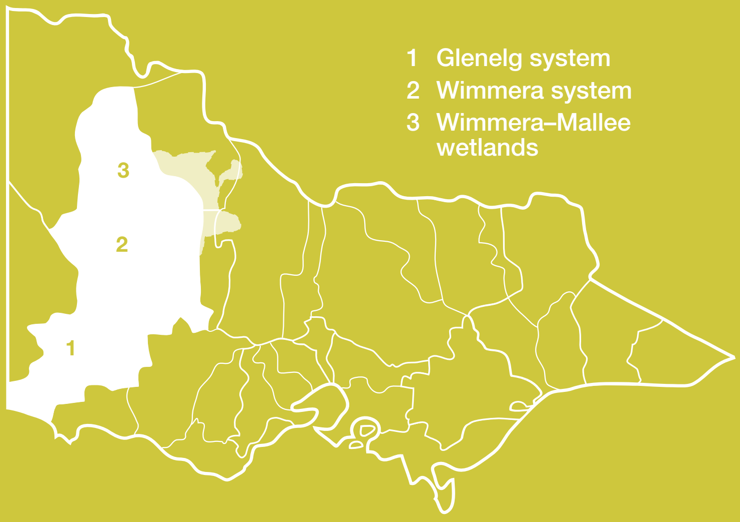
Section 4

Western Region



4.1 Western Region overview

Environmental water in the Western Region is shared between the Wimmera and Glenelg river systems and the Wimmera–Mallee wetlands. Important waterways that receive environmental water include sections of the Glenelg, Wimmera and MacKenzie rivers, and Mount William, Burnt and Bungalally creeks, as well as priority wetlands formerly supplied by the Wimmera–Mallee channel system.

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 shifted between storages and delivered in different catchments, including from the Glenelg catchment to the Wimmera catchment.

Waterways in the Western Region are highly valued by local residents and visitors for their environmental and aesthetic values, and are widely used for recreational activities such as fishing, camping, swimming, boating, bushwalking and wildlife watching.

Seasonal outlook 2015–16

Inflows to the Wimmera–Mallee headworks system are highly variable. Though the system experienced significant floods in September 2010 and January 2011, which significantly boosted streamflows and storage levels, this was followed by a sequence of dry years. Due to the low rainfall and catchment inflows during this period, environmental water carried over from previous years was important in meeting demands in 2014–15. Conditions in 2015–16 are again expected to be dry, with a high likelihood of low allocations being available to support environmental watering in the region, especially in the early part of the season. Again, carryover from 2014–15 will be critical for supplying demand in the coming year.

If the forecast dry conditions prevail in 2015–16, environmental watering in the Western Region in 2015–16 will be limited to protecting the water quality in the Wimmera and Glenelg rivers to maintain habitat for native fish. Due to the likely low water availability, deliveries will largely be restricted to the summer/autumn period, when water quality risks are highest. There will likely be periods of cease-to-flow in both river systems. Opportunities will be assessed to protect critical environmental values across the system, including consideration of supplementing water availability through trade. The focus of environmental watering in the Wimmera–Mallee wetlands will be providing refuges within the dry landscape to support local fauna.

Delivering outcomes under 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 Basin Plan. The potential environmental watering outlined in section 4 fulfil 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 Murray-Darling Basin Plan.

Platypus near the MacKenzie River, by Josh Griffiths

4.2 Glenelg system

Waterway manager – Glenelg Hopkins Catchment Management Authority

Storage manager – GWMWater

Environmental water holder – Victorian Environmental Water Holder

Environmental values

The lower section of the Glenelg River has been recognised as one of two biodiversity hotspots in Victoria due to the high-value aquatic life it supports, including the endangered Glenelg freshwater mussel and Glenelg spiny crayfish. It is also home to platypuses and important native fish populations including river blackfish, estuary perch and pygmy perch, some of which migrate long distances upstream from the Glenelg River estuary to complete their lifecycles. Frasers Swamp is another important feature of the upper Glenelg system, supporting 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 gums with paperbark and tea-tree understorey.

Social and economic values

The Glenelg system is valued for a wide range of fishing opportunities. From Rocklands Reservoir down to the estuary, the river is about 380 km long. Several fishing competitions are held on the river, in addition to other recreational activities including canoeing, bird watching and camping. Many landholders rely on the Glenelg River for stock water and use the productive floodplains for grazing. The river also provides tourism opportunities and supports businesses within townships such as Harrow, Casterton, Dartmoor and Nelson. The waterways in the Glenelg system continue to be places of importance for Traditional Owners and their Nations in the region.

Environmental watering objectives in the Glenelg system

- Maintain a healthy and diverse mix of riverside plant life
- Protect and boost populations of native fish including the threatened variegated pygmy perch. Provide flows for fish to move upstream and downstream and between the river and the ocean, encouraging fish such as eel, bream, estuary perch and tupong to spawn (release eggs)
- Maintain a wide range of waterbugs to provide energy, break down organic matter and support the river's food chain
- Move sand built up on the river bed to provide healthy habitat pools and places to shelter for fish, platypus and other water animals such as the critically endangered Glenelg freshwater mussel and endangered Glenelg spiny crayfish

System overview

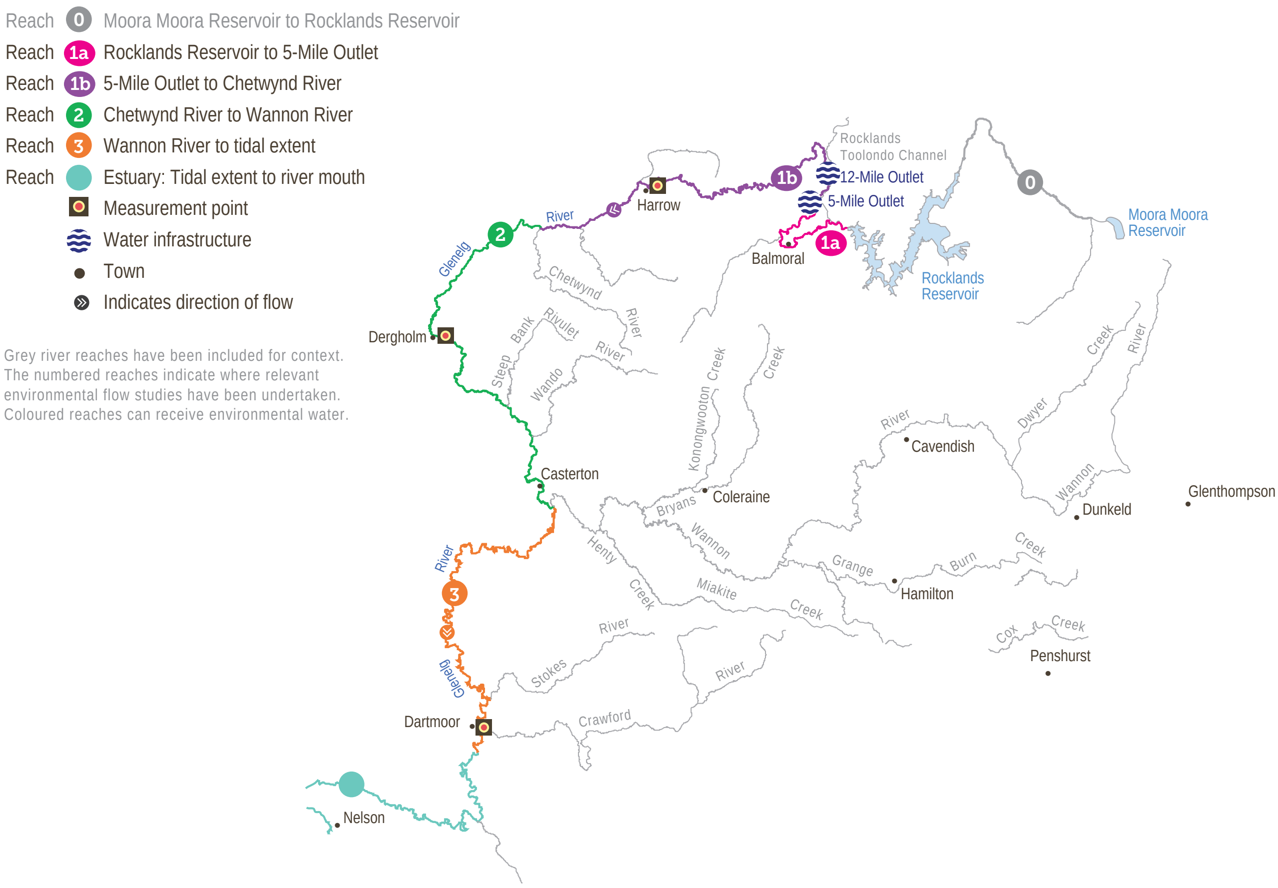
The Glenelg River supports a wide range of flow-dependent environmental values including rare and threatened flora and fauna. This diversity is driven by the range of landforms, climate conditions and connection with the estuary.

The Glenelg River is an integral part of the Wimmera–Mallee headworks system. It is regulated at Moora Moora Reservoir and Rocklands Reservoir. Water is also diverted from the Glenelg catchment to the Wimmera catchment by the Moora Moora channel and the Rocklands–Toolondo–Taylors channel, and at three weirs on the upper Wannon River. Environmental water is managed in the main stem of the Glenelg River below Rocklands Reservoir.

Due to their high environmental value, the priority river reaches in the Glenelg system are reach 1a (Rocklands Reservoir to 5-Mile Outlet), reach 1b (5-Mile Outlet to Chetwynd River) and reach 2 (Chetwynd River to Wannon River). 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, with through flow-delivering water to reach 2. The Glenelg River reach 3 and estuary also benefit from environmental water releases.

Although currently not managed for environmental needs, the Glenelg River above Rocklands Reservoir (reach 0) runs mostly through the Grampians National Park which retains significant environmental values. Further work is being undertaken to document these values and the flow requirements of this reach.

Figure 3.6.1 The Glenelg system



Recent conditions

The Glenelg catchment was dry in 2014–15 despite strong inflows to the system in July and early August 2014. Inflows fell significantly after this period although a minor rainfall event in January 2015 resulted in a small increase in inflows.

