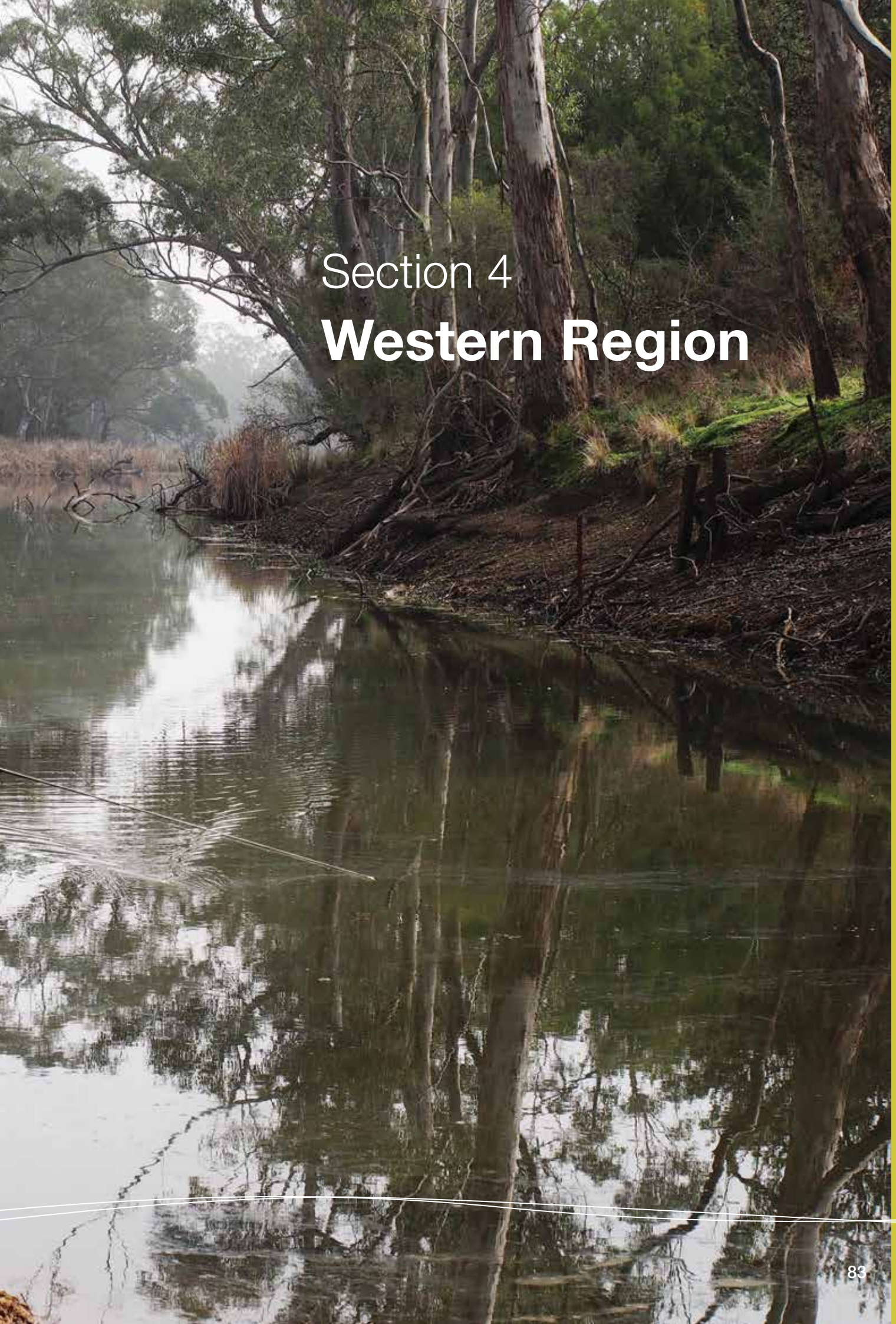


Section 4

Western Region

4.1 Western Region overview

The three systems in the Western Region that can receive environmental water are the Wimmera and Glenelg river systems and the Wimmera-Mallee wetlands.

The landscape

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 SA before returning to Victoria to enter the sea at Nelson.

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 natural freshwater lake. The Wimmera River receives flows from several regulated tributaries including the MacKenzie River and the Mount William, Burnt and Bungalally creeks.

The Wimmera-Mallee wetlands system includes 51 wetlands that were formerly supplied by the Wimmera-Mallee channel system. The wetlands are all within the footprint of the Wimmera-Mallee Pipeline project, which is bounded to the west and south by the Wimmera River and to the east by the Avoca River.

Environmental water is supplied from the Wimmera-Mallee headworks system, which also supplies towns, industries and farms across the Western Region. The complex network of channels and pipelines in the water supply and distribution systems managed by GWMWater enables water to be transferred between storages and delivered in different catchments, for example transferring from the Glenelg River to supply water in the Wimmera catchment.

Environmental values

The Glenelg River supports the endangered Glenelg freshwater mussel and Glenelg spiny crayfish, as well as platypus and native fish including river blackfish, estuary perch and pygmy perch. Its species diversity makes the river one of Australia's 15 national biodiversity hotspots. The endangered Wimmera bottlebrush also grows along the Glenelg River.

The Wimmera River supports diverse vegetation and animal communities and is home to one of Victoria's few self-sustaining populations of freshwater catfish as well as flat-headed gudgeon and Australian smelt. The MacKenzie River has the only stable population of platypus in the Wimmera and supports the Glenelg spiny crayfish and turtles. Tributaries such as Burnt and Mount William creeks also support populations of native fish and threatened species. The tributaries, along with the Bungalally Creek, provide important habitat corridors and have good streamside vegetation.

The Wimmera-Mallee wetlands provide a variety of different wetland types across a dry landscape. They are home to many types of water-dependent plants, birds, turtles and frogs and also provide drought refuge and drinking holes for other native animals.

Community considerations

Aboriginal Victorians and their Nations in the Western Region 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 cultural importance and value for Traditional Owners and Aboriginal Victorians.

Traditional Owner groups in and around western Victoria (including areas where there is no environmental water management) include the Bindjali, Dja Dja Wurrung, Djagurd Wurrung, Gunditjmara, Jaadwa, Jadawadjali, Jupagulk, Wamba Wamba, Wadawurrung, Wergaia and Wotjobaluk people, among others.

The Glenelg Hopkins and Wimmera CMAs work with Gunditj Mirring Traditional Owner Corporation and Barengi Gadjin Land Council to understand how environmental water management in the Glenelg and Wimmera rivers can better support Aboriginal aspirations, particularly around caring for Country and protecting important story places and cultural resources.

