Seasonal Watering Plan 2023-24

Section 2

VICTORIAN ENVIRONMENTAL WATER HOLDER

VICTORIA State Government

Section 2
Gippsland region

2.1 Gippsland region overview

The systems in the Gippsland region that can receive water from the VEWH's environmental entitlements are *Durt-Yowan* (Latrobe River), lower Latrobe wetlands, *Carran Carran* (Thomson River), Heyfield wetlands and *Wirn wirndook Yeerung* (Macalister River). The Snowy River also receives environmental flows, which the New South Wales Department of Planning, Industry and Environment manages.

Environmental values, objectives, and planned actions for delivering water for the environment for each system in the Gippsland region are presented in the system sections that follow.

Traditional Owners in the Gippsland region

Traditional Owners in the Gippsland region have a deep connection to Country that has endured for tens of thousands of years. This includes inherent rights and cultural obligations to Country and community.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC), on behalf of the Gunaikurnai, holds Native Title, has a recognition and settlement agreement with the Victorian Government and is a Registered Aboriginal Party (through the *Commonwealth Native Title Act 1993*, the *Victorian Traditional Owner Settlement Act 2010* and the *Victorian Aboriginal Heritage Act 2006*). Gunaikurnai Country extends over an area from Warragul in the west to the Snowy River in the east and from the Great Dividing Range in the north to the coast in the south. This area includes *Durt-Yowan* (Latrobe River), *Carran Carran* (Thomson River), *Wirn wirndook Yeerung* (Macalister River), the Snowy River and the lower Latrobe wetlands covered by this section of the seasonal watering plan.

Other Registered Aboriginal Parties in the Gippsland region are the Bunurong Land Council Aboriginal Corporation and Wurundjeri Woi Wurrung Cultural Heritage Aboriginal Corporation. Their boundaries do not extend to the waterways managed with water for the environment in the Gippsland region.

Traditional Owners with links to the Snowy River system include the Monero Ngarigo, Bidhawal and Gunaikurnai peoples.

The Victorian Government is committed to self-determination for Traditional Owners through Treaty negotiations, policies such as *Water is Life: Traditional Owner Access to Water Roadmap 2022* and actions in the 2022 *Central and Gippsland Region Sustainable Water Strategy*. The VEWH and its partners are working with Traditional Owners to embed the outcomes of government policy into the Victorian environmental watering program. Program partners in the environmental watering program are aware that structural changes (such as legislative, policy and governance changes) to how water is managed may be made in the future in recognition of Aboriginal water rights. Program partners have heard that Traditional Owners want empowerment and agency in water management, and in many cases, they want to manage water on Country on their terms.

Engagement

The environmental watering program is informed by engagement with Traditional Owners, stakeholders and local communities. Program partners undertake extensive engagement at the local level to understand community priorities for the delivery of water for the environment in the coming year.

Program partners also seek to understand how cultural, social, economic and recreational values, uses and objectives may be supported by delivering environmental flows. Opportunities to support these values, uses and objectives are incorporated into watering decisions where possible, provided they do not compromise environmental outcomes. Cultural, social, economic and recreational values considered for each system in the Gippsland region are presented in the following system sections.

Engagement through other strategies, plans and processes also informs environmental flows objectives. These include regional catchment strategies, regional waterway strategies and technical studies (such as environmental flows studies and environmental water management plans). Traditional Owner cultural objectives for environmental flows may refer to cultural flows studies, Aboriginal Waterway Assessments, Traditional Owner Country Plans and other tools. These strategies, plans and technical reports collectively describe a range of environmental, economic, social and Traditional Owner perspectives and longer-term integrated catchment and waterway management objectives that influence actions and priorities for water for the environment.

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Table 2.1.1 Partners and stakeholders engaged by West Gippsland Catchment Management Authority in developing seasonal watering proposals for the Latrobe, lower Latrobe wetlands, Thomson and Macalister systems and other key foundation documents that have directly informed the proposals (grouped in alphabetical order)

	Latrobe system	Lower Latrobe wetlands	Thomson system	Macalister system
Community groups and environment groups	• Birdlife Australia • Friends of Latrobe River • Friends of Tyers Park • Greening Australia • Latrobe Landcare Network • Latrobe Valley Field Naturalist Club Inc. • Native Fish Australia • Trust for Nature	• Birdlife Australia • Greening Australia • Latrobe Valley Field Naturalist Club Inc. • Native Fish Australia • VR Fish • WaterWatch Volunteers	• Birdlife Australia • Greening Australia • Heyfield Wetlands Committee of Management • Maffra and District Landcare Network • Native Fish Australia	• Birdlife Australia • Field Naturalists • Friends of Bellbird Corner • Greening Australia • Maffra and District Landcare Network • Native Fish Australia
Government agencies	• Department of Energy, Environment and Climate Action • East Gippsland CMA • Gippsland Water • Parks Victoria • Southern Rural Water • Victorian Environmental Water Holder • Victorian Fisheries Authority	• Department of Energy, Environment and Climate Action • East Gippsland CMA • Gippsland Water • Parks Victoria • Victorian Environmental Water Holder	• Department of Energy, Environment and Climate Action • Gippsland Water • Melbourne Water • Southern Rural Water • Victorian Environmental Water Holder • Victorian Fisheries Authority	• Department of Energy, Environment and Climate Action • Gippsland Water • Southern Rural Water • Victorian Environmental Water Holder • Victorian Fisheries Authority
Landholders/farmers	• Individual landholders and irrigators	• Field & Game Australia (Heart Morass) • Individual landholders	• Individual irrigators • Individual landholders	• Individual landholders • Macalister Irrigation District irrigators/ diverters
Recreational users	• Field & Game Australia • Recreational users • VR Fish	• Field & Game Australia (Dowd Morass and Sale Common) • Recreational users • VR Fish	• Recreational users • Whitehorse Canoe Club • VR Fish	• Recreational users VR Fish
Local businesses		• Frog Gully Cottages • Port of Sale Heritage River Cruises		
Technical experts	• Arthur Rylah Institute		• Arthur Rylah Institute	• Arthur Rylah Institute
Traditional Owners	• Gunaikurnai Land and Waters Aboriginal Corporation	• Gunaikurnai Land and Waters Aboriginal Corporation	• Gunaikurnai Land and Waters Aboriginal Corporation	• Gunaikurnai Land and Waters Aboriginal Corporation

Integrated catchment management

Altered water regimes are one of many threats to the health of Victoria's waterways. To be effective, environmental flows need to be part of an integrated approach to catchment management. Many of the environmental objectives of water for the environment in the Gippsland region will not be fully met without simultaneously addressing issues such as barriers to fish movement, high nutrient loads, loss of streambank vegetation and invasive species.

Victorian and Australian government agencies, Traditional Owner groups, community groups and private landholders collectively implement a wide range of programs that aim to protect and improve the environmental condition and function of land, soils and waterways throughout Victoria's catchments.

Examples of complementary programs that support the outcomes of environmental flows in the Gippsland region include:

- works to protect and enhance stream banks along priority reaches of rivers and their tributaries, including fencing to exclude stock, revegetation of riverbanks, willow removal and erosion control
- work with farmers along the Thomson and Macalister rivers on grazing and soil management and on nutrient and water-use-efficiency projects that help to improve water quality and river health
- construction of a fishway on the Thomson River to improve fish passage near the heritage-listed Horseshoe Bend Tunnel, completed in August 2019. The fishway now allows Australian grayling (specifically targeted with releases of water for the environment) and other migratory fish to access over 200 km of river habitat from the upper reaches of the Aberfeldy River down to the Latrobe River. Tupong are now regularly found above the Horseshoe Bend Tunnel in surveys conducted by the Arthur Rylah Institute
- construction of a fishway on the Macalister River to allow fish passage through the Maffra Weir, which is due to commence in 2024
- a weed and willow control program in remote parts of the Snowy River catchment, which led to 200 km of the river now being willow-free. Surveys and ongoing control of willows in areas burned by the 2019-20 bushfires will be a particular focus over the next few years.