The low inflows resulted in low allocations of 48 per cent (to May 2015) and severely restricted passing flows from Rocklands Reservoir. Actions in 2014–15 relied heavily on environmental water carried over from 2013–14.

In July and August 2014, environmental water was used to supplement unregulated and passing flows to maintain baseflows through winter. Following the delivery of a spring fresh in October, flows transitioned to lower summer baseflows. The transition to summer baseflows was earlier than usual and was based on the hot, dry climatic conditions and resulting vegetation responses, with plants flowering much earlier than usual.

The bulk of summer and autumn flows was provided by environmental releases. Summer storms contributed to some river flow but a dry catchment severely restricted runoff. In light of the low allocations across the Wimmera–Glenelg system, and low forecast allocations in 2015–16, watering priorities were reviewed and revised throughout the 2014–15 year. Particular emphasis was placed on managing threats to key values, particularly water quality, as Glenelg River releases were scaled back to target a limited range of flows, mostly in reach 1b.

A cease-to-flow was trialled in autumn 2015 when temperatures reduced and the risk of poor water quality lessened. Knowledge gained through this trial will be used to inform management in drier years when there may be longer cease-to-flow periods.

Saline groundwater intrusion in deep pools is an ongoing threat to the unique ecology of the Glenelg River. Water quality monitoring was undertaken at key sites in reach 1b to monitor salinity and dissolved oxygen levels. The information was used to inform and monitor the impact of releases. Monitoring demonstrated that a layer of fresh and well-oxygenated water was maintained at the surface of key sites in the reach due to environmental water releases. Water quality at depth did decline after periods of lower flow but fresh events were effective at breaking down stratification and restoring water quality in these pools.

Glenelg River native fish populations continue to recover in response to environmental watering. Fish monitoring has shown that diadromous species (those that use both the estuary and freshwater part of the system, such as eel, bream, estuary perch and tupong) have responded strongly to environmental watering and a suite of complementary river health works in the system, including the installation of fishways. Since 2011, estuary perch have increased their upstream range in the Glenelg River by 160 km. Other non-migratory fish species (such as variegated pygmy perch) showed a strong spawning response and were the most abundant species caught in 2015 Glenelg River fish surveys.

Scope of environmental watering

The full range of potential environmental watering actions and their environmental objectives are explained in Table 4.2.1 and illustrated in Figure 4.2.2. The environmental watering proposed to be undertaken in 2015–16 is discussed under Scenario planning below.

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

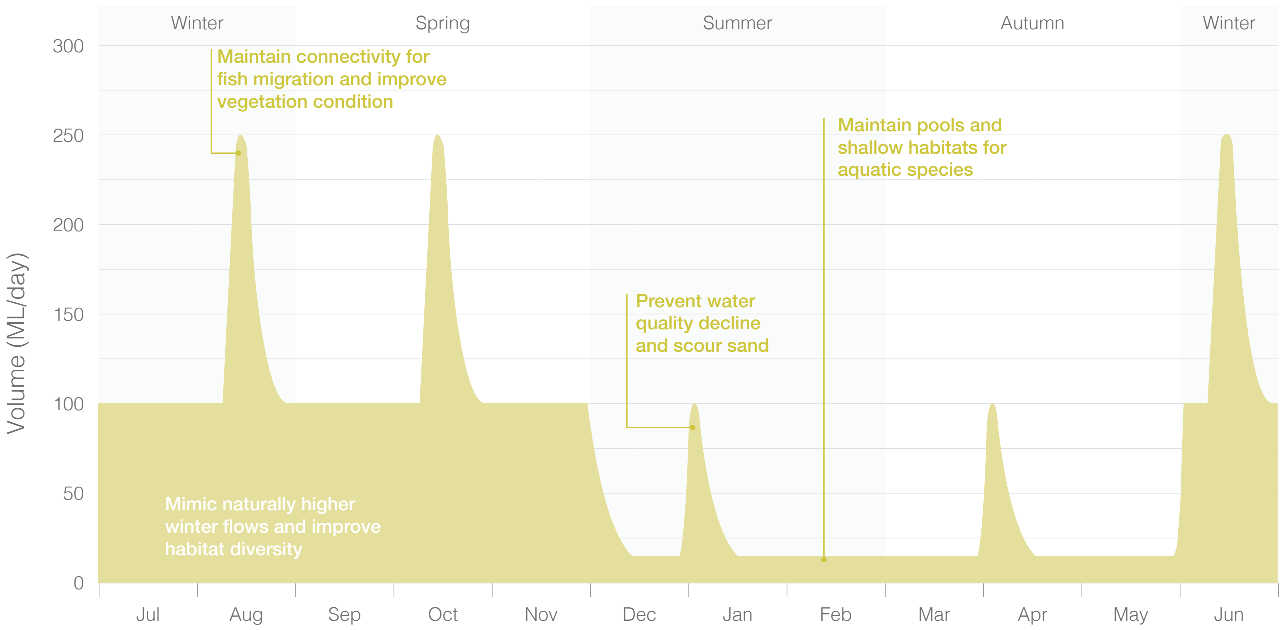
Potential environmental watering	Environmental objectives
Summer/autumn freshes targeting reach 1a (2 freshes of 60 ML/day for 2–3 days each during December–May)	• Provide variable flow during low-flow season to support macroinvertebrates, diverse habitats and water quality • Facilitate localised scouring of sand for fish habitat • Maintain condition of emergent vegetation by wetting lower banks • Flush pools to prevent water quality decline during low flows
Summer/autumn freshes targeting reaches 1b (2 freshes of 100 ML/day for 2–3 days each during December–May)	
Summer/autumn freshes targeting reach 2 (2 freshes of 150 ML/day for 2–3 days each during December–May)	
Summer/autumn baseflows targeting reach 1a (10 ML/day or natural during December–May)[1]	• Protect against rapid water quality decline over low-flow period • Maintain edge habitats, pools and shallow water habitat availability for fish, macroinvertebrates and platypuses • Maintain a near-permanent inundated stream channel to prevent excessive instream terrestrial species growth and promote instream vegetation
Summer/autumn baseflows targeting reach 1b (15 ML/day or natural during December–May)[1]	
Summer/autumn baseflows targeting reach 2 (25 ML/day or natural during December–May)[1]	
Winter/spring freshes targeting reach 1b (1–5 freshes of 250 ML/day for 1–5 days during June–November)	• Wet benches to improve condition of emergent vegetation and maintain habitat diversity • Increase the baseflow water depth and connectivity to provide stimulus and opportunity for fish movement • Facilitate localised scouring of sand for fish habitat • Maintain pools and inundate benches to improve instream habitat and vegetation diversity
Winter/spring freshes targeting reach 2 (1–5 freshes of 300 ML/day for 1–5 days during June–November)	
Winter/spring baseflows targeting reach 1a (60 ML/day or natural during June–November)[1,3]	• Provide desirable water quality conditions for fish, macroinvertebrates and aquatic vegetation • Maintain seasonality of flow and improve habitat diversity by increasing wetted area from summer period • Maintain shallow water habitat availability for fish and macroinvertebrates and facilitate annual dispersal of juvenile platypuses
Winter/spring baseflows targeting reach 1b (100 ML/day or natural during June–November) [1,3]	
Winter/spring baseflows targeting reach 2 (160 ML/day or natural during June–November) [1,3]	

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 to the health of the Glenelg River but due to operational constraints and potential flooding risks achievement relies solely on natural events.

3 Passing flows provided under the environmental entitlement generally provide winter/spring baseflows. 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 during fresh events.

Figure 4.2.2 Potential environmental watering in the Glenelg River reach 1b



Note: This figure is for illustrative purposes only and depict watering that has been identified under the average planning scenario. Scheduling and delivery of particular watering actions within the stated timeframes will vary.

Scenario planning

Table 4.2.2 outlines the potential environmental watering and expected water usage under a range of planning scenarios.

The potential watering actions identified in Table 4.2.2 reflect most flow recommendations from the Glenelg River flows study under different climatic scenarios and have not been constrained by the available supply of environmental water. While the actions are similar in each climatic scenario, the magnitude, duration and/or frequency differ between scenarios, and therefore the volume required under each scenario also differs. For example, for Glenelg River in a drought scenario, a 250 ML per day winter/spring fresh for one day is recommended once per year, however in the wet scenario the same fresh is recommended to occur five times per year for five days each time.

In light of the limited water availability expected, it will not be possible to fully deliver all potential environmental watering actions outlined in Table 4.2.2. The focus in 2015–16 will be on protecting water quality in the river to maintain habitat for native fish.

Environmental water deliveries will likely be targeted to manage threats during high-risk periods, with limited scope to undertake winter watering unless there are significant inflows and allocations in the early part of the water year. While the aim is to maintain environmental values in the system, there is still a high risk of poor water quality and associated adverse impacts at times due to shortfalls in water availability. Environmental watering will typically occur in response to triggers, particularly associated with managing water quality risks, as there is unlikely be sufficient water to deliver the full recommended flows.

Under most scenarios, there will likely be periods of cease-to-flow in summer due to the low water availability. Where possible, the duration of these cease-to-flow periods will be carefully managed and monitored to minimise adverse impacts. Due to the expected low water availability, this may not be possible in all cases and prolonged cease-to-flow periods may be experienced.

If the wet scenario eventuates, watering is likely to be more extensive, reflecting the increased water availability. However, given the low water availability compared to previous years, there may be a focus on reserving some water for use in the early part of the 2016–17 water year. Wet conditions will also reduce the need to use regulated allocations, due to increased passing and unregulated flows.