Year by year and case by case, the VEWH and its program partners consider opportunities raised by communities to use environmental water to provide additional social, cultural and recreational benefits (for example, releasing environmental water increases the enjoyment of people camping by a waterway, or publicising an environmental water release in advance provides more opportunities for kayakers). Where possible, the VEWH and its program partners incorporate such opportunities into watering decisions, as long as they do not compromise environmental outcomes or increase demand on the water holdings.

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.

The Glenelg River is highly valued by anglers across Australia. Several fishing competitions are held on the river each year. The Glenelg River also hosts other recreational activities (such as walking, swimming, sightseeing, boat cruises, canoeing, birdwatching and camping).

The Wimmera River is extremely important for recreation activities (such as walking, boating, rowing, waterskiing, fishing, swimming, canoeing and camping). Several large community events are held on the waterway including festivals, a triathlon, rowing regattas, dragon boating and fishing competitions. The wetlands in the region are used for canoeing, yabbying, duck hunting, swimming and birdwatching.

Some scoped opportunities for shared community benefits of environmental water in western Victoria for 2017–18 include:

- where possible, managing environmental water deliveries to support major recreational events along the Wimmera River (such as the Horsham, Dimboola and Jeparit fishing competitions, waterskiing at the Kanamaroo Festival, the Dimboola Regatta and Head of the Wimmera rowing event and the Horsham Triathlon)
- improving water quality in the Glenelg River resulting in better river conditions at popular camp grounds in the upper reaches, which improves amenity and provides more opportunities for swimming, fishing and canoeing
- increasing opportunities for yabbying and birdwatching at the Wimmera-Mallee wetlands
- improving habitat for recreational fish species resulting in increased recreational fishing opportunities along the Glenelg, Wimmera and MacKenzie rivers and Burnt and Mt William creeks
- increasing amenity at walking tracks in Horsham, Dimboola, Jeparit and Dadswells Bridge along the Wimmera River and Burnt and Mt William creeks, and along the Glenelg River including the Glenelg River Walk at Harrow and Casterton, and the Kelpie Trail.

The VEWH's ability to deliver these benefits depends on climate, water available and the way the system is being operated to deliver water for other purposes (such as to homes, farms or businesses).

For more information about scoped opportunities for shared community benefits in 2017–18, 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, environmental water planning and releases 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 simultaneously addressing excessive catchment erosion, barriers to fish movement, high nutrient loads, loss of streambank vegetation and invasive species, to name just a few issues.

Victorian and Australian government agencies, community groups and private landowners implement many programs to protect and improve the environmental condition and function of land, soils and waterways throughout Victoria's catchments. Activities in the Western Region that are planned and implemented to coordinate with the management of environmental water include:

- erosion control in the upper Wimmera catchment, to improve water quality
- stock exclusion fencing along priority waterways throughout the catchments of the Wimmera and Glenelg rivers, to support the re-establishment of riparian and in-stream vegetation
- major works to improve fish passage at Sandford Weir and Dergholm Gauge, in combination with environmental water delivery to facilitate the movement of migratory fish from the estuary to the upstream reaches of the Glenelg and Wannon rivers
- carp management activities in both the Wimmera and Glenelg systems to reduce the number of carp and to better understand their behaviour in both rivers to improve environmental watering outcomes
- installation of snags in the Glenelg River reach 2 using red gum trunks and root balls to restore complex habitat in the reach
- control of invasive species within 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 2017–18

Conditions in 2016–17 were very wet, particularly in winter/spring, and naturally high flows and some flooding helped the rivers and wetlands recover from the very dry conditions in 2015–16. Allocations reached 100 percent for the first time since 2011–12. While the catchments dried over summer/autumn, delivery of accumulated passing flows and environmental water helped to optimise the benefits achieved from natural flows, while still reserving a significant volume to carry over into 2017–18.

If 2017–18 has low rainfall, environmental watering in the Western 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 2017–18 will be particularly important in this scenario. Under wetter conditions, priority will be given to reserving water for use in 2018–19 and delivering some of the flow components that have not been possible in the lead-up to last year's wet conditions (like some of the winter/spring flow components). The focus of environmental watering in the Wimmera-Mallee wetlands will continue to be providing refuge within the dry landscape to support local plants and animals.

The Murray–Darling Basin Plan

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

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

Refer to section 5.1 for further information about the Murray–Darling Basin Plan.

4.2 Glenelg system

Waterway manager – Glenelg Hopkins Catchment Management Authority

Storage manager – GWMWater

Environmental water holder – Victorian Environmental Water Holder

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 SA before returning to Victoria to enter the sea at Nelson.

Environmental values

The lower section of the Glenelg River is recognised as one of Australia's 15 national biodiversity hotspots due to the high-value aquatic life it supports including the endangered Glenelg freshwater mussel and Glenelg spiny crayfish. It is also home to platypus and important native fish populations including river blackfish, estuary perch, tupong and diverse pygmy perches. 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, cultural 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 Fisheries Victoria's The Great Perch Search broodfish collection event. 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 use the productive floodplains for grazing. The river provides tourism opportunities and supports businesses in townships (such as Harrow, Casterton, Dartmoor and Nelson). Maintaining healthy Country is vitally important to Aboriginal Victorians in the Glenelg River area including those represented by the Gunditj Mirring Traditional Owners Aboriginal Corporation and the Barengi Gadjin Land Council, and Aboriginal Victorians have a continuing connection to the river system.

Environmental watering objectives in the Glenelg system

	Assist in-stream and riverside plants to recover after disturbance from recent floods
	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 population of waterbugs to provide energy, break down organic matter and support the river's food chain
	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