For more information about integrated catchment management programs in the Gippsland region, refer to the West Gippsland and East Gippsland regional catchment strategies and regional waterway strategies.

Risk management

During the development of the seasonal watering proposals for the Latrobe, Thomson and Macalister systems, environmental watering program partners assessed risks associated with the potential delivery of water for the environment in 2023-24 and identified appropriate mitigating strategies. Risks and mitigating actions are continually assessed by program partners throughout the year (see subsection 1.2.7).

In the Snowy system, when weather conditions increase the risk of flooding, the New South Wales Department of Planning, Industry and Environment works with the Bureau of Meteorology, the East Gippsland CMA, New South Wales State Emergency Service and the VEWH to inform the community about the management of planned releases. Releases may be cancelled or rescheduled to limit flood impacts on private land.

Seasonal outlook 2023-24

La Nina conditions in 2022-23 delivered above-average winter and spring rainfall in the northern and western parts of the Gippsland region for the third consecutive year, while rainfall in the eastern part of the catchment was close to the long-term average. Upper sections of the Latrobe River catchment received their highest total June rainfall in 24 years, and heavy rainfall in August caused minor flooding in Traralgon Creek. Thomson Dam spilled in October for the first time since 1996. Temperatures throughout the region were close to the long-term average during 2022-23.

Delivery of water for the environment in rivers and wetlands within the West Gippsland CMA region was managed in line with the wet scenario during 2022-23, and all planned watering actions were achieved. Natural flows from spilling reservoirs and local catchment run-off met most planned watering actions during the year. Water for the environment was used to supplement the winter-spring low flow in the Thomson River during July to help fish and other animals move freely between different habitats. Water for the environment was not needed in the Macalister River or the Latrobe River at all during 2022-23 because the natural flow met or exceeded flow recommendations. The three lower Latrobe wetlands (Sale Common, Dowd Morass and Heart Morass) were flushed by natural flows for the second consecutive year, and salinity levels in Lake Wellington continued to remain low.

The Snowy River received high allocations of water for the environment for the second consecutive year, and the water was used to mimic seasonal snow melt patterns to enhance the river's ecological and physical conditions.

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The Bureau of Meteorology forecasts below-average rainfall and above-average temperatures for the Gippsland region during autumn and winter 2023. However, relatively high storage levels mean the risk of flooding remains for the Gippsland region in the first half of 2023-24.

High storage levels going into 2023-24 will likely result in high allocations to environmental entitlements in the Gippsland systems. Despite the loss of 23,039 ML of carryover when Thomson Dam spilled, the forecast allocations and remaining carryover volumes should be sufficient to deliver planned watering actions in all climate scenarios during 2023-24.

The approach to delivering water for the environment in the Gippsland region aims to maintain enough flow in dry times to minimise stress on existing plant and animal populations and deliver larger flows in wetter conditions to enhance the condition of and increase recruitment in those populations. Over the last three years, wet conditions have resulted in strong native fish recruitment in all the Gippsland systems that receive water for the environment. While certain flows will be delivered at a lower magnitude in the drier climate scenarios, the forecast high water availability means that delivery of water for the environment to consolidate the environmental gains of the last three years and to support additional recruitment should still be possible in all scenarios in 2023-24. Efforts to boost migratory fish populations in the Latrobe, Thomson and Macalister rivers are particularly important because the larvae and juveniles of these species spend time in the ocean and can then colonise other coastal rivers. Increasing the total number of larvae and juveniles in waters along the Gippsland coast may help recover native fish populations in river systems that were affected by the 2019-20 bushfires.

Delivery of water for the environment in the lower Latrobe wetlands in 2023-24 will aim to consolidate and, where possible, improve the environmental gains of the last three years. This will involve keeping Sale Common, Dowd Morass and Heart Morass at least partially full during winter and spring and allowing a natural partial drawdown during the warmer months in all climate scenarios.

The water year for the Snowy system starts in May and ends in April the following year, which differs from how water is managed in the other Gippsland systems. The total volume for release and daily release targets for the Snowy River from May 2023 to April 2024 were endorsed by the Snowy Advisory Committee in March 2023. The agreed daily releases will not vary unless flows increase the risk of flooding downstream or operational constraints prevent delivery.

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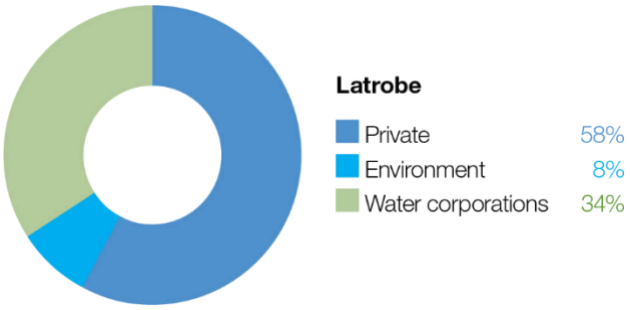
2.2 Latrobe system

Waterway manager – West Gippsland Catchment Management Authority

Storage manager – Southern Rural Water

Environmental water holder – Victorian Environmental Water Holder

Proportions of water entitlements in the Latrobe basin held by private users, water corporations and environmental water holders on 30 June 2020



The Latrobe system includes *Durt-Yowan* (Latrobe River) and the lower Latrobe wetlands: Sale Common, Heart Morass and Dowd Morass.

2.2.1 Latrobe River

System overview

Durt-Yowan **(Latrobe River) originates near the Baw Baw Plateau and passes through relatively flat to undulating plains, which have been largely cleared for agriculture, before flowing into Lake Wellington (the westernmost point of the Gippsland Lakes) (Figure 2.2.1). Notable tributaries include the Tanjil River, Narracan Creek, Morwell River, Tyers River, Traralgon Creek and** ***Carran Carran*** **(Thomson River).**

Water for the environment is supplied to the Latrobe River from Blue Rock Reservoir on the Tanjil River. Blue Rock Reservoir also supplies water for irrigation, urban supply and electricity generation, and water for a paper mill in the Latrobe Valley.

The Latrobe River from Kilmany to the Thomson River confluence (reach 5) is a high-priority reach for delivering water for the environment because it contains endangered plant communities with good potential for rehabilitation. However, capacity constraints within reach 5 mean that some of the larger freshes required to meet environmental objectives in reaches 4, 5 and 6 cannot be delivered without flooding private land. Until this can be resolved, environmental flows will be managed to within- channel levels. Where possible, the flow in the Latrobe River is coordinated with freshes in the Thomson River to meet targets for the Latrobe River estuary.

Options to deliver water for the environment to the Latrobe River via the Tyers River may be investigated in 2023-24. These options include a physical transfer of water from Blue Rock Reservoir to Moondarra Reservoir via existing infrastructure operated by Gippsland Water or a temporary administrative transfer arrangement. Delivering water via the Tyers River would increase the proportion of the Latrobe catchment that could receive water for the environment without compromising outcomes in the main target reaches of the Latrobe River. If adopted, these options are expected to benefit native in-stream and streamside vegetation and non-migratory fish within the Tyers River.