Glenelg spiny crayfish, by Glenelg Hopkins CMA

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	▸ No passing, compensation or unregulated flows	▸ Restricted passing and compensation flows and limited unregulated flows	▸ Some passing, compensation and unregulated flows, particularly during winter/spring	▸ Some passing flows and compensation flow and significant unregulated flows during winter/spring resulting in sustained baseflows
Expected availability of environmental water[1]	▸ 8,000 ML carryover ▸ 5,273 ML VEWH allocation ▸ 0 ML CEWH allocation[2] ▸ 13,273 ML total[3]	▸ 8,000 ML carryover ▸ 12,878 ML VEWH allocation ▸ 0 ML CEWH allocation[2] ▸ 20,878 ML total[3]	▸ 8,000 ML carryover ▸ 25,553 ML VEWH allocation ▸ 0 ML CEWH allocation[2] ▸ 33,553 ML total[3]	▸ 8,000 ML carryover ▸ 40,560 ML VEWH allocation ▸ 560 ML CEWH allocation[2] ▸ 49,120 ML total[3]
Potential environmental watering	▸ Summer/autumn fresh flows reaches 1a & 1b ▸ Winter/spring fresh flows reach 1b ▸ Summer/autumn baseflows reaches 1a & 1b ▸ Winter/spring baseflows reaches 1a & 1b	▸ Summer/autumn fresh flows reaches 1a & 1b ▸ Winter/spring fresh flows reach 1b ▸ Summer/autumn baseflows reaches 1a & 1b ▸ Winter/spring baseflows reaches 1a & 1b	▸ Summer/autumn fresh flows reaches 1a, 1b & 2 ▸ Summer/autumn baseflows reaches 1a, 1b & 2 ▸ Winter/spring fresh flows reaches 1b & 2 ▸ Winter/spring baseflows reaches 1a, 1b & 2	▸ Summer/autumn fresh flows reaches 1a, 1b & 2 ▸ Summer/autumn baseflows reaches 1a, 1b & 2 ▸ Winter/spring fresh flows reaches 1b & 2 ▸ Winter/spring baseflows reaches 1a, 1b & 2
Glenelg system				
Possible volume of environmental water required to achieve objectives	▸ 25,500 ML	▸ 27,350 ML	▸ 40,980 ML[4]	▸ 39,540 ML[4]
Wimmera system				
Possible volume of environmental water required to achieve objectives	▸ 42,337 ML	▸ 47,330 ML	▸ 55,423 ML[4]	▸ 58,713 ML[4]
Total possible environmental water requirements in the Wimmera and Glenelg systems				
Possible volume of environmental water required to achieve objectives[5]	▸ 67,837 ML	▸ 74,680 ML	▸ 96,403 ML	▸ 98,253 ML

1 Environmental water in the Wimmera–Glenelg system is shared between the Glenelg and Wimmera systems. The volumes specified indicate 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 2015–16, including carryover and the forecast allocation for the complete water year. The forecast opening allocation for each climate scenario is 0 ML under all scenarios, meaning the only water available is likely to be the carryover of about 8,000 ML at the start of the water year.

4 This volume assumes that passing flows make some contribution to achieving the potential watering actions. The volume of passing flows is highly variable from year to year and depends on allocations and inflows received. The compensation flow has not been included in this assumption as the likely volume this year is expected to be very low given the low forecast allocations.

5 Figures take into account the possible volume required in both the Glenelg and Wimmera 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 2015–16 year.

Risk management

In preparing its seasonal watering proposal, Glenelg Hopkins CMA considered and assessed risks and identified mitigating strategies relating to implementing environmental watering. Risks and mitigating actions are continually reassessed by program partners throughout the water year (see section 1.4.4).

Engagement

The Glenelg Hopkins CMA engaged key stakeholders when preparing the seasonal watering proposal for the Glenelg system. Table 4.2.3 shows these stakeholders.

Seasonal watering proposals are informed by longer-term regional waterway strategies, environmental water management plans and environmental flow studies, which incorporate environmental, cultural, social and economic considerations.

Table 4.2.3 Key stakeholders engaged in the development of the Glenelg system seasonal watering proposal key stakeholders

Stakeholder engagement
‣ Indigenous groups – Gunditj Mirring (Registered Aboriginal Party) ‣ Parks Victoria ‣ Glenelg Hopkins CMA Advisory Group (including representatives of key stakeholder groups and landholders in the region) ‣ Community members (through direct engagement) ‣ GWMWater ‣ Wimmera CMA ‣ Victorian Environmental Water Holder

Sandford weir and fishway on the Glenelg River, by Glenelg Hopkins CMA

Tupong, by Glenelg Hopkins 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

Environmental values

The Wimmera River and its tributaries boast a wide range of environmental and social values. The Wimmera system is home to many significant plant and animal species including one of Victoria's few self-sustaining populations of freshwater catfish. It also contains self-sustaining endemic fish species including flat-headed gudgeon and Australian smelt.

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

Protecting and restoring riparian vegetation communities is an environmental water objective for the Burnt and Bungalally creeks. Upper Burnt Creek contains an important native fish community and a population of threatened western swamp crayfish. Burnt Creek in particular provides important habitat corridors for both aquatic and terrestrial species. Mount William Creek is a priority reach to assist in maintaining the creek's healthy populations of endemic fish, in both the upper and lower sections.

Social and economic values

The Wimmera River system offers many popular recreational activities such as boating, rowing, water skiing, fishing and camping. It also provides important amenity for Wimmera residents in what is a very dry landscape. There are several events held on the waterways in the Wimmera catchment including the annual Kanamaroo Festival and Horsham fishing competition on the Wimmera River at Horsham. The waterways in the Wimmera system continue to be important for Traditional Owners and their Nations in the region.

Environmental watering objectives in the Wimmera system

- Protect and boost diverse 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
- Provide flows to support platypuses, maximising habitat in which they can rest, breed and feed
- Improve the condition, abundance and diversity of aquatic, emergent and riparian vegetation
- Support communities of waterbugs which provide energy, break down dead organic matter and support the river's food chain

System overview

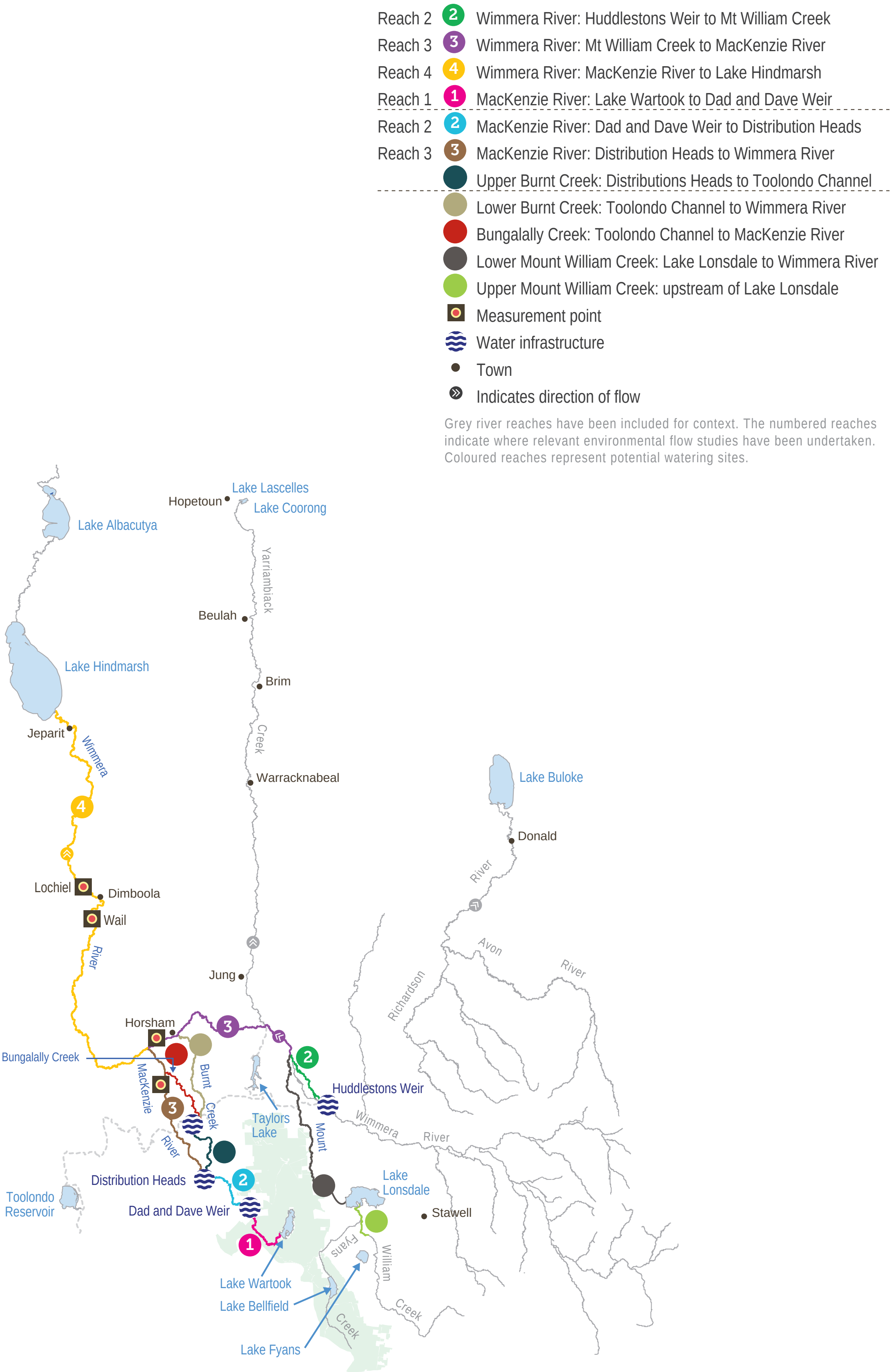
The Wimmera River commences in the Pyrenees Range near Elmhurst and receives flow from several tributaries including the MacKenzie River and the Mount William, Burnt and Bungalally creeks. All of these can receive environmental water, as can the Wimmera River downstream of lower Mount William Creek. Just east of Mt Arapiles the Wimmera River swings to the north and continues through Dimboola and Jeparit to Lake Hindmarsh, Victoria's largest freshwater lake. During exceptionally wet periods, Lake Hindmarsh overflows into Outlet Creek and on to Lake Albacutya, an internationally recognised, Ramsar-listed wetland, extending to the Wirrengren Plain in the southern Mallee.