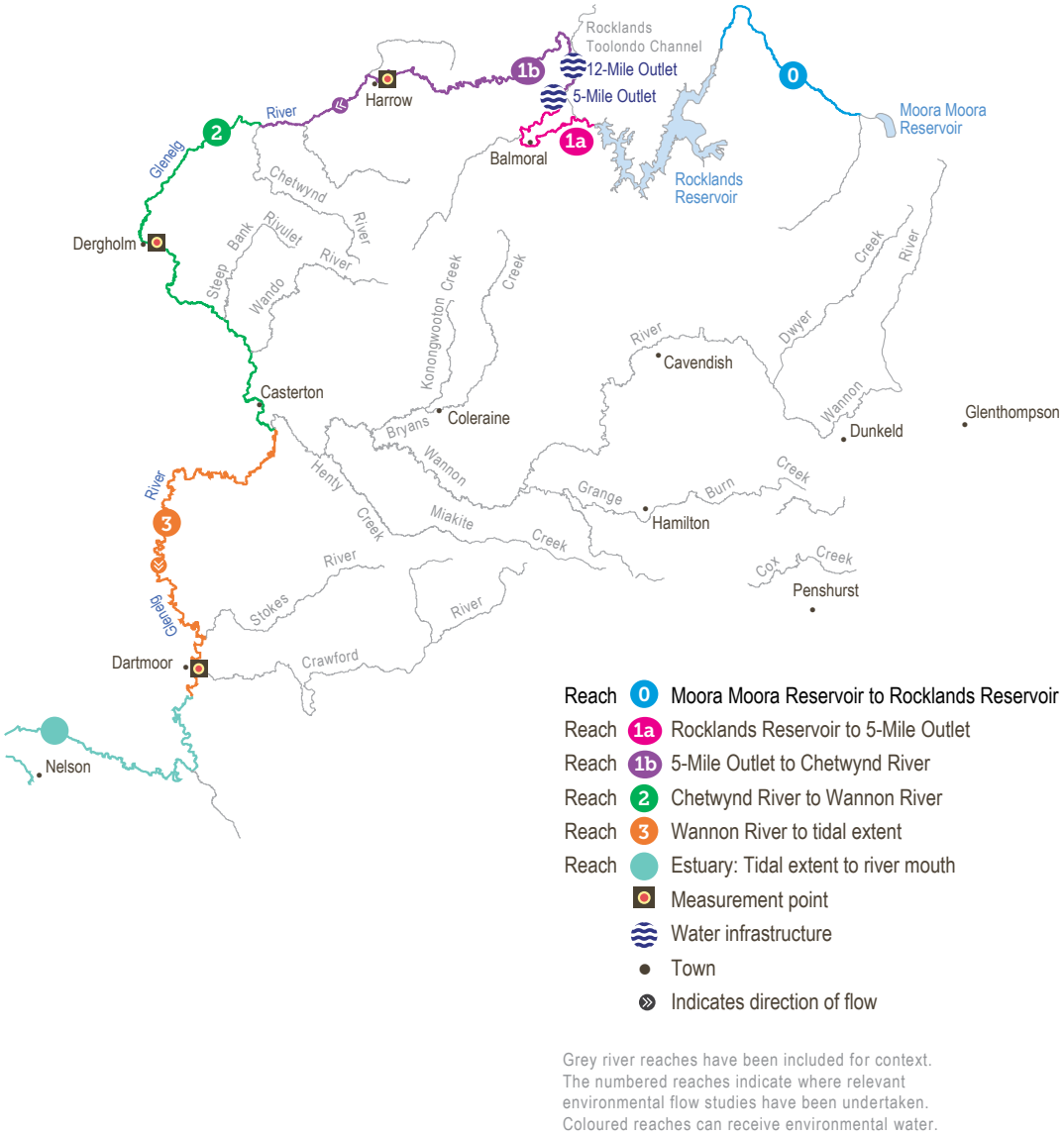
System overview

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. Environmental water is actively managed in the main stem of the Glenelg River below Rocklands Reservoir, and passing flow rules are in place for the Glenelg River and upper Wannon River.

The priority environmental flow reaches of the Glenelg River are 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). Environmental water 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 in reach 2. The Glenelg River reach 3 and estuary benefit from environmental water releases to upstream reaches, but releases are not specifically 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 being undertaken to confirm its flow requirements. Work is also being undertaken 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 has been nominated for international listing under the Ramsar Convention.

Figure 4.2.1 The Glenelg system



Grey river reaches have been included for context.
The numbered reaches indicate where relevant environmental flow studies have been undertaken.
Coloured reaches can receive environmental water.

Recent conditions

Heavy rainfall in winter/spring 2016 ended a very dry 18 month period and led to widespread flooding throughout the Glenelg catchment. The floods connected the river and floodplain, provided a significant influx of carbon into the system, scoured woody debris and boosted food resources for aquatic species. The high flows also allowed migratory fish species to disperse throughout the system and recolonise areas that were unsuitable during the preceding dry period. Although not specifically measured, the natural high flows and floods probably provided cues and conditions for some fish species to breed. These natural flow events met many of the environmental flow objectives for winter and spring and so managed environmental flow releases were not needed. Passing flows were also suspended for much of winter/spring to reduce the flood risk to communities downstream of Rocklands Reservoir.

Environmental water allocations reached 100 percent in October 2016 for the first time since 2011–12. Water that was accumulated as a result of the suspended passing flows in winter was released from late November 2016 to help meet the recommended low flows and freshes through summer and autumn. Regulated environmental water releases began in April and will continue until the start of the next passing flow season in June 2017.

Electrofishing demonstration on the Glenelg River at Harrow, by Chloe Wiesenfeld

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
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 the 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 to 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]	
Winter/spring freshes targeting reach 1b (1–5 freshes of 250 ML/day for 1–5 days in June–November)[2]	• Wet benches to improve the condition of emergent vegetation and to maintain habitat diversity • Provide adequate depth for fish passage and cue fish movement • 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 and waterbugs and facilitate the annual dispersal of juvenile 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 4–5 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. 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, to reduce stress on environmental values. Cease-to-flow events should be followed with a fresh.*

2 *Winter/spring freshes in reach 1a are important for 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 environmental water releases may be required to supplement them or to ensure appropriate rates of rise and fall and provide appropriate conditions in fresh events.*

Scenario planning

Table 4.2.2 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: therefore, the volume required under each scenario also differs.

Under most scenarios, there will probably 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) in the warmer months, when the risks are highest. Under a drought or dry climate scenario, low flows will be provided for some periods in reaches 1b and 2, but they are unlikely to be delivered to reach 1a. 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. Some low flows will also be delivered to reach 1a. Natural river flows and passing flows are also likely to help meet many of the environmental flow objectives in a wet year. Reserving water for carrying over into the 2018–19 water year will be a priority under all scenarios.