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Figure 2.2.1 The Latrobe system

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Environmental values

The upper reaches of the Latrobe River flow through state forest and are relatively intact and ecologically healthy. They have continuous stands of river red gums and intact streamside vegetation, and they support native animals, including barred galaxias, river blackfish, Gippsland spiny crayfish and nankeen night herons.

Below Lake Narracan, the Latrobe River is regulated and highly degraded due to historic river management practices. Most large woody habitat has been removed from the river, and many sections have been artificially straightened. These practices have caused significant erosion and widened the channel, reducing the quality and quantity of habitat for aquatic plants and animals.

Endangered and vulnerable vegetation is found in all but the most modified sections of the Latrobe River. The banks along the lower reaches support stands of swamp scrub, characterised by swamp paperbark and tea tree. Mature river red gums grow adjacent to the lower Latrobe wetlands and provide nesting habitat for sea eagles and other birds of prey that hunt in the wetlands. The Latrobe River supports native estuarine and freshwater fish, including black bream, Australian bass, Australian grayling and short- and long-finned eel. The river also provides habitat and supports feeding and breeding conditions for platypus, rakali (water rats) and freshwater turtles.

The Latrobe River and its tributaries provide an essential source of freshwater to the Gippsland Lakes system, of which the lower Latrobe wetlands are an important component.

Environmental objectives in the Latrobe River
Increase native fish (migratory, resident and estuary) populations
Increase in-stream geomorphic diversity
Increase the extent of platypus and rakali (water rats) populations
Maintain the abundance of freshwater turtle populations
Improve the condition and increase the extent and diversity of submerged, emergent and streamside native vegetation Reduce the extent and density of invasive plants
Increase the abundance of all macro- and micro-invertebrates
Avoid adverse water-quality conditions (such as high salinity) in the lower reaches of the Latrobe River and its estuary

Traditional Owner cultural values and uses

The Gunaikurnai have had a continued connection to Country for tens of thousands of years, including with the waterways in the Latrobe system.

For the Gunaikurnai as Traditional Owners, there are immense challenges to heal, protect and manage Country, which has been drastically altered since colonisation. *“As Gunaikurnai, we see our land (Wurruk), waters (Yarnda), air (Watpootjan) and every living thing as one. All things come from Wurruk, Yarnda and Watpootjan and they are the spiritual life-giving resources, providing us with resources and forming the basis of our cultural practices. We have a cultural responsibility to ensure that all of it is looked after” (Water is Life: Traditional Owner Access to Water Roadmap 2022 - Gunaikurnai Nation Statement)*. This cultural landscape is dependent on culture and Aboriginal management.

Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is working with the West Gippsland CMA to determine how to express Gunaikurnai objectives for water in a way that contributes to seasonal watering proposals from the perspective of Traditional Owners with traditional knowledge. GLaWAC has membership of the Latrobe Environmental Water Advisory Group (EWAG).

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GLaWAC is working in partnership with the West Gippsland CMA to determine how cultural values and uses can be considered in planning for water for the environment. For the Latrobe system, this includes:

- undertaking Aboriginal Waterways Assessments to examine cultural values and uses and incorporating the findings of assessments into the Latrobe Environmental Water Requirements Investigation
- identifying primary objectives under the modified water regime
- supporting approaches to water management that recognise and promote healthy Country
- reinforcing the importance of the *Durt-Yowan* (Latrobe River) system to the Gunaikurnai creation story of *Borun* the pelican and *Tuk* the musk duck, and their water quality and habitat requirements
- implementation of cultural resource management
- waterways as meeting places, pathways and boundaries
- preliminary accommodation of the water quality and management requirements of species with cultural values and uses.

GLaWAC is sharing its knowledge with the West Gippsland CMA around plant and animal species of cultural significance in and around the waterways of the Latrobe Valley, and the importance of specific watering decisions to support them.

Watering requirements to support cultural values and uses include:

- timing the delivery of water for the environment planned in partnership with GLaWAC to support a seasonal flow regime and wet and dry periods that contribute to healthy Country
- maintaining freshwater supply to Latrobe estuary, Dowd Morass, Sale Common and Heart Morass, and associated freshwater habitats as the lower Latrobe wetlands are an important resource for the Gunaikurnai
- providing connectivity between reaches and onto floodplains to support dependent plants and animals with cultural values and uses of significance to the Gunaikurnai
- maintaining water quality to support the health of native plants and animals with cultural values and uses of significance to the Gunaikurnai.

West Gippsland CMA engaged with the GLaWAC Cultural Water Team on Durt-Yowan (Latrobe River) watering priorities for 2023-24, with engagement planned to continue in the 2023-2024 water year.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in Table 2.2.1, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as fishing and water skiing)
- riverside recreation and amenity (such as birdwatching and game hunting)
- socioeconomic benefits (such as commercial fishing, tourism and improved water quality for domestic, irrigation and stock use).

If the timing or management of planned environmental flows may be modified to align with a community benefit, this is acknowledged in Table 2.2.1 with the following icon.

Watering planned to support water sports activities (e.g. water skiing)

The West Gippsland CMA plans the timing of releases of water for the environment so that they do not impact the lake's water levels during water skiing events held between January and March.

Scope of environmental watering

The term 'environmental watering' refers to the active delivery of water for the environment to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are also used to describe the delivery of water for the environment, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.2.1 describes the potential environmental watering actions in 2023-24, their expected watering effect (that is, the intended physical or biological effects of the watering action) and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

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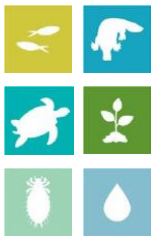
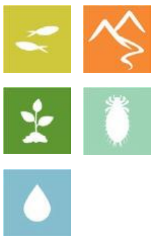
Table 2.2.1 Potential environmental watering actions, expected watering effects and associated environmental objectives for the Latrobe River

Potential environmental watering action	Expected watering effects	Environmental objectives
Latrobe River (targeting reach 5)		
Winter/spring low flow (620 ML/day during July to November 2023 and June 2024)	• Wet benches to maintain habitat, support the growth of emergent macrophyte vegetation and limit the encroachment of terrestrial vegetation • Maintain oxygen levels in pools and maintain sediment (sands and silts) in suspension to prevent pools from filling and depositing on substrates, helping to maintain habitat for waterbugs, turtles, aquatic mammals and breeding substrate for river blackfish • Maintain longitudinal connectivity to allow movement/dispersal of native fish, turtles, platypus and rakali (water rats)	
Summer/autumn low flow (440 ML/day during December to May)	• Maintain an adequate depth in pool habitat to support native fish, turtles, platypus and rakali (water rats) and submerged vegetation • Limit encroachment by terrestrial vegetation and support the growth of emergent macrophyte vegetation • Mix pools to maintain oxygen levels suitable for aquatic animals	

Summer/autumn river freshes (five to nine freshes of 980 ML/day for one to five days during December to May)
 
	Water-quality fresh (one-day duration):
	• freshen water quality in pools to support fish, waterbug and zooplankton communities
	• provide sufficient velocity to turn over and flush sediments (sands and silts) from pools, scour algae from hard surfaces and clean fine sediment from substrates, including river blackfish nesting habitats
	Fish and vegetation fresh (three to five days duration):
	• objectives of the one-day fresh as well as:
	  • wet benches to support the growth of emergent macrophyte vegetation
	  • provide longitudinal connectivity (including over benches for Australian grayling) for native fish, platypus and rakali (water rats)
		