Water in the Wimmera system is stored in three onstream reservoirs: Lake Wartook on the MacKenzie River, Lake Lonsdale on Mount William Creek and Lake Bellfield on Fyans Creek, as well as in several offstream storages: Taylors Lake, Lake Fyans and Toolondo Reservoir. The channel system enables water movement between storages and from the Glenelg to the Wimmera system. Inter-basin transfers of water can occur from Rocklands Reservoir (in the Glenelg system) via the Rocklands–Toolondo Channel and from Moora Moora Reservoir via the Moora Channel to the Wimmera system. Water from the system is also delivered to towns and several Wimmera–Mallee wetlands in the Loddon, Avoca and Mallee catchments.

Passing flows are provided to the Wimmera River and to Mount William and Fyans creeks. Where possible, environmental water releases will be combined with passing flows, unregulated flows and the delivery of consumptive use water en route, to optimise environmental outcomes.

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, due to the range of environmental values they support.

Figure 4.3.1 The Wimmera system



Recent conditions

Dry conditions prevailed in the Wimmera system throughout 2014–15 with minimal rainfall and catchment inflows. Allocations to May 2015 remained low (48 per cent) and passing flows were largely absent. The low inflows resulted in low allocations of 48 per cent (to May 2015) and severely restricted passing flows from Lake Lonsdale. Actions in 2014–15 relied heavily on environmental water carried over from 2013–14. Given the low water availability, the focus in 2014–15 was on building resilience in fish, platypus, crayfish, turtle, macroinvertebrate and plant communities in preparation for potentially dry conditions in 2015–16.

Environmental watering occurred in the Wimmera and MacKenzie rivers and upper and lower Mount William and Burnt creeks in 2014–15. While many flow targets were not completely achieved due to low water availability, the releases assisted in maintaining water quality and a diverse range of habitats, leading to several positive environmental outcomes.

Recent fish surveys in the Wimmera River show an increase in native fish populations since 2010, with the flathead gudgeon populations increasing by 98 percent and golden perch by 91 percent. A significant increase in abundance and diversity was also found in the MacKenzie River.

In February 2015, Lake Lonsdale effectively dried and water could no longer be delivered to lower Mount William Creek. In May 2015, water was delivered to a refuge pool at Mokepilly on upper Mount William Creek (upstream of Lake Lonsdale) to provide drought refuge for the native fish in this area.

In March 2015, three female platypuses were found in the MacKenzie River, providing further evidence of the growth in the population of platypuses found in this river. A population of Peron's tree frog was also found in Burnt Creek in 2014, the first time this species has been found in the Wimmera catchment.

In response to the recent and forecast dry conditions, environmental releases were scaled back in March 2014 with cease-to-flow events implemented in all creeks and rivers except Burnt Creek and MacKenzie River (reach 2). The risk to the plants and animals at this cooler time of year was considered less than the risk in the summer months if the water was not available for use in summer 2015–16. Throughout this period, water was delivered to Burnt Creek and MacKenzie River (reach 2) to maintain some habitat for fish and platypuses. Wimmera CMA closely monitored the water quality in all waterways to manage risks to environmental values.

Scope of environmental watering

The full range of potential environmental watering actions and their environmental objectives are explained in Table 4.3.1 and illustrated in figures 4.3.2 to 4.3.6. The environmental watering proposed to be undertaken in 2015–16 is discussed in the Scenario planning section below.

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 baseflows (15 ML/day or natural during December–May)[1]	▸ Maintain edge habitats in deeper pools and runs, and shallow water habitat availability for macroinvertebrates and native fish from the local area ▸ Maintain near-permanent inundated stream channel for riparian vegetation and to prevent excessive instream terrestrial species growth
Winter/spring baseflows (30 ML/day during June–November)	▸ Provide flow variability to maintain diversity of habitats
Summer/autumn freshes (1–3 freshes of 70 ML/day for 2–7 days during December–May)	▸ Provide variable flow during low-flow season for macroinvertebrates, fish movement and to maintain water quality and diversity of habitat
Winter/spring freshes (1–5 freshes of 70 ML/day for 1–4 days during June–November)	▸ Increase the baseflow water depth to provide stimulus for fish movement ▸ Provide flow variability to maintain water quality and diversity of fish habitats
Moderate winter/spring freshes (1–3 freshes of 200 ML/day for 1–3 days during June–November)[2]	▸ Wet lower benches, entraining organic debris and promoting diversity of habitat
Higher winter/spring freshes (1–2 freshes of up to 1,300 ML/day for 2–3 days during June–November)	▸ Flush surface sediments from hard substrates to support macroinvertebrates ▸ Wet higher benches, entraining organic debris and promoting diversity of habitat
MacKenzie River (reach 2 and 3)	
Year-round baseflows (of 2–27 ML/day or natural, year-round)[1]	▸ Maintain edge habitats and deeper pools and runs for macroinvertebrates ▸ Maintain inundated stream channel to protect and restore riparian and floodplain vegetation communities including the Wimmera bottlebrush and support aquatic vegetation for fish habitat ▸ Maintain sufficient area of pool habitat for intact fish communities and shallow water habitats for small-bodied fish ▸ Facilitate annual dispersal of juvenile platypuses into the Wimmera River

Potential environmental watering	Environmental objectives
Summer/autumn freshes (3–4 freshes of 5–50 ML/day for 2–7 days each during December–May)	▸ Provide variable flow during low-flow season for macroinvertebrates, fish movement and to maintain water quality and diversity of habitat
Winter/spring freshes (5 freshes of 35–55 ML/day for 2–7 days during June–November)	▸ Stimulate fish movement, maintain water quality and diversity of habitat
Higher winter/spring freshes (1–5 freshes of up to 190 ML/day for 1–4 days during June–November)	▸ Stimulate fish movement and maintain water quality ▸ Flush surface sediments from hard substrates to support macroinvertebrates ▸ Wet higher benches, entraining organic debris and promoting diversity of habitat
Burnt Creek	
Year-round baseflows targeting upper Burnt Creek (1 ML/day or natural, year-round)[1]	▸ Maintain edge habitats and deeper pools and runs for macroinvertebrates ▸ Maintain inundated stream channel to protect and mimic riparian and floodplain vegetation communities, and prevent excessive stream bed colonisation by terrestrial vegetation species ▸ Maintain sufficient area of pool habitat for intact fish communities and shallow water habitats for small-bodied fish
Summer/autumn freshes targeting upper Burnt Creek (3 freshes of 30 ML/day for 2–7 days each during December–May)	▸ Prevent water quality decline by flushing pools during low flows
Winter/spring freshes targeting upper Burnt Creek (1–5 freshes of 55 ML/day for 3–7 days during June–November)	▸ Provide variable flow for fish movement and diversity of habitat ▸ Flush surface sediments from hard substrates for macroinvertebrates
Higher winter/spring freshes targeting upper Burnt Creek (1–3 freshes of up to 160 ML/day for 1–3 days during June–November)	▸ Disturb biofilms present on rocks or woody debris to support macroinvertebrates
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 ▸ Entrain organic debris in the channel to support macroinvertebrates ▸ Maintain structural integrity of channel
High-flow fresh targeting lower Burnt Creek (1 fresh of 90 ML/day for 1 day during August–November)	▸ Inundate floodplain vegetation to maintain condition and facilitate recruitment ▸ Entrain organic debris from the floodplain to support macroinvertebrates ▸ Maintain floodplain geomorphic features
Mount William Creek	
Summer/autumn top-up of upper Mount William Creek pools (December–May)	▸ Maintain habitat for native fish
Year-round baseflows targeting lower Mount William Creek (5 ML/day or natural, year-round)[1]	▸ Maintain edge habitats and shallow water habitat for macroinvertebrates and endemic fish ▸ Maintain inundated stream channel to protect and restore riparian and floodplain vegetation communities and prevent excessive stream bed colonisation by terrestrial vegetation species
Summer/autumn freshes targeting lower Mount William Creek (3 freshes of 20–30 ML/day for 2–7 days during December–May)	▸ Prevent water quality decline by flushing pools during low flows ▸ Provide variable flow during low-flow season for macroinvertebrates, 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 during June–November)	▸ Wet benches, entrain organic debris and promote diversity of habitat ▸ Flush surface sediments from hard substrates to support macroinvertebrates
Higher winter/spring freshes targeting lower Mount William Creek (1–3 freshes of up to 500 ML/day for 1–3 days during June–November)	▸ Wet highest benches, entrain organic debris and promote diversity of habitat
Bungalally Creek	
Year-round fresh (1 fresh of 60 ML/day for 1–2 days at any time)	▸ Inundate riparian zone to maintain condition and facilitate recruitment for riparian vegetation communities ▸ Maintain structural integrity of 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 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 lasting at least seven days.