Table 4.2.2 Potential environmental watering for the Glenelg system under a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
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 watering requirements in winter/spring
Expected availability of environmental water[1]	• 32,210 ML carryover • 23,119 ML VEWH • 0 ML CEWH[2] • 55,329 ML total[3]	• 32,210 ML carryover • 25,147 ML VEWH • 0 ML CEWH[2] • 57,357 ML total[3]	• 32,210 ML carryover • 32,854 ML VEWH • 0 ML CEWH[2] • 65,064 ML total[3]	• 32,210 ML carryover • 40,560 ML VEWH • 0 ML CEWH[2] • 72,770 ML total[3]
Potential environmental watering – tier 1 (high priorities)[4]	• 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 • 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 1b • Summer/autumn low flows reach 1b • Summer/autumn freshes reach 2 • Summer/autumn freshes reach 1a • Winter/spring freshes reach 1b • Winter/spring low flows reach 1a • Trial release reach 0
Potential environmental watering – tier 2 (lower priorities)[5]	• Summer/autumn low flows reach 1a • Winter/spring low flows reach 1a • Winter/spring low flows reach 1b • Winter/spring low flows reach 2	• Summer/autumn low flows reach 1a • Winter/spring low flows reach 1a • Winter/spring low flows reach 1b • Winter/spring low flows reach 2	• Summer/autumn freshes reach 1a • Winter/spring low flows reach 1b • Winter/spring low flows reach 2	• Winter/spring low flows reach 1b • Winter/spring freshes reach 2 • Winter/spring low flows reach 2
Possible volume of environmental water required to achieve objectives[6]	• 9,880 ML (tier 1) • 11,760 ML (tier 2)	• 12,280 ML (tier 1) • 11,480 ML (tier 2)	• 27,760 ML (tier 1) • 25,480 ML (tier 2)	• 27,110 ML (tier 1) • 20,780 ML (tier 2)

1 *Environmental water in the Wimmera–Glenelg system is shared between the Glenelg and Wimmera systems. The volumes specified show the likely availability across the shared systems.*

2 *Commonwealth environmental water is only available for use in the Wimmera system.*

3 *This volume is a forecast of the total water likely to be available under the VEWH entitlement in 2017–18 including carryover water and the forecast allocation for the complete water year.*

4 *As the entitlement is shared between the Wimmera and Glenelg catchments, 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 2017–18 year.*

5 *Tier 2 actions are lower-priority actions to be considered if water is available.*

6 *Environmental water requirements for tier 2 actions are additional to tier 1 requirements.*

Frasers Swamp, by Emma Coates

Risk management

In preparing its seasonal watering proposal, Glenelg Hopkins CMA considered and assessed the risks of environmental watering and identified mitigation strategies. Program partners continually reassess risks and mitigation actions 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 and regional waterway strategies and by environmental flow studies, water management plans and other studies. The strategies 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.

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 • DELWP • Environment groups: Baghalla/Killara, Chetwynd, Culla-Pigeon Ponds, Dunrobin, Red Cap and Wando River Landcare groups, Balmoral Land Management and Tree Group, 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 District Angling Club, Casterton Angling Society, Dartmoor Angling Club, VRFish, Fishcare Victoria, South West Fishing Report, individual anglers • Southern Grampians Shire • VEWH • 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 starts 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. The Wimmera receives flows from several regulated tributaries including the MacKenzie River and the Mount William and Burnt creeks. All 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.

Environmental values

The Wimmera system is home to many significant plant and animal species including populations of freshwater catfish, flat-headed gudgeon, carp gudgeon, river blackfish, southern pygmy perch, Australian smelt and Wimmera bottlebrush.

The Wimmera River itself 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 stable population of platypus in the Wimmera and supports good 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 and provide refuge for these populations.

The vegetation along Burnt and Bungalally creeks provide habitat corridors 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.

Social, cultural 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 Wimmera residents. Events held on the waterways include waterskiing at the annual Kanamaroo Festival, the Horsham Triathlon, the Dimboola Regatta and Head of the Wimmera rowing event and fishing competitions in Horsham, Jeparit and Dimboola. The waterways in the Wimmera system continue to hold significance for Traditional Owners and their Nations in the region including those represented by the Barengi Gadjin Land Council.

Environmental watering objectives in the Wimmera system

	Rehabilitate and protect populations of native fish including one of Victoria's few self-sustaining populations of freshwater catfish
	Maintain water quality to provide suitable conditions for fish and other water-dependent plants and animals
	Increase platypus populations by increasing the quality and quantity of habitat and food and providing suitable conditions for breeding and dispersal
	Improve the condition, abundance and diversity of aquatic, emergent and riparian vegetation
	Increase the abundance and diversity of waterbugs which provide energy, break down dead organic matter and support the waterway's food chain