Latrobe River (targeting reach 6)		
Summer/autumn estuary fresh(es) (one to three freshes of 2,200 ML/day for seven to 10 days during December to May) *Note: this is a combined magnitude with the Thomson River over the equivalent period; a contribution of at least 1,220 ML/day from the Thomson River is required*	• Upper estuary: fully flush with freshwater to support submerged vegetation, provide adequate oxygen levels for aquatic animals, transport silt, wet benches, and deliver freshwater to connected wetlands • Mid-estuary: partially/fully flush the upper layer of the water column to improve water quality, support emergent macrophytes, provide freshwater habitat and associated food sources for freshwater fish and provide breeding opportunities for estuary fish • Lower estuary: partially flush the upper layer of the water column; a flow of this magnitude will also provide opportunities to fill the lower Latrobe wetlands	

Scenario planning

Table 2.2.2 outlines potential environmental watering and expected water use in a range of planning scenarios. As seen in recent years, natural tributary inflows are likely to achieve many of the planned watering actions under the wetter planning scenarios, so all tier 1 actions proposed in the average and wet planning scenarios can be achieved with the available supply. High volumes of water carried over into 2023-24 also mean tier 1 actions proposed in the drought and dry planning scenarios can also be achieved with the available supply.

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Maintaining the target low flow throughout the year to provide habitat for native fish, turtles, platypus and rakali (water rats) and to support vegetation growth are high priorities in all planning scenarios. Delivering summer/autumn freshes to maintain water quality and provide specific opportunities for fish movement are also high priorities in all planning scenarios. Three consecutive wet years have meant the Latrobe River estuary and the lower Latrobe wetlands are the freshest they have been for many years, which has improved the condition and extent of streamside and wetland vegetation. Maintaining this level of freshness in the Latrobe River estuary on the back of three wet years to improve vegetation condition is a high priority in 2023-24.

Most of the recommended flows are likely to be fully achieved through a combination of natural events, operational releases, passing flows and environmental deliveries in the average and wet planning scenarios. There will be less natural inflow and lower operational releases in the drought and dry planning scenarios, and available water for the environment will be used to deliver a low flow and freshes at their lower recommended magnitude, duration and frequency to maintain rather than improve current environmental conditions in the Latrobe River. Maintaining the recommended minimum low flow during summer/autumn will be the highest priority in the drought and dry planning scenarios to avoid poor water quality and a reduction of pool habitats that could threaten populations of native fish, platypus and turtles. It is expected that even in the drought and dry planning scenarios, passing flow and natural inflows from unregulated tributaries will provide some flow through the system during winter and spring.

Freshes with larger magnitudes and longer durations (up to 10 days) may be coordinated with the flow in the Thomson River in all planning scenarios to meet environmental flow objectives in the Latrobe River estuary (reach 6). Summer/autumn estuary freshes also achieve the objectives of river freshes in reach 5 and will likely be met naturally in the wet and possibly the average planning scenarios. In the drier planning scenarios, estuary freshes are achieved by extending the duration of summer/autumn river freshes.

There are no true carryover provisions in the Latrobe system. Rather, the VEWH maintains an ongoing share of storage capacity in Blue Rock Reservoir. In the drought and dry planning scenarios, ensuring a minimum of 5,000 ML is maintained in storage at the end of 2023-24 to help deliver critical watering actions in 2024-25 will be important. Natural inflows will likely meet some planned watering actions in the average and wet planning scenarios in 2023-24 and result in some leftover water at the end of the year. This leftover water will help support potential environmental watering actions in 2024-25, and no specified carryover target has been set or prioritised for the wet planning scenario.

Table 2.2.2 Potential environmental watering for the Latrobe River in a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Small contributions to low flow from unregulated reaches and tributaries • Passing flow likely reduced over summer/autumn	• Possible spills from storages in spring, minor flood levels may occur • Some natural flow contributing to low flow and freshes • Passing flow likely reduced over summer	• Regular spills from storages in spring and minor to moderate flood levels may occur • Natural flow and/or passing flow likely to meet low-flow requirements	• Large and frequent spills from storages and moderate to major flood levels may occur • Natural flow and/or passing flow are likely to meet low-flow requirements
Expected availability of water for the environment	• 25,800 ML	• 28,400 ML	• 31,500 ML	• 36,200 ML
Potential environmental watering – tier 1 (high priorities)	**Tier 1 (can be achieved with predicted supply)**			
	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river freshes (four freshes of lower duration and one of mid-duration [four days]) • Summer/autumn estuary freshes (two freshes of lower duration)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river freshes (five freshes of lower duration and two of mid-duration [three days]) • Summer/autumn estuary freshes (two freshes of upper duration)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river fresh (six freshes of lower duration and three of mid-duration [four days]) • Summer/autumn estuary freshes (three freshes of upper duration)	• Winter/spring low flow • Summer/autumn low flow • Summer/autumn river fresh (six freshes of lower duration and three of upper duration [five days]) • Summer/autumn estuary freshes (three freshes of upper duration)

Planning scenario	Drought	Dry	Average	Wet
Possible volume of water for the environment required to achieve objectives	• 16,400-20,600 ML (tier 1)	• 16,900-22,100 ML (tier 1)	• 22,700-30,200 ML (tier 1)	• 15,800-35,600 ML (tier 1)
Priority carryover requirements for 2024-25	• 5,000 ML	• 5,000 ML	• 0-3,000 ML	• 0 ML

2.2.2 Lower Latrobe wetlands

System overview

The lower Latrobe wetlands (Dowd Morass, Heart Morass and Sale Common) are an important component of the internationally recognised Gippsland Lakes Ramsar site and provide habitat for waterbirds of state, national and international conservation significance. The wetlands are located on the floodplain of *Durt-Yowan* (Latrobe River) between its confluence with *Carran Carran* (Thomson River), and they form part of the Gippsland Lakes system.

River regulation and water extraction from the Latrobe, Thomson and Macalister rivers have reduced the frequency of small and medium-sized floods that naturally wet the lower Latrobe wetlands. The construction of levees and drains and the filling of natural depressions have also altered water movement into and through the wetlands. The drainage and flooding regime in all three wetlands is now managed to some extent with regulators connected to the Latrobe River.

Environmental values

Sale Common is one of only two remaining freshwater wetlands in the Gippsland Lakes system. It provides sheltered feeding, breeding and resting habitat for diverse waterbirds, including the Australasian bittern.

Dowd Morass is a large, brackish wetland that regularly supports rookeries of colonial nesting waterbirds, including Australian white ibis, straw-necked ibis, little black and little pied cormorants, royal spoonbills and great egrets.

Heart Morass is also a large brackish wetland, with open expanses providing shallow feeding habitat for waterbirds, including black swans, Eurasian coots and various duck species. The lower Latrobe wetlands function as a diverse and complementary ecological system. Colonial nesting waterbirds breed among swamp paperbark trees at Dowd Morass in spring. Migratory shorebirds feed on the mudflats that are exposed as the wetlands draw down and dry over the summer. Waterfowl and fish-eating birds use open-water habitat at the wetlands year-round. The wetlands also support threatened vegetation communities, including swamp scrub, brackish herbland and aquatic herbland.