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

Figure 4.3.2 Potential environmental watering in the Wimmera River reach 4

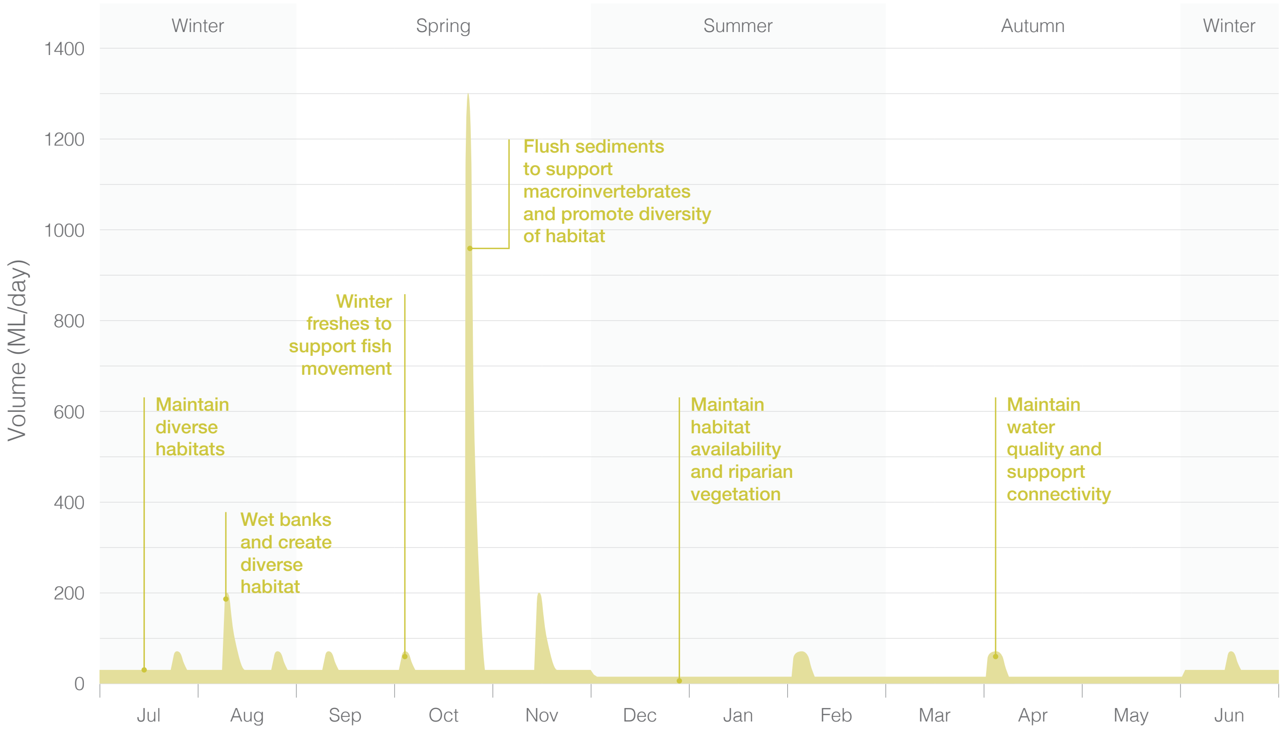


Figure 4.3.3 Potential environmental watering in the MacKenzie River reach 3

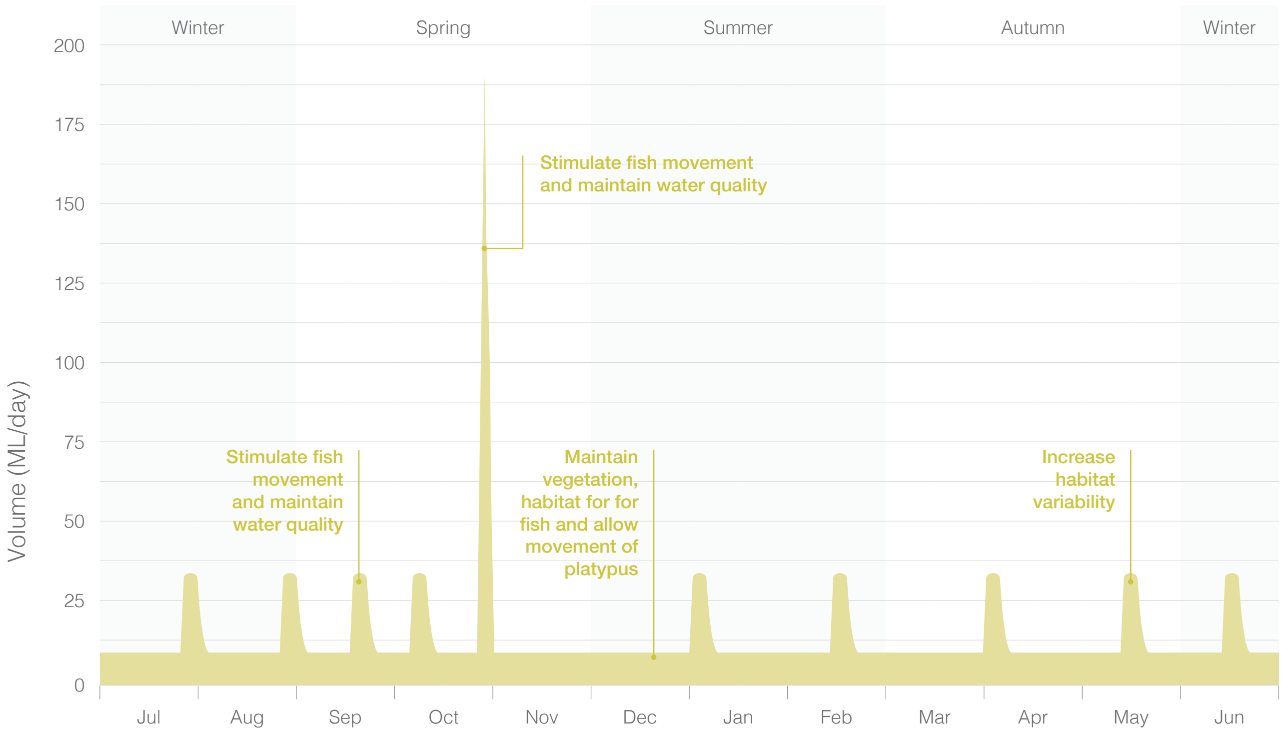


Figure 4.3.4 Potential environmental watering in upper Burnt Creek

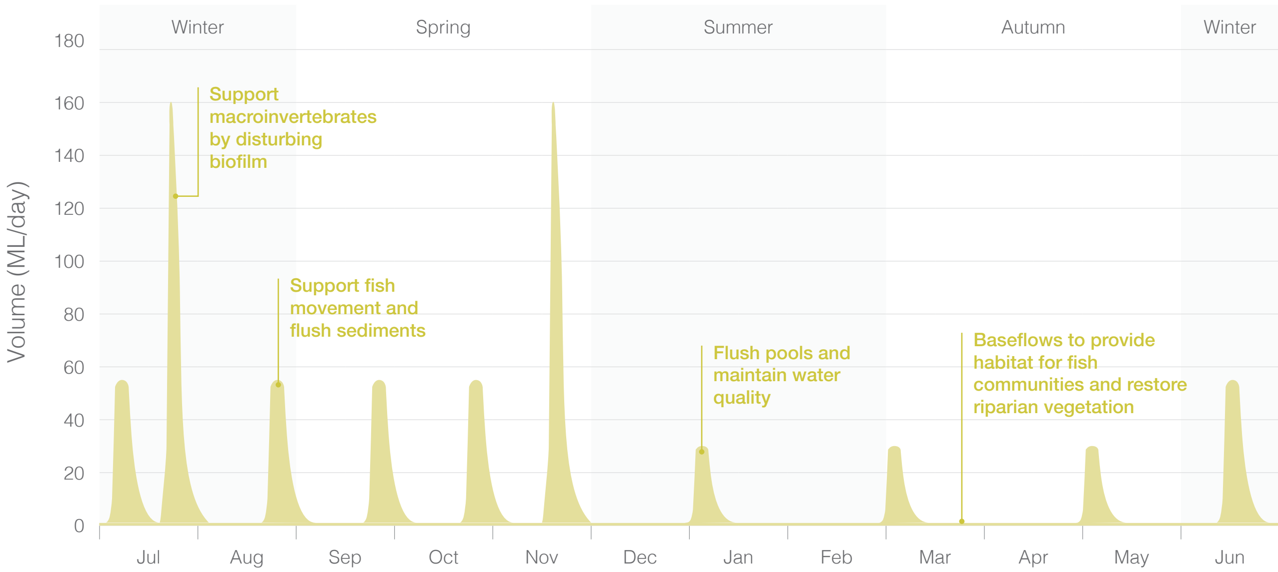


Figure 4.3.5 Potential environmental watering in lower Mount William Creek

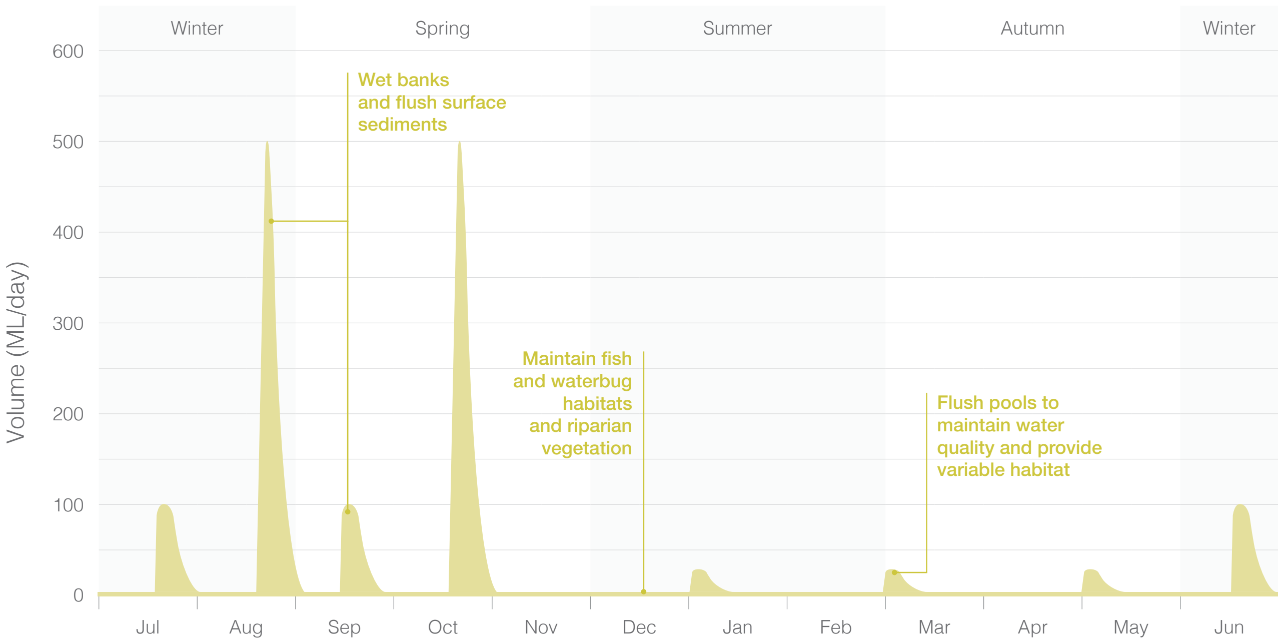
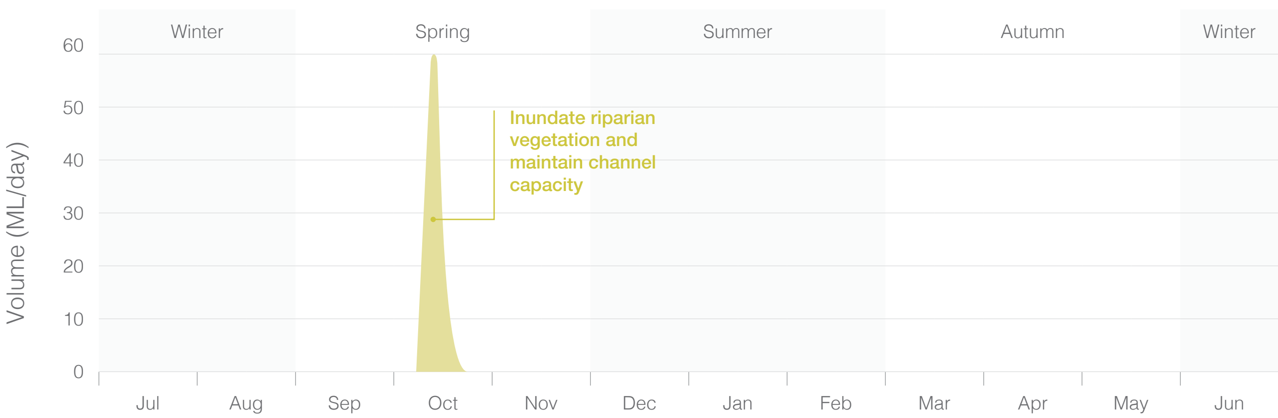