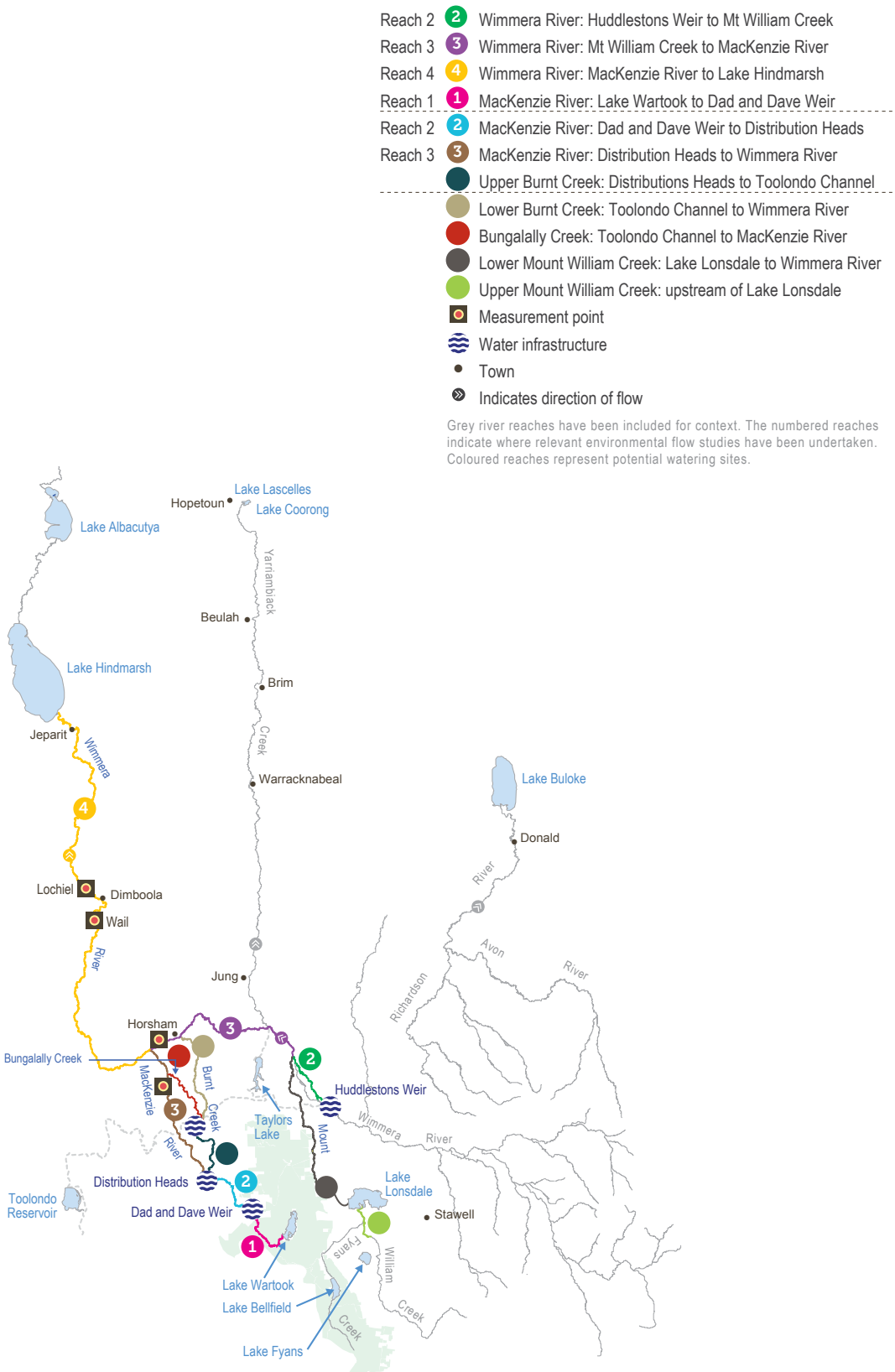
System overview

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 transferred between several storages. Water can also be transferred from the Glenelg system to the Wimmera system from Rocklands Reservoir via the Rocklands–Toolondo Channel and from Moora Moora Reservoir via the Moora Channel. The connected storages and channels are collectively called the Wimmera–Glenelg Headworks System and harvested water is also 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 the 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 naturally would have received some flows during high-flow events. However, the creek now receives more flows due to modifications to the offtake. This affects environmental water deliveries to the high-priority reaches of the Wimmera River. In line with past practice during dry years, flows entering the creek may be blocked to ensure watering objectives in the Wimmera River are not compromised.

Figure 4.3.1 The Wimmera system



Recent conditions

Heavy rainfall in winter/spring 2016 ended a prolonged dry period in the Wimmera catchment. Unregulated natural flows and passing flows met a high proportion of planned winter and spring watering actions. Passing flows from Lake Lonsdale were suspended for much of winter/spring to reduce the flood risk associated with the natural high flows through the system and to help storage management operations. Managed environmental water releases in 2016–17 were mainly used to provide low flows and freshes during summer and autumn. With the high rainfall, allocations reached 100 percent in October 2016 for the first time since 2011–12. In April 2017, the CEWH received its first allocation of 15 percent.

The wet conditions in 2016 and environmental water deliveries have improved the condition of the rivers and creeks in the Wimmera system. Monitoring from 2016–17 shows that native fish numbers are increasing and the MacKenzie River platypus populations are continuing to breed.

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 ML/day or natural in December–May)[1]	• Maintain in-stream habitat to support native fish populations and waterbugs • Maintain near-permanent inundation of the stream channel for riparian vegetation and to prevent the growth of terrestrial plants in the streambed
Winter/spring low flows (30 ML/day in June–November)	• Provide variability in flows to maintain various types of habitat
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)	• Provide fish passage to allow fish to move through the reach and increase the flow to stimulate their movement • 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, moving organic debris and promoting 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, moving organic debris and promoting diverse habitat • Maintain the quality, diversity and extent of submerged and emergent aquatic vegetation for fish habitat
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 inundation of the stream channel for riparian vegetation and to prevent the growth of terrestrial plants including the Wimmera bottlebrush in the streambed and aquatic vegetation for fish habitat • Maintain a 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, fish movement and maintenance of 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)	• Maintain edge habitats and shallow water habitat for waterbugs • Maintain inundation of the 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

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

Potential environmental watering	Environmental objectives
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 inundation of the 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 the 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 its condition and facilitate recruitment • Move organic debris in the channel to support waterbugs • Maintain the structural integrity of channels
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 inundation of the stream channel for riparian vegetation and to prevent the growth of terrestrial plants in the streambed
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 diversity of habitat
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, move organic debris and promote habitat diversity • Flush surface sediments from hard substrates to support waterbugs
Mount William Creek	
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, move organic debris and promote habitat diversity
Bungalally Creek	
Year-round fresh (1 fresh of 60 ML/day for 2 days at any time)	• Inundate the riparian zone to maintain its condition and facilitate recruitment for riparian vegetation communities • Maintain the structural integrity of the channel and prevent loss of channel capacity

1 *Cease-to-flow events occur naturally in the Wimmera system and may be actively managed. 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, to reduce stress on environmental values. Cease-to-flow events should be followed with a fresh lasting at least seven days.*

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

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 are similar in each climate scenario, the magnitude, duration and/or frequency of specific watering actions may differ, and so the volume required under each scenario also differs. For example, in Wimmera River reach 4, one summer/autumn fresh of 70 ML/day for two to seven days is recommended, but under a wet scenario the recommendation is for three of these freshes.

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

Natural unregulated flows and increased environmental water allocations 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. Reserving water to carry over into the 2018–19 water year will also be a priority under all scenarios.