Environmental objectives in the lower Latrobe wetlands	
	Maintain the abundance of frog populations
	Maintain the abundance of freshwater turtle populations
	Maintain a variety of self-sustaining submerged and emergent aquatic vegetation types Maintain the diversity, condition and/or extent of native streamside vegetation fringing wetlands Discourage the introduction and reduce the extent and density of undesirable/invasive plants (Sale Common)
	Enhance waterbird breeding, recruitment, foraging and sheltering opportunities
	Provide suitable physio-chemical conditions to support aquatic life Avoid catastrophic water-quality conditions (such as acid sulfate soil exposure) (Heart Morass)

Traditional Owner cultural values and uses

The lower Latrobe wetlands are a place of spiritual and cultural connection for the Gunaikurnai people. Over many thousands of years, customs and lore have been passed orally between generations about the cultural values and uses of the wetlands and their importance to all Gunaikurnai people. The wetlands are on the lands of the Brayakaulung clan of the Gunaikurnai.

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For the Gunaikurnai, the overarching objective for the wetlands is to provide and maintain healthy Country. Healthy Country includes the importance of place and the health of the entire ecosystem, including maintaining water quality, controlling pest species and maintaining a natural, seasonal flow regime and overbank flood events.

Environmental objectives for the delivery of water for the environment for the lower Latrobe wetlands should take a cultural landscape approach.

Watering requirements to support cultural values and uses include:

- timing the delivery of water for the environment planned in partnership with the Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) to support a seasonal flow regime and wet and dry periods that embody healthy Country
- maintaining freshwater supply to the *Durt-Yowan* (Latrobe River) estuary, Dowd Morass, Sale Common and Heart Morass and associated freshwater habitats
- providing connectivity between reaches and onto floodplains and maintaining water quality to support cultural values and uses of significance to the Gunaikurnai.

The lower Latrobe wetlands support many keystone species important to the Gunaikurnai. *Borun* (pelican) and *Tuk* (musk duck) are the father and mother in the Gunaikurnai creation story. If *Borun* and *Tuk* are living and breeding at the wetlands, it is a sign that Country is healthy. If they are not, flows should be provided to promote required habitat and ecosystem services.

Other birds are important for *woorngan* (hunting) and food, including *nalbong* (water hens), *gidai* (black swans), *boyangs* (eggs) and *koortgan* (ducks except for tuk). *Gidai* require submerged and softer emergent vegetation to make nest mounds, placing them on a small island or floating them in deeper water. *Gidai* breed in late Winter to early Spring after the water level rises. Actions that fill the large wetlands and support the growth of *loombrak* (water ribbon) and submerged aquatic plants will support *gidai*. Ensuring that the lower wetlands and floodplain depressions (for example, billabongs) receive freshwater flows in Winter/Spring will provide the conditions for submerged and emergent aquatic plants to grow and provide food and nesting materials for the waterbirds.

GLaWAC is developing a vision for the wetlands that aligns with the Gunaikurnai Whole-of-Country Plan. Key aspects of the vision include:

- **healthy Country:** reflecting the spiritual and cultural values of the Gunaikurnai custodians; healthy Country contributes to the wellbeing of the Gunaikurnai
- **water access:** access to water is crucial for many cultural values, including identity and relational values, future economic values and place values, among many others. Access to water, through ownership or management, means that water is made available to the Gunaikurnai on the Latrobe and Thomson systems to provide freshwater to the wetlands. Every effort should be made to maintain freshwater-dependent values, which in turn deliver cultural values
- **cultural and economic use:** returning to cultural practices and Gunaikurnai-informed management at the lower Latrobe wetlands is key to returning to a more freshwater habitat for cultural uses and cultural species. It will also provide for water-based tourism, cultural education and ecotourism (camping) experiences
- **connection:** GLaWAC takes its responsibility to work closely with the people it represents on management decisions concerning Country and the health of Country very seriously. Gunaikurnai cultural obligations reflect Gunaikurnai views on healthy Country and, in turn, help the Gunaikurnai continue their ongoing connection to the land and waters of Country
- **climate change:** the Gunaikurnai have cared for Country for thousands upon thousands of years through many cycles of climatic change, and they understand how to manage the landscape as it too changes. When cared for using traditional knowledge, Country can be healed. Mitigation of climate change impacts affecting the lakes, rivers and other waterways of the lower Latrobe wetlands can be effective with resources and empowerment provided to the Gunaikurnai.

Increasing the involvement of Traditional Owners in environmental flows management and progressing opportunities towards self-determination in the environmental watering program is a core commitment of the VEWH and its agency partners. This is reinforced by a range of legislation and policy commitments, including the *Water Act 1989*, the Victorian Aboriginal Affairs Framework, the 2016 *Water for Victoria*, the 2022 *Water is Life: Traditional Owner Access to Water Roadmap* and in some cases, agreements under the *Traditional Owner Settlement Act 2010*.

Where Traditional Owners are more deeply involved in the planning and/or delivery of environmental flows for a particular site, their contribution is acknowledged in Table 2.2.3 with an icon. The use of this icon is not intended to indicate that these activities are meeting all the needs of Traditional Owners but is incorporated in the spirit of valuing that contribution.

Watering planned and/or delivered in partnership with Traditional Owners to support cultural values and uses

GLaWAC and West Gippsland CMA are exploring opportunities to align environmental flows with Gunaikurnai outcomes in the lower Latrobe wetlands. In 2023-24, a Gunaikurnai cultural event is planned at Dowd Morass. This event will be jointly managed with WGCMA and will coincide with delivery of water for the environment. The timing of the event will be decided by GLaWAC, after some water quality and fish monitoring.

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In early 2023, the West Gippsland CMA met with GLaWAC to discuss 2023-24 environmental watering priorities in the lower Latrobe wetlands, with further engagement planned in the 2023-2024 water year.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in Table 2.2.3, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing and fishing)
- riverside recreation and amenity (such as birdwatching, bushwalking, camping and duck hunting)
- socioeconomic benefits (such as commercial eel and carp fishing and tourism).

Scope of environmental watering

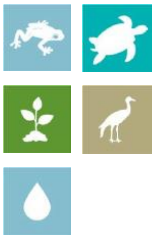
The term 'environmental watering' refers to the active delivery of water for the environment to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are also used to describe the delivery of water for the environment, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.2.3 describes the potential environmental watering actions in 2023-24, their expected watering effect (that is, the intended physical or biological effects of the watering action) and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 2.2.3 Potential environmental watering actions, expected watering effects and associated environmental objectives for the lower Latrobe wetlands

Potential environmental watering action	Expected watering effects	Environmental objectives
Sale Common		
Top-up (anytime, following bird breeding event if required)	• Prolong wetting of reed beds to maintain habitat and food resources for nesting waterbirds and protect chicks from predators	
Partial fill (in July to August[1] with top-ups as required to maintain water depth of at least 0.3 m AHD and surface coverage year-round)	• Encourage the growth and flowering of semi-aquatic plants • Provide appropriate wetland habitat for frogs and turtles • Provide conditions that support waterbug communities and food resources for waterbirds	
Fill (with top-ups as required during August to November to maintain a water depth of 0.4 m AHD for two months)	• Wet the outer boundaries of the wetland to support the growth and flowering of streamside and fringing wetland plants, increasing foraging opportunities for waterbirds • Encourage bird and turtle breeding by providing nesting habitat • Provide connectivity between the river and wetlands and increase habitat and feeding opportunities for frogs and turtles	
Trigger-based fill or top-up to 0.5 m AHD (during December to January) *Trigger: requirement to drown out invasive vegetation*	• Wet key habitats within the wetland for a sufficient duration to discourage invasive plants, particularly the excessive spread of giant rush	
Partial drawdown (during December to March)	• Oxygenate sediments to enable aquatic vegetation germination and recruitment • Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly swamp scrub and tall marsh) • Break down organic matter and promote nutrient cycling • Expose mudflats and create shallows to facilitate waterbird foraging	