Figure 4.3.6 Potential environmental watering in Bungalally Creek



Note: These figures are for illustrative purposes only and depict watering that has been identified under the average planning scenario. Scheduling and delivery of particular watering actions within the stated timeframes will vary.

Scenario planning

Table 4.3.2 outlines the potential environmental watering and expected water usage under a range of planning scenarios.

Water resource management in the Wimmera system is complex with numerous storages and variable release points for supplying environmental, consumptive use and recreational water. Planning for and delivery of environmental water requires flexible and adaptive management. There are supply routes that maximise environmental outcomes throughout the system, although it may be impractical to deliver via these routes during certain periods due to storage levels or water quality issues. This may limit the feasibility of some environmental watering. Wimmera CMA will work closely with GWMWater to maximise environmental outcomes.

Yarriambiack Creek is a distributary of the Wimmera River, flowing northwards into the Mallee. Historically, the creek would only receive flows during high-flow events in the Wimmera River. The Yarriambiack Creek offtake has since been modified, resulting in flows entering the creek on a more-frequent basis. When delivering environmental water to the Wimmera River reach 4, losses are incurred into Yarriambiack Creek. As has been past practice, it may be necessary to block flows entering the creek to ensure efficient and effective environmental watering in the Wimmera River.

The potential watering actions identified in Table 4.3.2 reflect most flow recommendations from the Wimmera River flows study under different climatic scenarios and have not been constrained by the available supply of environmental water. While the actions are similar in each climatic scenario, the magnitude, duration and/or frequency differ between scenarios, and therefore the volume required under each scenario also differs. For example, for Wimmera River reach 4 in a drought scenario, a 70 ML per day summer/autumn fresh for two to seven days is recommended once per year; in the wet scenario, the same fresh is recommended to occur three times per year.

In light of the limited allocation volume expected, it will not be possible to fully deliver all potential environmental watering actions. The focus in 2015–16 will be on protecting the water quality and wetting pools in rivers and creeks to maintain habitat for native fish and other fauna such as platypuses.

Environmental water deliveries will likely be restricted to high-risk periods in summer/autumn when stress on biota from poor water quality and limited habitat are greatest. There will likely be limited scope to undertake winter watering unless there are significant inflows and allocations in the early part of the water year. While the aim is to maintain environmental values in the rivers and creeks, there is still a high risk of poor water quality and associated adverse impacts at times, due to shortfalls in water availability. Environmental watering will typically occur in response to triggers, particularly associated with managing water quality risks, as there is unlikely to be sufficient water to deliver the full recommended flows.

Under most scenarios, there will likely be periods of cease-to-flow in summer due to the low water availability. Where possible, the duration of these cease-to-flow periods will be carefully managed and monitored to minimise adverse impacts. Due to the expected low water availability, this may not be possible in all cases and prolonged cease-to-flow periods may be experienced.

If the wet scenario eventuates, watering is likely to be more extensive, reflecting the increased water availability. However, given the low level of water available compared to previous years, particularly as a result of low carryover, there is likely to be a focus on reserving some water for use in the early part of the 2016–17 water year. Wet conditions will also reduce the need to use regulated allocations due to increased passing and unregulated flows.

Upper MacKenzie River at Wartook Reservoir, by Wimmera CMA

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

Planning scenario	Drought	Dry	Average	Wet
Expected availability of Water Holdings[1]	▸ 8,000 ML carryover ▸ 5,273 ML VEWH allocation ▸ 0 ML CEWH allocation[2] ▸ 13,273 ML total[3]	▸ 8,000 ML carryover ▸ 12,878 ML VEWH allocation ▸ 0 ML CEWH allocation[2] ▸ 20,878 ML total[3]	▸ 8,000 ML carryover ▸ 25,553 ML VEWH allocation ▸ 0 ML CEWH allocation[2] ▸ 33,553 ML total[3]	▸ 8,000 ML carryover ▸ 40,560 ML VEWH allocation ▸ 560 ML CEWH allocation[2] ▸ 49,120 ML total[3]
Expected river conditions	▸ No passing or unregulated flows	▸ Restricted passing and limited unregulated flows	▸ Some passing and unregulated flows particularly during winter/spring	▸ Some passing flows and significant unregulated flows during winter/spring resulting in sustained baseflows
Wimmera River (reach 4)				
Potential environmental watering	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Moderate winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Moderate winter/spring freshes ▸ Higher winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Moderate winter/spring freshes ▸ Higher winter/spring freshes
Possible volume of environmental water required to achieve objectives	▸ 24,150 ML	▸ 25,940 ML	▸ 28,310 ML	▸ 33,220 ML
MacKenzie River (reaches 2 and 3)				
Potential environmental watering	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes
Possible volume of environmental water required to achieve objectives	▸ 9,010 ML	▸ 10,415 ML	▸ 12,550 ML	▸ 14,050 ML
Burnt Creek (upper and lower)				
Potential environmental watering	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes ▸ Lower Burnt Creek all year freshes	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes ▸ Lower Burnt Creek all year and high-flow freshes
Possible volume of environmental water required to achieve objectives	▸ 3,767 ML	▸ 4,375 ML	▸ 6,363 ML	▸ 8,543 ML

Planning scenario	Drought	Dry	Average	Wet
Mount William Creek (upper and lower)				
Potential environmental watering	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Upper Mount William Creek top-ups	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes ▸ Upper Mount William Creek top-ups	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes ▸ Upper Mount William Creek top-ups	▸ Year-round baseflows ▸ Summer/autumn freshes ▸ Winter/spring freshes ▸ Higher winter/spring freshes ▸ Upper Mount William Creek top-ups
Possible volume of environmental water required to achieve objectives	▸ 5,650 ML	▸ 6,900 ML	▸ 8,160 ML	▸ 9,760 ML
Bungalally Creek				
Potential environmental watering	▸ None	▸ None	▸ Year-round freshes	▸ Year-round freshes
Possible volume of environmental water required to achieve objectives	▸ 0 ML	▸ 0 ML	▸ 500 ML	▸ 500 ML
Wimmera system				
Possible volume of environmental water required to achieve objectives	▸ 42,337 ML	▸ 47,330 ML	▸ 55,423 ML[4]	▸ 58,713 ML[4]
Glenelg System				
Possible volume of environmental water required to achieve objectives	▸ 25,500 ML	▸ 27,350 ML	▸ 40,980 ML[4]	▸ 39,540 ML[4]
Total possible environmental water requirements				
Possible volume of environmental water required to achieve objectives[5]	▸ 67,837 ML	▸ 74,680 ML	▸ 96,403 ML	▸ 98,253 ML

1 Environmental water in the Wimmera–Glenelg system is shared between the Glenelg and Wimmera systems. The volumes specified indicate 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 2015–16, including carryover and the forecast allocation for the complete water year. The forecast opening allocation for each climate scenario is 0 ML under all scenarios, meaning the only water available is likely to be carryover of about 8,000 ML at the start of the water year.

4 This volume assumes that passing flows make some contribution to achieving the potential watering actions. The volume of passing flows is highly variable from year to year and depends on allocations and inflows received.

5 Figures take into account the possible volume required in both the Glenelg and Wimmera 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 2015–16 year.

Risk management

In preparing its seasonal watering proposal, Wimmera CMA considered and assessed risks and identified mitigating strategies relating to implementing environmental watering. Risks and mitigating actions are continually reassessed by program partners throughout the water year (see section 1.4.4).

Engagement

Wimmera CMA engaged key stakeholders when preparing the seasonal watering proposal for the Wimmera system. Table 4.3.3 shows these stakeholders.

Seasonal watering proposals are informed by longer-term regional waterway strategies, environmental water management plans and environmental flow studies, which incorporate environmental, cultural, social and economic considerations.

Table 4.3.3 Key stakeholders engaged in the development of the Wimmera system seasonal watering proposal

Stakeholder engagement
▸ Glenelg Hopkins CMA ▸ Local governments (including Horsham Rural City Council and Hindmarsh Shire Council) ▸ GWMWater ▸ Victorian Environmental Water Holder

Wimmera River at Jeparit, by Chloe Wiesenfeld

Wimmera River at Dimboola Weir, by Wimmera CMA

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

Environmental values

There is great variation in the character of wetlands in the Wimmera–Mallee system, which provide habitat, feeding and breeding opportunities for a range of waterbirds and animals. Important vegetation species (such as spiny lignum, ridged water milfoil and cane grass) are also present in some wetlands.