Wimmera River, by Chloe Wiesenfeld

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

Planning scenario	Drought	Dry	Average	Wet
Expected river conditions	• Some passing flows but no unregulated flows	• Some passing but no unregulated flows	• Passing and unregulated flows, particularly in winter/spring	• Passing flows and unregulated flows
Expected availability of environmental water[1]	• 32,210 ML carryover • 23,119 ML VEWH • 0 ML CEWH[2] • 55,329 ML total[3]	• 32,210 ML carryover • 25,147 ML VEWH • 0 ML CEWH[2] • 57,357 ML total[3]	• 32,210 ML carryover • 32,854 ML VEWH • 0 ML CEWH[2] • 65,064 ML total[3]	• 32,210 ML carryover • 40,560 ML VEWH • 0 ML CEWH[2] • 72,770 ML total[3]
Potential environmental watering – tier 1 (high priorities)[4]				
MacKenzie River reaches 2 & 3	• Partial summer/ autumn low flows and freshes • Partial winter/spring low flows • Winter/spring smaller freshes	• Partial summer/ autumn low flows and freshes • Partial winter/spring low flows • Winter/spring smaller freshes	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and smaller and larger freshes	• Summer/autumn low flows • Partial summer/ autumn freshes • Winter/spring low flows and smaller and larger freshes
Wimmera River reach 4	• Partial summer/ autumn low flows and freshes • Partial winter/spring low flows • Winter/spring smaller fresh	• Partial summer/ autumn low flows and freshes • Partial winter/spring low flows • Winter/spring smaller and larger freshes	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and smaller and larger freshes	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and smaller and larger freshes
Upper Burnt Creek	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and freshes	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and freshes	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and freshes	• Summer/autumn low flows • Partial summer/ autumn freshes • Winter/spring low flows and freshes
Upper Mt William Creek	• Top-ups	• Top-ups	• N/A	• N/A
Lower Mt William Creek	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and freshes	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and freshes	• Partial summer/ autumn low flows and freshes • Winter/spring low flows and freshes	• Summer/autumn low flows • Partial summer/ autumn freshes • Winter/spring low flows and freshes
Lower Burnt Creek	• N/A	• N/A	• Year-round fresh	• Year-round fresh
Bungalally Creek	• N/A	• N/A	• Year-round fresh	• Year-round fresh
Potential environmental watering – tier 2 (lower priorities)[5]				
MacKenzie River reaches 2 & 3	• Remainder summer/autumn low flows and freshes • Remainder of winter/spring low flows	• Remainder of summer/autumn low flows and freshes • Remainder of winter/spring low flows	• Remainder of summer/autumn low flows and freshes • Remainder of winter/spring low flows	• Remainder of summer/autumn freshes • Remainder of winter/spring low flows

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

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (lower priorities)[5]				
Wimmera River reach 4	• Remainder of summer/autumn low flows and freshes • Remainder of winter/spring low flows and freshes • Reach 3 winter/spring low flows	• Remainder of summer/autumn low flows and freshes • Remainder of winter/spring low flows and freshes • Reach 3 winter/spring low flows	• Remainder of summer/autumn low flows and freshes • Reach 3 winter/spring low flows	• Remainder of summer/autumn freshes • Reach 3 winter/spring low flows
Upper Burnt Creek	• Remainder of summer/autumn low flows and freshes	• Remainder of summer/autumn low flows and freshes	• Remainder of summer/autumn low flows and freshes	• Remainder of summer/autumn freshes
Lower Mount William Creek	• Remainder of summer/autumn low flows and freshes	• Remainder of summer/autumn low flows and freshes	• Remainder of summer/autumn low flows and freshes	• Remainder of summer/autumn freshes
Possible volume of environmental water required to achieve objectives[6]	• 21,635 ML (tier 1) • 24,045 ML (tier 2	• 22,280 ML (tier 1) • 24,020 ML (tier 2	• 29,615 ML (tier 1) • 20,345 ML (tier 2	• 33,035 ML (tier 1) • 19,655 ML (tier 2

1 *Environmental water in the Wimmera–Glenelg system is shared between the Glenelg and Wimmera systems. The volumes specified show the likely availability across the shared systems.*

2 *Commonwealth environmental water is only available for use in the Wimmera system.*

3 *This volume is a forecast of the total water likely to be available under the VEWH entitlement in 2017–18 including carryover water and the forecast allocation for the complete water year.*

4 *As the entitlement is shared between the Wimmera and Glenelg catchments, 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 2017–18 year.*

5 *Tier 2 actions are lower-priority actions to be considered if water is available.*

6 *Environmental water requirements for tier 2 actions are additional to tier 1 requirements.*

Risk management

In preparing its seasonal watering proposal, Wimmera CMA considered and assessed the risks of environmental watering and identified mitigation strategies. Program partners continually reassess risks and mitigation actions 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 Wimmera CMA implement the seasonal watering plan.

Seasonal watering proposals are informed by longer-term regional catchment strategies and regional waterway strategies and by environmental flow studies, water management plans and other studies. The strategies 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 Wimmera Waterway Strategy.

Wimmera CMA holds an annual Environmental Water Management Forum at which feedback is sought from community groups and agencies in the area with an interest in environmental water about the effectiveness of environmental watering, drought actions and related issues. Groups in this forum included the Barengi Gadjin Land Council, Yarriambiack Shire, Northern Grampians Shire, Hindmarsh Shire and Horsham Rural City councils, Parks Victoria, Fisheries Victoria, Dimboola and Jeparit town committees, Lake Lonsdale Action Group, Friends of Bungalally Creek and Friends of Burnt Creek, VRFish, Natimuk Lake Water Ski Club, Dimboola Water Ski Club, Dimboola Fishing Classic, Horsham Triathlon Committee, Wimmera Anglers Association, Dimboola Rowing Club, Jeparit Anglers' Club, Hindmarsh Ski Club, Native Fish Australia (Wimmera) and Horsham Fishing Competition Committee.

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

Partner engagement
• CEWO • Glenelg Hopkins CMA • GWMWater • VEWH

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 the dry north-west area of Victoria.

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 the plants and animals in the western part of the state. They 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 provide a valuable source of water for other native animals including the vulnerable growling grass frog, turtles and many other species that rely on these wetlands 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, cultural and economic values

The Wimmera-Mallee wetlands are highly valued by the community and provide places for recreational activities including canoeing, yabbying, duck and quail hunting and bird watching. The Wimmera-Mallee wetlands have been and continue to be places of significance for the Aboriginal Victorians in the region including the Wamba Wamba people and those represented by the Barengi Gadjin Land Council and the Dja Dja Wurrung Clans Aboriginal Corporation. Some of the sites have artefacts and scar trees recorded in or adjacent to them.

Environmental watering objectives in the Wimmera-Mallee wetlands

	Provide watering holes for native animals across the landscape
	Strengthen and maintain plant life in and around the wetlands, including to provide shade, shelter and food for native animals
	Provide habitat and food to maintain regional populations of native frogs and turtles
	Create shallow and deep wetlands to provide foraging and breeding habitat for a wide range of waterbirds

System overview

Historically, the wetlands received water from the open channel system before the Wimmera-Mallee Pipeline was completed. As part of the pipeline project, all stock and domestic supply dams were replaced with tanks and the open channel distribution system was replaced by pipelines. The project achieved significant water savings for environmental watering of the area's flow-stressed rivers, creeks and waterways and created regional development opportunities; but it also reduced the amount of open-water habitat in areas that were formerly supplied by the open channel system. To mitigate the loss of open water in the landscape, a 1,000 ML environmental entitlement was created to supply water to wetlands (some with associated dams) that were previously supplied through the old channel system. The entitlement is supplied via the Wimmera-Mallee Pipeline. A project was completed in 2011 to identify priority wetlands to be connected to the pipeline system, and all 51 wetlands are now connected.