Potential environmental watering action	Expected watering effects	Environmental objectives
Dowd Morass		
Top-up (any time, following bird breeding event if required)	• Prolong wetting of reed beds to maintain habitat and food resources for waterbirds and protect chicks from predators, following an observed breeding event	
Fill to control salinity (anytime)	• Dilute salt concentrations within the wetland that may be caused by king tides from Lake Wellington (likely occurring between March to May) or other sources • This watering action is likely to be triggered[1] if electrical conductivity rises and reaches 7,000 µS/cm	
Partial fill (with top-ups as required to maintain a water depth of 0.3 m AHD during July to December 2023 and April to June 2024[2])	• Provide seasonal variation in water depth throughout the wetland to support the growth and flowering of semi-aquatic plants • Wet vegetation and soils at middle elevations within the wetland to increase the abundance of waterbugs and other food resources for frogs, turtles and waterbirds • Provide connectivity between the river and wetlands and between wetlands, increasing available habitat for frogs and turtles • Support bird breeding (when delivered in spring/early summer following earlier fill) by maintaining wetted habitat around reed beds	
Fill (with top-ups as required to maintain a water depth of 0.6 m AHD during August to November)	• Wet reed beds and deep water next to reedbeds to provide waterbird nesting habitat and stimulate bird breeding • Wet high-elevation banks and the streamside zone to support vegetation growth, creating nesting habitat for waterbirds • Wet vegetation and soils at higher elevations to stimulate ecosystem productivity and increase the abundance of waterbugs and other food resources for frogs, turtles and waterbirds • Provide connectivity between the river and wetlands and between wetlands, increasing available habitat and food resources for frogs and turtles • Reduce the impact of saltwater incursion from Lake Wellington	
Partial drawdown (during January to March)	• Oxygenate sediments to enable aquatic vegetation to germinate and recruit • Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly swamp scrub and tall marsh) • Break down organic matter and promote nutrient cycling • Expose mudflats and create shallows to facilitate waterbird foraging	
Heart Morass		
Top-up to permanently maintain water level above -0.3 m AHD (anytime)	• Minimise the risk of acid sulfate soils developing by keeping known high-risk areas wet • Respond to decreasing pH from the rewetting of exposed acid sulfate soils (most likely during high-wind events) • Dilute salt concentrations within the wetland that may be caused by king tides from Lake Wellington or other sources. This watering action is likely to be triggered[3] if wetland overtopping appears likely; based on rising water levels at Lake Wellington (reaching or exceeding +0.5 m AHD)	
Top-up (anytime up to 0.5 m AHD, following bird breeding event if required)	• Prolong wetting of reed beds to maintain habitat and food resources for waterbirds and protect chicks from predators, following an observed breeding event	

Potential environmental watering action	Expected watering effects	Environmental objectives
Fill and partial flushing flow (during July to November[4])	• Wet high-elevation banks and streamside zone to support vegetation growth, create nesting and foraging habitat for waterbirds and provide food resources for terrestrial birds • Provide connectivity between the river and wetlands and between wetlands, increasing available habitat and providing food resources for frogs and turtles • Export accumulated salts and sulfates and transport nutrients, dissolved organic carbon and seeds between the Latrobe River and Heart Morass	
Partial fill (with top-ups as required to maintain a minimum water depth of 0.3 m AHD during August to December[1])	• Support the growth and flowering of semi-aquatic plants • Provide appropriate wetland fringing habitat for frogs and turtles • Provide conditions that support waterbug communities and food resources for frogs, turtles and waterbirds	
Partial drawdown (during January to March)	• Oxygenate sediments to enable aquatic vegetation to germinate and recruit • Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly swamp scrub and tall marsh) • Break down organic matter and promote nutrient cycling • Expose mudflats and create shallows to facilitate waterbird foraging	

1 If the salinity level in the Latrobe River exceeds 15,000 µS/cm, a fill will not be provided.
2 This is the likely timing in the drought scenario. In the average or wet scenarios, a fill event may occur during this period, as detailed in Table 2.2.4.
3 If the salinity level in the Latrobe River exceeds 10,000 µS/cm, a top-up will not be provided.
4 If a partial flushing flow is not possible until the end of November, top-ups will be provided to maintain a fill with a minimum water depth of 0.5 m AHD.

Scenario planning

Table 2.2.4 outlines potential environmental watering and expected water use in a range of planning scenarios.

Wet conditions over the last three years have caused natural flooding and flushing flows through all of the lower Latrobe wetlands, which have improved the condition and extent of most native wetland vegetation and triggered significant waterbird breeding. However, prolonged inundation has also caused partial dieback of swamp paperbark communities around the fringes of Dowd Morass. The main environmental watering priorities in 2023-24 will be partially filling each wetland in winter/spring to prevent complete drying over summer and autumn. The proposed watering actions aim to consolidate environmental outcomes from the past three wet years and build ecosystem resilience ahead of future dry periods. The wetlands can only be filled when water levels and water quality in the lower reaches of the Latrobe River are suitable, and therefore the timing and extent of water delivery will be influenced by natural climatic conditions and flow in the Latrobe River. Only partial fills will likely be possible in the drought planning scenario, and natural overbank floods are likely at any time of year in the wet planning scenario. Trigger-based inflows to address a potential acid sulfate soil risk, support a natural waterbird breeding event or control invasive vegetation will be delivered when needed and possible, even if the timing of these actions compromises other planned wetting or partial drawdown events. Specific watering plans for each wetland in different planning scenarios are described below.

Sale Common

The aim for Sale Common is to partially fill the wetland in winter and provide top-ups as needed to maintain water levels above 0.3 m AHD throughout the year, which will wet about half of Sale Common. Maintaining at least a partial fill is considered ecologically important to support wetland plant communities and provide habitat for frogs, turtles and waterbirds. This is likely to be the maximum water level achieved in the drought planning scenario. Completely filling the wetland in late winter or early spring is a low priority in 2023-24, as the objectives for this action have been met for the past three years.

Allowing the wetland to partially draw down naturally over the warmer months to promote the germination of emergent vegetation is a high priority in all planning scenarios, although there may be a limited drawdown in the average and wet planning scenarios. A trigger-based fill or top-up during December or January to control the spread of giant rush remains a high priority, and delivering this event may be prioritised over a partial drawdown if an increase in the extent of giant rush is observed. Facilitated drawdown (by opening regulator gates) is not proposed in 2023-24 unless it is deemed necessary to control carp. If climatic conditions only allow a limited drawdown in 2023-24, the wetland may be actively drawn down in 2024-25 to facilitate nutrient cycling and other dry-phase ecosystem processes.

Dowd Morass

The plan at Dowd Morass is to maintain the water level above 0.3 m AHD from June to December 2023 and from April to June 2024 and allow the wetland to partially draw down (without complete drying) between January and March 2024. This proposed watering regime will provide sufficient variation in the water level to support the needs of a range of vegetation communities

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within and beside the wetland and provide habitat and food for native frogs, turtles and waterbirds. After several wet years, the partial drawdown over summer will be particularly important to reduce damage to swamp paperbark communities around the wetland fringes, facilitate carbon and nutrient cycling in drying soils, and provide foraging habitat for wading shorebirds.

The proposed watering regime described above may need to be modified if wet conditions naturally fill the wetland or additional water is needed to support a large waterbird breeding event or dilute saline water from king tides. Completely filling Dowd Morass is a lower priority in 2023-24 because the environmental objectives for this action have been met by natural floods in each of the past two years, and another fill may further damage swamp paperbark trees around the wetland perimeter.