The Wimmera–Mallee wetlands include a wide range of wetland types (such as freshwater meadows, open freshwater lakes and freshwater marshes). They also vary in size and consist of many different vegetation communities which are home to native waterbird populations including of brolga, egret, blue-billed duck, freckled duck, Australian painted snipe 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.

Social and economic values

These wetlands are highly valued by the community and provide places for recreational activities including canoeing, yabbying, duck and quail hunting and bird watching.

Environmental watering objectives in the Wimmera–Mallee wetlands
Provide watering holes for native land animals
Strengthen and maintain plant life in and around the wetlands, including to provide shade, shelter and food for native animals
Provide habitat and food for frogs and turtles
Create shallow and deep wetlands to provide habitat for a wide range of waterbirds

System overview

The Wimmera–Mallee wetlands include 51 dams and wetlands spread across the dry north-western area of Victoria on public and private land. 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 pipeline. The project achieved significant water savings for environmental watering of the area's flow-stressed rivers and creeks, and created development opportunities; but it also substantially reduced the open water in the formerly channel-supplied areas. To counteract the loss of open water in the landscape, a 1,000 ML environmental entitlement was created to supply dams associated with wetlands; the entitlement is supplied via the Wimmera–Mallee pipeline system. A project was completed to identify priority wetlands to be connected to the pipeline system, and all 51 dams and wetlands are now connected to the pipeline.

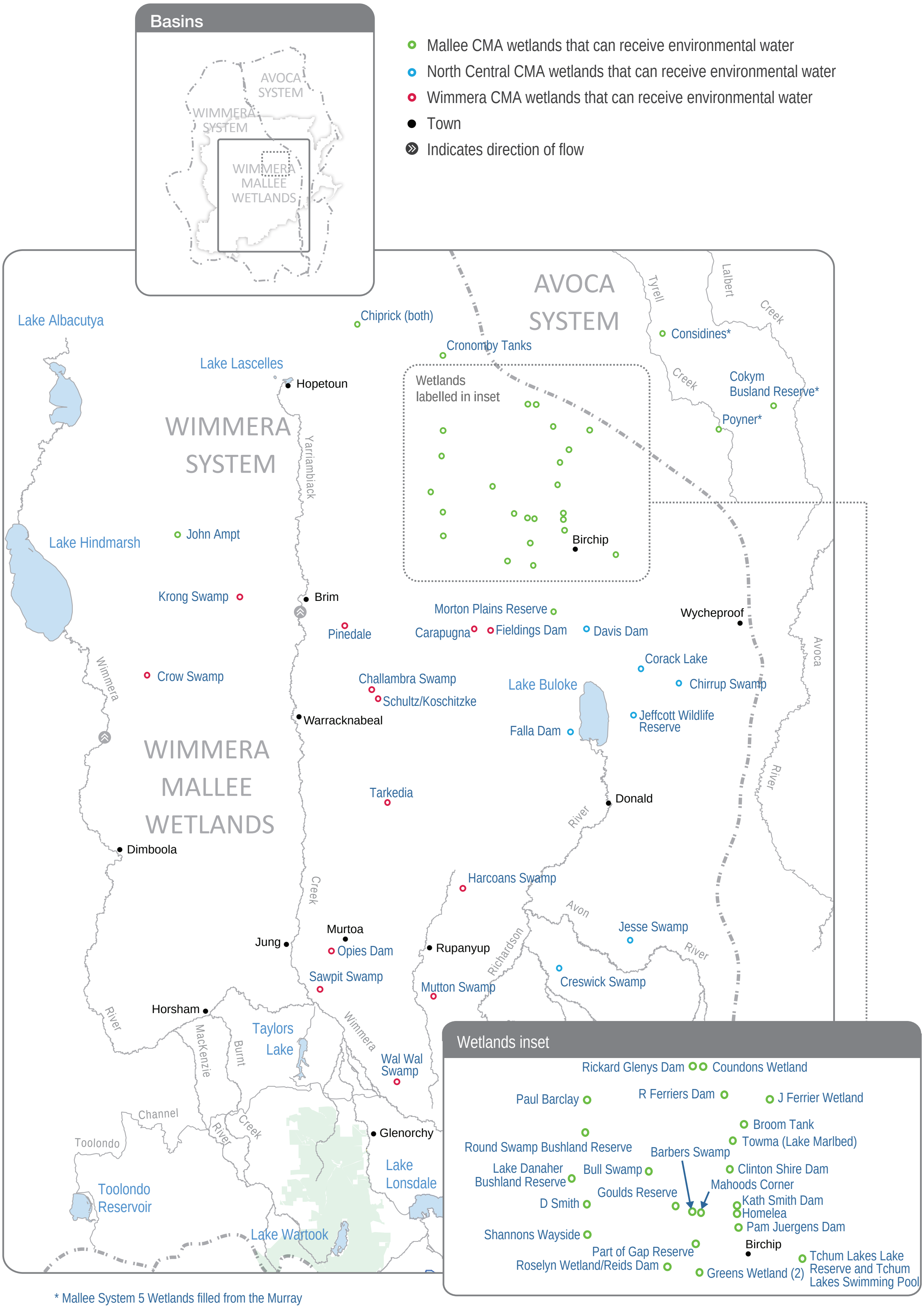
Recent conditions

The Wimmera–Mallee area was very dry in 2014–15 with no allocation made to the wetland environmental entitlement. Despite this, due to carryover from allocations in previous years and the time required to connect all the wetlands to the pipeline—all wetlands were connected by the end of 2013–14—there was still a significant volume of environmental water available for use in 2014–15.

To the end of autumn 2015, environmental deliveries were made to a total of 17 wetlands in 2014–15 including seven wetlands in the North Central area and ten wetlands in the Wimmera system. Deliveries were planned for an additional wetland in the Wimmera system and six wetlands in the Mallee system during winter. Fewer wetlands received environmental water in 2014–15 than in 2013–14, for a variety of reasons, largely based on previous watering history and environmental need. Across the system, many of the dams received water in autumn 2014 which meant that water requirements in early 2014–15 were reduced.

For the Mallee CMA area, there was a rain event in January 2015 that at least partially filled many of the dams, extending the period of inundation from the previous watering and reducing the requirement for environmental deliveries. The water planned to be delivered to the six wetlands (Barbers Swamp, John Ampt, Morton Plains Reserve, R Ferriers Dam, Poyner and Considines) in the Mallee was intended to increase the inundation period of wetlands that still contained water in autumn 2015.

Figure 4.4.1 The Wimmera–Mallee wetlands



* Mallee System 5 Wetlands filled from the Murray

Jeffcott Wildlife Reserve, by Chloe Wiesenfeld

The Wimmera–Mallee wetlands in the North Central and Wimmera areas received negligible natural inflow in 2014–15. In the Wimmera area, many of the wetlands have dried out since the floods in September 2010 and January 2011. Water was delivered to the ten wetlands (Carapugna, Crow Swamp, Fieldings Dam, Harcoans, Krong Swamp, Mutton, Pinedale, Sawpit Swamp, Tarkedia and Wal Wal Swamp) to autumn 2014–15 to provide drought refuges across the landscape. Infrastructure was installed and used at several wetlands this year to maximise delivery efficiency and environmental outcomes.

In the North Central area, all seven dams—Chirrup Swamp, Corack Lake, Creswick Swamp, Davis Dam, Falla Dam, Jeffcott Wildlife Reserve and Jesse Swamp—were watered, providing a spread of water in the landscape. Parts of the wetlands at Jesse Swamp and Corack Lake were also inundated.

Many different animals (such as brolgas, wedge tailed eagles, herons, yabbies, parrots, ducks, turtles, kangaroos and wallabies) used the Wimmera–Mallee wetlands in 2014–15. Vegetation (both submerged in the wetlands and on the banks) responded well at the wetlands that were watered. In the Mallee, photographic and anecdotal evidence indicated an improvement in vegetation condition with increased foliage vigour, emergence of native vegetation and a reduction in exotic flora. Waterbird activity and breeding has been pronounced with shorebirds and wading birds using the wetlands.

Scope of environmental watering

Potential environmental watering actions and their environmental objectives are explained in Table 4.4.1.

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	▸ Support black box and cane grass vegetation ▸ Maintain as drought refuge and a watering point for fauna
Creswick Swamp	▸ Support a diversity of aquatic plants including re-establishment of marbled marshwort ▸ Provide refuge, feeding and breeding opportunities for frog and turtles
Chirrup Dam	▸ Provide drought refuge and a watering point for fauna (particularly frogs and turtles) to facilitate recolonisation of Chirrup Swamp when it is naturally inundated
Corack Lake	▸ Provide conditions that support an abundance of 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
Jeffcott Wildlife Reserve	▸ Maintain the diversity of aquatic plants ▸ Provide refuge and breeding conditions for water-dependent species (such as frogs, macroinvertebrates, turtles and waterbirds)
Jesse Swamp	▸ Promote native aquatic plant growth including re-establishment of marbled marshwort ▸ Provide shallow foraging habitat for waterbirds (including brolgas) and feeding opportunities for frogs

