • Clinton Shire Dam • Cokum Bushland Reserve[1] • Considines[1] • Corack Lake • Coundons wetland • Creswick Swamp • Cronomby Tanks • Crow Swamp • D Smith Wetland • Davis Dam • Falla Dam • Fieldings Dam • Goulds Reserve • Greens Wetland • Harcoans • J Ferrier Wetland • Jeffcott Wildlife Reserve • Jesse Swamp • John Ampt • Krong Swamp • Lake Danaher Bushland Reserve • Mahoods Corner • Morton Plains Reserve	• Barbers Swamp • Broom Tank • Bull Swamp • Carapugna • Challambra Swamp • Chirrup Swamp • Chiprick • Clinton Shire Dam • Cokum Bushland Reserve[1] • Considines[1] • Corack Lake • Coundons wetland • Creswick Swamp • Cronomby Tanks • Crow Swamp • D Smith Wetland • Davis Dam • Falla Dam • Fieldings Dam • Goulds Reserve • Greens Wetland • Harcoans • Homelea • J Ferrier Wetland • Jeffcott Wildlife Reserve • Jesse Swamp • John Ampt • Kath Smith Dam • Krong Swamp • Lake Danaher Bushland Reserve

Table 4.4.2 Potential environmental watering for the Wimmera-Mallee wetlands under a range of planning scenarios *continued*

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering	• Poyner1 • R Ferriers Dam • Rickard Glenys Dam • Roselyn Wetland/ Reids Dam • Sawpit Swamp • Schultz/ Koschitzke • Shannons Wayside • Tarkedia Dam • Towma (Lake Marlbed) • Wal Wal Swamp	• Opies Dam • Pam Juergens Dam • Part of Gap Reserve • Paul Barclay • Pinedale • Poyner1 • R Ferriers Dam • Rickard Glenys Dam • Roselyn Wetland/ Reids Dam • Sawpit Swamp • Schultz/Koschitzke • Shannons Wayside • Tarkedia Dam • Tchum Lakes Swimming Pool (North Lake - Dam) • Towma (Lake Marlbed) • Wal Wal Swamp	• Mutton Swamp • Newer Swamp • Opies Dam • Pam Juergens Dam • Part of Gap Reserve • Paul Barclay • Pinedale • Poyner1 • R Ferriers Dam • Rickard Glenys Dam • Roselyn Wetland/ Reids Dam • Sawpit Swamp • Schultz/Koschitzke • Shannons Wayside • Tarkedia Dam • Tchum Lakes Lake Reserve (North Lake - Wetland) • Tchum Lakes Swimming Pool (North Lake - Dam) • Towma (Lake Marlbed) • Wal Wal Swamp	• Mahoods Corner • Morton Plains Reserve • Mutton Swamp • Opies Dam • Pam Juergens Dam • Part of Gap Reserve • Paul Barclay • Pinedale • Poyner1 • R Ferriers Dam • Rickard Glenys Dam • Roselyn Wetland/ Reids Dam • Newer Swamp • Sawpit Swamp • Schultz/Koschitzke • Shannons Wayside • Tarkedia Dam • Tchum Lakes Lake Reserve (North Lake - Wetland) • Tchum Lakes Swimming Pool (North Lake - Dam) • Towma (Lake Marlbed) • Wal Wal Swamp
Possible volume of water for the environment required to achieve objectives	• 250ML	• 309 ML	• 643 ML	• 794 ML
Priority carryover requirements	• 145 ML	• 152 ML	• 152 ML	• 152 ML

[1] *Water supplied to these wetlands in supply system 5 is made available from GWMWater allocations.*

Risk management

Environmental watering program partners have considered and assessed risks and identified mitigating strategies relating to environmental flows in 2018–19. Risks and mitigating actions are continually reassessed by program partners throughout the water year (see section 1.3.6).

Engagement

Table 4.4.3 shows the partners, stakeholder organisations and individuals with which the Wimmera, Mallee and North Central CMAs engaged when preparing the Wimmera-Mallee wetlands seasonal watering proposal.

Seasonal watering proposals are informed by longer-term regional catchment management strategies, regional waterway strategies, environmental water management plans and other studies, which incorporate environmental, cultural, social and economic considerations. For further details, refer to the Wimmera, North Central and Mallee regional catchment strategies and waterway strategies.

Table 4.4.3 Partners and stakeholders engaged in developing the Wimmera-Mallee wetlands seasonal watering proposal

Partner and stakeholder engagement
All CMAs • Barengi Gadjin Land Council Aboriginal Corporation • GWMWater • Parks Victoria • Victorian Environmental Water Holder
Mallee CMA • Buloke Shire Council • Department of Environment, Land, Water and Planning • Landcare groups • Landholders with wetlands on their properties in the Mallee area • North Central and Wimmera CMAs • Wimmera Bushwalking Club • Yarriambiack Shire Council
North Central CMA • Department of Environment, Land, Water and Planning • Dja Dja Wurrung Clans Aboriginal Corporation • Landcare groups • Landholders with wetlands on their properties in the North Central CMA area • Mallee and Wimmera CMAs • Wimmera-Mallee Wetlands Environmental Water Advisory Group comprising community members, interest groups, a North Central CMA Community Consultative Committee representative, a North Central CMA Board member, the Department of Environment, Land, Water and Planning, Parks Victoria and the Victorian Environmental Water Holder
Wimmera CMA • Field and game representatives • Landholders with wetlands on their properties in the Wimmera CMA area • North Central and Mallee CMAs