Heart Morass

Acidity and salinisation represent a high risk to environmental values at Heart Morass, and maintaining water levels above -0.3 m AHD at all times is a high priority to avoid exposing potential acid sulfate soils. Heart Morass was filled and fully flushed in 2021-22 and 2022-23, which removed accumulated salt and sulphides and reduced the immediate risk of acid sulfate soils. Filling and providing flushing flows are, therefore, a low priority in 2023-24 but may still be considered in all planning scenarios if they can be delivered in combination with a natural flood to lower the risk of acid sulfate soils occurring in subsequent years.

The preferred watering strategy in all planning scenarios involves partially filling the wetland from winter to early summer and maintaining the water level above -0.3 m AHD for the rest of the year. The partial fill in winter and spring will support established wetland plant communities and increase the available habitat and food for frogs, turtles and waterbirds. To expose shoreline habitat, a partial drawdown in summer and autumn 2024 is a high priority in all climate scenarios. This will increase the diversity of vegetation communities, allow nutrient cycling and provide foraging habitat for shorebirds. Significant drawdown is unlikely in the average and wet planning scenarios.

Table 2.2.4 Potential environmental watering for the lower Latrobe wetlands in a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• No natural inflow from the Latrobe River and wetlands are likely to dry completely	• Minor natural inflow from the Latrobe River in winter/spring; expect moderate to substantial drying in summer	• Moderate winter/ spring flow in the Latrobe River is likely to fill or partially fill the wetlands; expect minor drying in summer	• Major flow in the Latrobe River in winter/spring and possibly autumn/ winter is likely to fill all wetlands with very little drying in summer
Sale Common				
Potential environmental watering – tier 1[1] (high priorities)	• Top-up (any time following bird breeding) • Partial fill (with top-ups as required) • Trigger-based fill or top-up to 0.5 m AHD (during December to January, if required) • Partial drawdown (during December to March)			
Potential environmental watering – tier 2 (additional priorities)	• Fill (with top-ups as required during August to November)			• N/A
Dowd Morass				
Potential environmental watering – tier 11 (high priorities)	• Top-up (any time following bird breeding) • Fill (any time to control salinity) • Partial fill (with top-ups as required in July to December and April to June) • Partial drawdown (during January to March)			
Potential environmental watering – tier 2 (additional priorities)	• Fill (with top-ups as required during August to November)		• N/A	
Heart Morass				
Potential environmental watering – tier 1[1] (high priorities)	• Top-up (any time to permanently maintain water level above -0.3 m AHD) • Top-up (any time following bird breeding) • Partial fill (with top-ups as required during August to December) • Partial drawdown (during December to March)			

Planning scenario	Drought	Dry	Average	Wet
Potential environmental watering – tier 2 (additional priorities)	• Fill and partial flushing flow (during July to November)			

1 Potential environmental flows at the lower Latrobe wetlands are not classified as tier 1a or tier 1b because there is no limitation on the volume of water that can be supplied to the site from the Latrobe River. Water can be diverted to the lower Latrobe wetlands at any time of the year when flows are above -0.7 m AHD in the Latrobe River at the Swing Bridge gauging station.

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2.3 Thomson system

Waterway manager – West Gippsland Catchment Management Authority

Storage managers – Melbourne Water (Thomson Reservoir), Southern Rural Water (Cowwarr Weir)

Environmental water holder – Victorian Environmental Water Holder

System overview

***Carran Carran* (Thomson River) flows from the slopes of the Baw Baw Plateau to join *Durt-Yowan* (Latrobe River) south of Sale (Figure 2.3.1). The major tributaries of the Thomson River are the Aberfeldy and Jordan rivers in the upper reaches and *Wirn wirndook Yeerung* (Macalister River) in the lowest reach. Two major structures regulate flow on the Thomson River: Thomson Reservoir — the largest water supply storage for metropolitan Melbourne — and Cowwarr Weir — a regulating structure that supplies irrigation water to parts of the Macalister Irrigation District.**

Thomson Reservoir harvests most of the flow from the upper catchment of the Thomson River and significantly affects the flow in all downstream reaches. The Aberfeldy River now provides most of the natural flow to the Thomson River below Thomson Reservoir and is essential for providing natural freshes and a high flow.

Water for the environment is held in the Thomson Reservoir and released into the river as required. Reach 3 of the Thomson River (from the Aberfeldy River confluence to Cowwarr Weir) is the highest priority for delivery of water for the environment due to its heritage river status, high-value native streamside vegetation, high-quality in-stream habitat and low abundance of exotic fish species.

At Cowwarr Weir, the Thomson River splits into the old Thomson River course (reach 4a) and Rainbow Creek (reach 4b) (see Figure 2.3.1). Passing flow throughout the year is split two-thirds down reach 4a and one-third down reach 4b to avoid impacts to irrigators located on Rainbow Creek. Water for the environment is primarily delivered to the old Thomson River course (reach 4a) to support fish migration as Cowwarr Weir impedes fish movement through Rainbow Creek.

The Heyfield wetlands is a cluster of pools located between the Thomson River and the township of Heyfield. The construction of levees and weirs along the Thomson River means that river water rarely enters the wetlands. While the largest pool receives stormwater from the Heyfield township, smaller ponds rely on rainfall or pumped water for the environment to maintain environmental values. These values include wetland plant communities planted in recent years as part of a comprehensive revegetation program.

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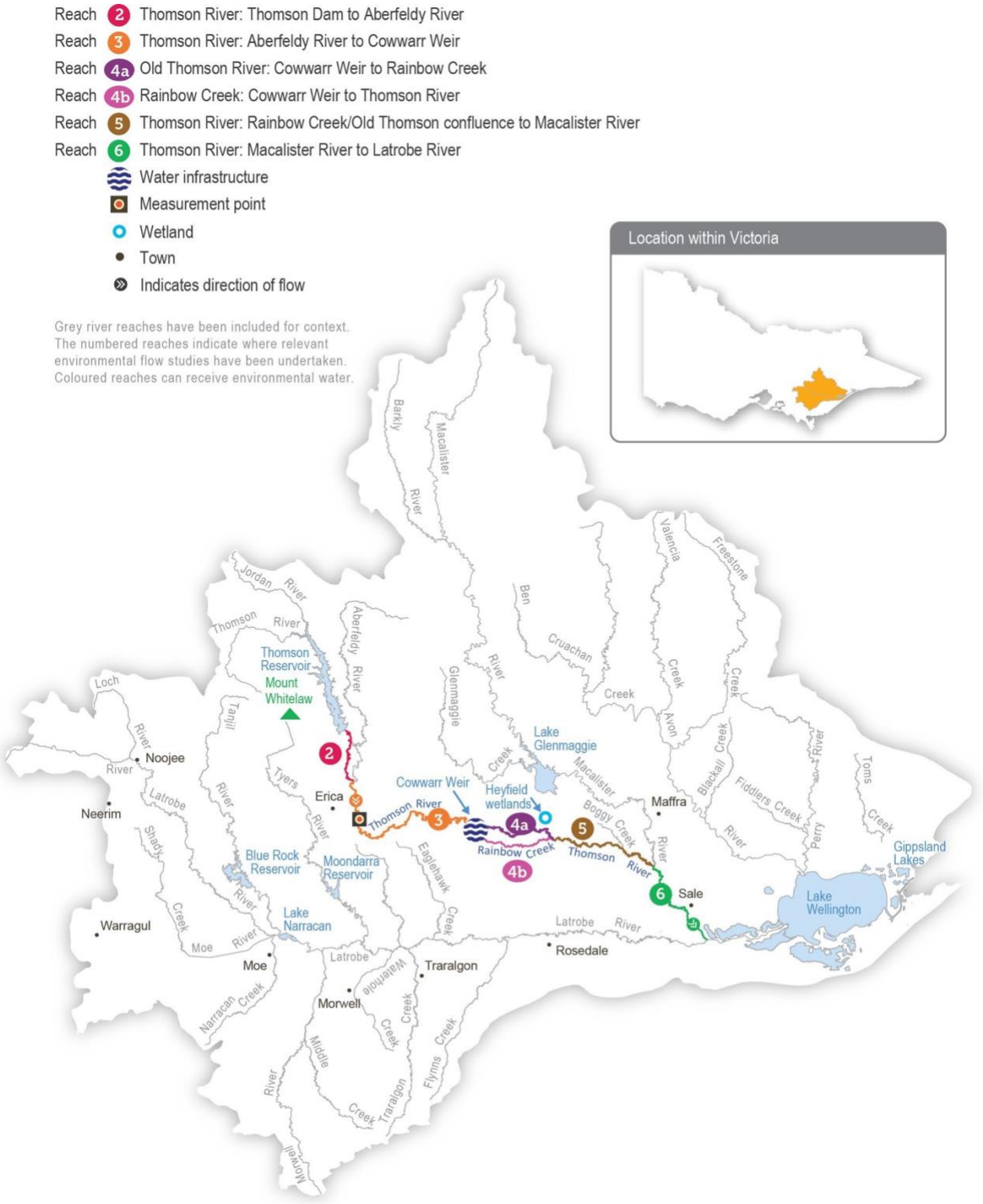
Figure 2.3.1 The Thomson system