Potential environmental watering	Environmental objectives
Wimmera wetlands	
Carapugna Challambra Swamp Crow Swamp Fieldings Dam Krong Swamp Mutton Swamp Pinedale Sawpit Swamp Schultz/Koschitzke Tarkedia Wal Wal Swamp	▸ Retain water in the dam to sustain fauna (especially frogs and wetland and woodland birds) ▸ Sustain and where possible increase the abundance of wetland flora, especially threatened species
Harcoans Swamp	▸ Retain water in the dam to sustain fauna (especially frogs and wetland and woodland birds) ▸ Sustain and where possible increase the abundance of wetland flora
Opies Dam	▸ Retain water in the dam to sustain fauna, especially growling grass and other frogs
Mallee wetlands	
Barbers Swamp Bull Swamp Cokym Bushland Reserve Tchum Lakes Lake Reserve (North Lake - Wetland) Tchum Lakes Swimming Pool (North Lake – Dam)	▸ Maintain the health of fringing lignum and black box communities ▸ Provide suitable feeding and breeding habitat for various waterbird guilds
Broom Tank Poyner Towma (Lake Marlbed)	▸ Maintain the health of fringing lignum and black box communities ▸ Improve the diversity and quality of wetland vegetation communities
Clinton Shire Dam Pam Juergens Dam	▸ Maintain the health of fringing lignum and black box communities ▸ Provide watering points for terrestrial and aerial fauna
Goulds Reserve Greens Wetland (2) J Ferrier Wetland Part of Gap Reserve Roselyn Wetland Round Swamp Bushland Reserve	▸ Maintain the health of fringing lignum and black box communities
Mahoods Corner Shannons Wayside	▸ Provide suitable feeding and breeding habitat for various waterbird guilds ▸ Improve the diversity and quality of wetland vegetation communities

Potential environmental watering	Environmental objectives
Chiprick (both) D Smith Wetland Homelea Wetland John Ampt Kath Smith Dam Paul Barclay R Ferriers Dam Rickard Glenys Dam	▸ Provide watering points for terrestrial and aerial fauna
Considines	▸ Maintain the health of fringing lignum and black box communities ▸ Provide watering points for terrestrial and aerial fauna ▸ Improve the diversity and quality of wetland vegetation communities
Coundons Wetland	▸ Maintain the health of fringing lignum and black box communities ▸ Maintain habitat opportunities for turtles and frogs ▸ Provide watering points for terrestrial and aerial fauna
Cronomby Tanks	▸ Maintain the health of fringing lignum and black box communities ▸ Maintain habitat opportunities for turtles and frogs
Lake Danaher Bushland Reserve	▸ Maintain the health of fringing lignum and black box communities ▸ Maintain habitat opportunities for turtles and frogs ▸ Improve the diversity and quality of wetland vegetation communities
Morton Plains Reserve	▸ Maintain the health of fringing lignum and black box communities ▸ Improve the diversity and quality of wetland vegetation communities ▸ Provide suitable feeding and breeding habitat for various waterbird guilds

Scenario planning

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

Most Wimmera–Mallee wetlands are considered off-stream wetlands, meaning they do not receive water from a recognised watercourse. Unlike connected floodplain wetlands, catchment conditions may not strongly influence environmental water requirements unless there is a flooding event that reduces the need for water in the wetlands.

Environmental water delivery to the wetlands relies on capacity in the Wimmera–Mallee pipeline system. CMAs continue to work closely with GWMWater and land managers (including Parks Victoria and landowners) to deliver environmental water to these wetlands.

The wetlands considered for potential environmental watering in 2015–16 have been determined after assessing their scientific watering requirements and watering history, and considering climatic conditions, water availability and the likely capacity in the Wimmera–Mallee pipeline system.

Under a drought scenario, the wetlands in Table 4.4.2 would receive a small volume, in many cases topping up water levels from previous environmental watering. As conditions become wetter, the number of sites and extent of watering increases, with some wetland watering also aiming to inundate some of the surrounding vegetation. As a result, the expected water use increases as resources and conditions improve.

Due to the lower reliability of environmental water in the Wimmera–Mallee wetland system, carrying over water following wetter periods is considered important to assist in managing supply during dry times. A critical carryover volume of 223 ML has been identified which is the equivalent of the expected drought level demand in 2015–16. This has been identified to ensure there is sufficient water to provide at least the drought level objectives in 2016–17.

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 the wetlands
Expected availability of environmental water	‣ 900 ML carryover ‣ 0 ML allocation ‣ 900 ML available	‣ 900 ML carryover ‣ 0 ML allocation ‣ 900 ML available	‣ 900 ML carryover ‣ 40 ML allocation ‣ 940 ML available	‣ 900 ML carryover ‣ 900 ML allocation ‣ 1,900 ML available
Potential environmental watering	‣ Barbers Swamp ‣ Broom Tank ‣ Bull Swamp ‣ Carapugna ‣ Challambra Swamp ‣ Chirrup Swamp ‣ Chiprick (both) ‣ Clinton Shire Dam ‣ Cokym Bushland Reserve ‣ Considines ‣ Corack Lake ‣ Creswick Swamp ‣ Cronomby Tanks ‣ Crow Swamp ‣ D Smith Wetland ‣ Davis Dam ‣ Fieldings Dam ‣ Greens Wetland (2) ‣ Harcoans Swamp ‣ Homelea ‣ J Ferrier Wetland ‣ Jeffcott Wildlife Reserve ‣ Jesse Swamp ‣ John Ampt ‣ Krong Swamp ‣ Lake Danaher Bushland Reserve ‣ Mahoods Corner ‣ Morton Plains Reserve ‣ Mutton Swamp ‣ Opies Dam ‣ Part of Gap Reserve ‣ Paul Barclay ‣ Pinedale ‣ Poyner ‣ R Ferriers Dam ‣ Rickard Glenys Dam ‣ Roselyn Wetland/Reids Dam ‣ Round Swamp Bushland Reserve ‣ Sawpit Swamp ‣ Schultz/Koschitzke ‣ Shannons Wayside ‣ Tarkedia Dam ‣ Towma (Lake Marlbed) ‣ Wal Wal Swamp	‣ Barbers Swamp ‣ Broom Tank ‣ Bull Swamp ‣ Carapugna ‣ Challambra Swamp ‣ Chirrup Swamp ‣ Chiprick (both) ‣ Clinton Shire Dam ‣ Cokym Bushland Reserve ‣ Considines ‣ Corack Lake ‣ Creswick Swamp ‣ Cronomby Tanks ‣ Crow Swamp ‣ D Smith Wetland ‣ Davis Dam ‣ Fieldings Dam ‣ Greens Wetland (2) ‣ Harcoans Swamp ‣ 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 ‣ Mutton Swamp ‣ Opies Dam ‣ Pam Juergens Dam ‣ Part of Gap Reserve ‣ Paul Barclay ‣ Pinedale ‣ Poyner ‣ R Ferriers Dam ‣ Rickard Glenys Dam ‣ Roselyn Wetland/Reids Dam ‣ Round Swamp Bushland Reserve ‣ 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	‣ Barbers Swamp ‣ Broom Tank ‣ Bull Swamp ‣ Carapugna ‣ Challambra Swamp ‣ Chiprick (both) ‣ Clinton Shire Dam ‣ Cokym Bushland Reserve ‣ Considines ‣ Coundons Wetland ‣ Creswick Swamp ‣ Cronomby Tanks ‣ Crow Swamp ‣ D Smith Wetland ‣ Falla Dam ‣ Fieldings Dam ‣ Goulds Reserve ‣ Greens Wetland (2) ‣ Harcoans Swamp ‣ 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 ‣ Mutton Swamp ‣ Opies Dam ‣ Pam Juergens Dam ‣ Part of Gap Reserve ‣ Paul Barclay ‣ Pinedale ‣ Poyner ‣ R Ferriers Dam ‣ Rickard Glenys Dam ‣ Roselyn Wetland/Reids Dam ‣ Round Swamp Bushland Reserve ‣ 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	‣ Barbers Swamp ‣ Broom Tank ‣ Bull Swamp ‣ Carapugna ‣ Challambra Swamp ‣ Chiprick (both) ‣ Clinton Shire Dam ‣ Cokym Bushland Reserve ‣ Considines ‣ Coundons Wetland ‣ Creswick Swamp ‣ Cronomby Tanks ‣ Crow Swamp ‣ D Smith Wetland ‣ Falla Dam ‣ Fieldings Dam ‣ Goulds Reserve ‣ Greens Wetland (2) ‣ Harcoans Swamp ‣ 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 ‣ Mutton Swamp ‣ Opies Dam ‣ Pam Juergens Dam ‣ Part of Gap Reserve ‣ Paul Barclay ‣ Pinedale ‣ Poyner ‣ R Ferriers Dam ‣ Rickard Glenys Dam ‣ Roselyn Wetland/Reids Dam ‣ Round Swamp Bushland Reserve ‣ 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	‣ 223 ML	‣ 368 ML	‣ 597.5 ML	‣ 846.5 ML
Critical carryover into 2016–17	‣ 223 ML			

Risk management

In preparing its seasonal watering proposal, the Wimmera, Mallee and North Central CMAs considered and assessed risks and identified mitigating strategies relating to implementing environmental watering. Risks and mitigating actions are continually reassessed by program partners throughout the water year (see section 1.4.4).

Engagement

The Wimmera, Mallee and North Central CMAs engaged key stakeholders when preparing the seasonal watering proposal for the Thomson system. Table 4.4.3 shows these stakeholders.

Seasonal watering proposals are informed by longer-term regional waterway strategies, environmental water management plans and environmental flow studies, which incorporate environmental, cultural, social and economic considerations.

Table 4.4.3 Key stakeholders engaged in the development of the Wimmera–Mallee wetlands seasonal watering proposals

Stakeholder engagement

- GWMWater
- Parks Victoria
- Victorian Environmental Water Holder

Mallee CMA

- Mallee CMA Aboriginal Reference Group, an advisory committee to Mallee CMA comprising Indigenous representatives from across the region
- Mallee CMA Land and Water Advisory Committee, an advisory group to Mallee CMA comprising community members from across the region
- Department of Environment, Land, Water and Planning
- Landholders with wetlands on their properties in the Mallee
- Local community at a public information session in Birchip

North Central CMA

- Wimmera–Mallee Wetlands Environmental Water Advisory Group comprising community members; interest groups; North Central CMA Natural Resource Management Committee representatives; Department of Environment, Land, Water and Planning and VEWH
- North Central CMA Natural Resource Management Committee, a community advisory group to the North Central CMA Board
- Landholders with wetlands on their properties in the North Central area

Wimmera CMA

- Landholders with wetlands on their properties in the Wimmera area

Bull Swamp, by Mallee CMA

Jesse Swamp and surrounding wetland, by Chloe Wiesenfeld