Environmental water delivery to the wetlands relies on capacity in the Wimmera-Mallee Pipeline. CMAs work closely with GWMWater and land managers (including Parks Victoria, DELWP and private landowners) to manage around these capacity constraints and deliver environmental water to these wetlands.

Crow Swamp, by Chloe Wiesenfeld

Recent conditions

The Wimmera-Mallee received well above-average rainfall in winter 2016–17 and many of the wetlands naturally filled. The environmental entitlement also received full allocations for the first time in four years.

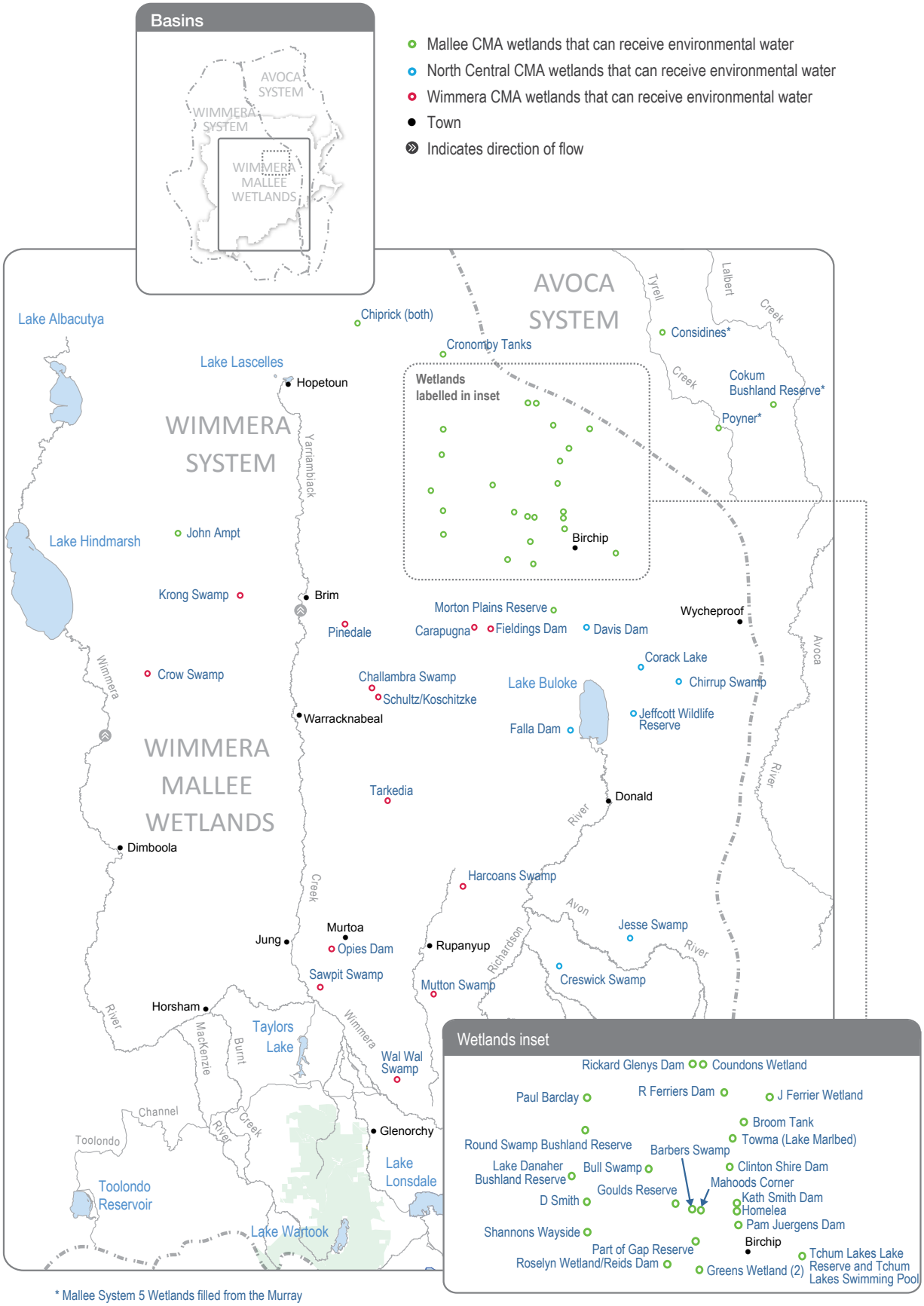
Environmental water was delivered to 31 Wimmera-Mallee wetlands in 2016–17: 21 wetlands in the Mallee area, three in the north-central area and seven in the Wimmera area. Deliveries were made in spring 2016 and autumn 2017, with some wetlands receiving water once and others receiving water twice.

Many different animals (such as lace monitors, kangaroos, wallabies, turtles, carpet pythons, ducks, grebes, stilts and other waterbirds, frogs, yabbies and eastern long-necked turtles) used the Wimmera-Mallee wetlands in 2016–17. Vegetation (both submerged in the wetlands and on the banks, including nardoo, water milfoil and water ribbons) has responded well at the wetlands that were watered or naturally filled and is contributing to the improved environmental conditions at these wetlands.

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 spring or autumn, but may occur at any time of the year depending on environmental need, seasonal conditions and pipeline capacity.

Figure 4.4.1 The Wimmera-Mallee wetlands



* Mallee System 5 Wetlands filled from the Murray

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 terrestrial animals
Creswick Swamp	• Maintain the range of aquatic plants and re-establish marbled marshwort • Provide refuge, feeding and breeding opportunities for frog and turtles
Chirrup Dam	• Provide drought refuge and a watering point for animals (particularly frogs and turtles) to facilitate recolonisation of Chirrup Swamp when it is naturally inundated
Corack Lake	• Maintain aquatic plants • Provide refuge and nursery habitat for turtles and frogs • Provide variety of feeding conditions for waterbirds (such as drawdown zones and shallows)
Falla Dam	• Maintain as a drought refuge for turtles and frogs and a watering point for terrestrial species
Jeffcott Wildlife Reserve	• Maintain a range of aquatic plants • Provide refuge and breeding conditions for water-dependent species (such as frogs, waterbugs, turtles and waterbirds)
Jesse Swamp	• Maintain native aquatic plants and re-establish marbled marshwort • Provide shallow foraging habitat for waterbirds (including brolgas) and feeding opportunities for frogs
Wimmera wetlands	
Carapugna	• Maintain regional populations of native animals especially frogs and wetland and woodland birds • Maintain and where possible increase the abundance of wetland plants, especially threatened species
Challambra Swamp	
Crow Swamp	
Fieldings Dam	
Krong Swamp	
Mutton Swamp	
Pinedale	
Sawpit Swamp	
Schultz–Koschitzke	
Tarkedia	
Wal Wal Swamp	
Harcoans Swamp	
Opies Dam	
Mallee wetlands	
Barbers Swamp	• Maintain the health of fringing lignum and black box communities • Provide suitable feeding and breeding habitat for various waterbird guilds
Bull Swamp	
Cokum Bushland Reserve	
Morton Plains Reserve	
Tchum Lakes Lake Reserve (North Lake - Wetland)	
Tchum Lakes Swimming Pool (North Lake – Dam)	

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

Potential environmental watering	Environmental objectives
Mallee wetlands	
Broom Tank	• Maintain the health of fringing lignum and black box communities • Provide watering points for terrestrial animals and woodland birds
Poyner	
Clinton Shire Dam	
Pam Juergens Dam	
Greens Wetland	
Roselyn Wetland	
Considines	
Goulds Reserve	• Maintain the health of fringing lignum and black box communities
Part of Gap Reserve	
Newer Swamp	
Towma (Lake Marlbed)	
Coundons Wetland	• Maintain the health of fringing lignum and black box communities • Provide watering points for terrestrial animals and woodland birds • Provide foraging, refuge and breeding habitat for turtles and frogs
J Ferrier Wetland	
Mahoods Corner	• Provide suitable feeding and breeding habitat for various waterbird guilds
Shannons Wayside	
Chiprick	• Provide watering points for terrestrial animals and woodland birds
D Smith Wetland	
Homelea Wetland	
John Ampt	
Kath Smith Dam	
Paul Barclay	
R Ferriers Dam	
Rickard Glenys Dam	
Cronomby Tanks	• Maintain the health of fringing lignum and black box communities • Provide foraging, refuge and breeding habitat for turtles and frogs
Lake Danaher Bushland Reserve	

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 2017–18 have been determined after assessing their water requirements, recent watering history and considering climatic conditions, water availability and the expected capacity in the Wimmera-Mallee Pipeline.

Under drought conditions, small volumes of water will be delivered to selected wetlands to top up water levels from previous environmental or natural watering events. Under average and wet climate scenarios more water becomes available which allows more wetlands to be watered. The volume of water delivered to individual wetlands will also increase under average and wet climate scenarios and some wetlands may be overfilled to inundate surrounding patches of native vegetation.

Due to the low reliability of environmental water in the Wimmera-Mallee wetlands, it is important to carry over water during wet periods to help manage the system during dry periods. A critical carryover volume of 161–254 ML has been identified for 2017–18 depending on the scenario.

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 rainfall or catchment inflows are likely to contribute to water levels in the wetlands	• No rainfall or catchment inflows are likely to contribute to water levels in the wetlands	• Some localised catchment inflows may contribute to water levels in some wetlands	• Catchment inflows are likely to contribute to water levels in most of the wetlands
Expected availability of environmental water	• 1,253 ML carryover • 0 ML allocation • 1,253 ML available	• 1,253 ML carryover • 60 ML allocation • 1,313 ML available	• 1,253 ML carryover • 250 ML allocation • 1,503 ML available	• 1,253 ML carryover • 250 ML allocation • 1,503 ML available
Potential environmental watering	• 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 • Fieldings Dam • Greens Wetland • Harcoans • Homelea • J Ferrier Wetland • Jeffcott Wildlife Reserve • Jesse Swamp • John Ampt • Kath Smith Dam • 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 • Greens Wetland • Harcoans • Homelea • J Ferrier Wetland • Jeffcott Wildlife Reserve • Jesse Swamp • John Ampt • Kath Smith Dam • Krong Swamp • Lake Danaher Bushland Reserve • Mahoods Corner	• 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	• 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
	• Mutton Swamp • Opies dam • Pam Juergens Dam • Paul Barclay • Pinedale • Poyner[1] • R Ferriers Dam • Rickard Glenys Dam • Roselyn Wetland–Reids Dam • Sawpit Swamp • Schultz–Koschitzke • Tarkedia Dam • Wal Wal	• Morton Plains Reserve • Mutton Swamp • Opies dam • Pam Juergens Dam • Part of Gap Reserve • Paul Barclay • Pinedale • Poyner[1] • 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	• Mahoods Corner • Morton Plains Reserve • Mutton Swamp • Opies dam • Pam Juergens Dam • Part of Gap Reserve • Paul Barclay • Pinedale • Poyner[1] • 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	• Mahoods Corner • Morton Plains Reserve • Mutton Swamp • Opies dam • Pam Juergens Dam • Part of Gap Reserve • Paul Barclay • Pinedale • Poyner[1] • 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 environmental water required to achieve objectives	• 261 ML	• 335 ML	• 519 ML	• 676 ML
Priority carryover requirements	• 161 ML	• 168 ML	• 168 ML	• 254 ML

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

Risk management

In preparing its seasonal watering proposal, the Wimmera, Mallee and North Central CMAs considered and assessed the risks of environmental watering and identified mitigation strategies. Program partners continually reassess risks and mitigation actions 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 strategies and regional waterway strategies and by environmental flow studies, water management plans and other studies. The strategies 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 respective Wimmera, North Central and Mallee regional catchment strategies and waterway strategies as relevant.

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

Partner and stakeholder engagement
All CMAs • GWMWater • Parks Victoria • VEWH
Mallee CMA • Landholders with wetlands on their properties in the Mallee area • Barenji Gadjin Land Council • Landcare groups • DELWP • North Central and Wimmera CMAs
North Central CMA • 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, DELWP, Parks Victoria and the VEWH • North Central CMA Community Consultative Committee, a community advisory group to the North Central CMA Board • Landholders with wetlands on their properties in the North Central area • Landcare groups • Barenji Gadjin Land Council • Dja Dja Wurrung Traditional Owners • DELWP • Mallee and Wimmera CMAs
Wimmera CMA • Landholders with wetlands on their properties in the Wimmera area • Field & Game Australia representatives • North Central and Mallee CMAs