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Environmental values

The Thomson River supports native species of migratory fish that need to move between the sea and freshwater environments to complete their life cycles, including Australian grayling, tupong, short- and long-finned eel, Australian bass and pouched and short-headed lamprey. A focus for environmental flow management is the Australian grayling, which is a threatened species in Victoria. Australian grayling spawn in response to autumn freshes, and the larvae and juveniles spend time at sea before returning to the freshwater sections of coastal rivers.

The composition and condition of streamside vegetation vary throughout the Thomson River catchment. The vegetation is intact and in near-natural condition above Thomson Reservoir in the Baw Baw National Park. Streamside vegetation between Thomson Reservoir and Cowwarr Weir is mostly in good condition but is affected by exotic weeds, including blackberry and gorse. Below the Cowwarr Weir, the vegetation is degraded due to stock access and widespread weed invasion.

The Heyfield wetlands are among the few remaining freshwater wetland sites in the Gippsland Plains landscape. They provide habitat for aquatic and terrestrial animals, including threatened migratory birds that prefer shallow, slow-moving waterbodies.

Environmental objectives in the Thomson system	
	Restore populations of native fish, specifically Australian grayling Enhance the structure of native fish communities
	Maintain the existing frog population and provide suitable habitat
	Maintain the physical form of the channel to provide a variety of channel features and habitats for aquatic animals Enhance river function by maintaining substrate condition and enabling carbon cycling
	Increase the abundance of platypus
	Maintain the structural diversity and appropriate distribution (zonation) of streamside vegetation along the riverbank and reduce terrestrial encroachment/invasion (Thomson River) Increase the recruitment and growth of native in-stream, fringing and streamside vegetation (Thomson River) Maintain the existing vegetation and promote the growth and establishment of semi-aquatic species (Heyfield wetlands) Enhance the resilience of semi-aquatic species (Heyfield wetlands)
	Provide freshwater habitat for migratory and non-migratory wetland birds within the Gippsland Plains landscape
	Maintain the natural invertebrate community
	Improve water quality in the Thomson River estuary

Traditional Owner cultural values and uses

The Gunaikurnai have had a continued connection to Gunaikurnai Country for many thousands of years, including with the waterways in the Latrobe system, into which *Carran Carran* (Thomson River) feeds. For the Gunaikurnai as Traditional Owners, there are immense challenges to heal, protect and manage Country which has been drastically altered since colonisation. *"As Gunaikurnai, we see our land (Wurruk), waters (Yarnda), air (Watpootjan) and every living thing as one. All things come from Wurruk, Yarnda and Watpootjan and they are the spiritual life-giving resources, providing us with resources and forming the basis of our cultural practices. We have a cultural responsibility to ensure that all of it is looked after" (Water is Life: Traditional Owner Access to Water Roadmap 2022 - Gunaikurnai Nation Statement).* This cultural landscape is dependent on culture and Aboriginal management.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is working with the West Gippsland CMA to determine how to express Gunaikurnai objectives for water in a way that contributes to seasonal watering proposals from the perspective of traditional custodians with traditional knowledge. GLaWAC was a member of the Steering Committee and Project Advisory Group for the 2020 review of the *Carran Carran* (Thomson River) FLOWS study and has membership on the Thomson Environmental Water Advisory Group (EWAG).

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GLaWAC Cultural Water Officers have completed Aboriginal Waterways Assessments on *Carran Carran* (Thomson River) and are assessing how to protect and further the river's cultural values and uses. Traditionally, *Carran Carran* (Thomson River) was an important meeting place and a place to camp. Today, most of *Carran Carran* is inaccessible to the Gunaikurnai, making it difficult to meet and yarn along the river.

Assessments for watering requirements of *Carran Carran* (Thomson River) for the Gunaikurnai have been based on cultural indicators, including:

- the condition of the lower Latrobe wetlands (which *Carran Carran* helps supply)
- the condition and prevalence of plants and animals with cultural values and uses
- species known to be indicators of water quality, water regimes and healthy Country.

GLaWAC is working with the West Gippsland CMA to share traditional knowledge of plant and animal species of cultural significance in and around the waterways of the Latrobe Valley and the importance of specific watering decisions to support them.

Watering requirements to support cultural values and uses include:

- timing of deliveries of water for the environment planned in partnership with GLaWAC to support a seasonal flow regime and wet and dry periods that contribute to healthy Country
- maintaining freshwater supply to the *Durt-Yowan* (Latrobe River) estuary, Dowd Morass, Sale Common and Heart Morass, and associated freshwater habitats; the lower Latrobe wetlands are an important resource for the Gunaikurnai
- providing connectivity between reaches and onto floodplains to support dependent plants and animals with cultural values and uses of significance to the Gunaikurnai
- maintaining water quality to support the health of native plants and animals with cultural values and uses of significance to the Gunaikurnai.

West Gippsland CMA engaged with GLaWAC on Thomson watering priorities for 2023-24, with engagement planned to continue in the 2023-24 water year.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in Table 2.3.1, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as kayaking, canoeing, fishing and swimming)
- riverside recreation and amenity (such as birdwatching, camping, hiking and duck hunting)
- community events and tourism (such as community education, events at the Heyfield wetlands and visitation by locals and non-locals)
- socioeconomic benefits (such as maintaining bankside vegetation and preventing erosion and the potential loss of private and public land).

If the timing or management of planned environmental flows may be modified to align with a community benefit, this is acknowledged in Table 2.3.1 with the following icons.

	Watering planned to support water sports activities (e.g. canoeing and kayaking)
	Watering planned to support peaks in visitation

Autumn, winter and spring freshes in the Thomson River create ideal conditions for white water rafting, kayaking and canoeing. The timing of environmental flows may be adjusted to optimise opportunities to support these recreation activities, where it does not compromise environmental outcomes. For example, a fresh that aims to cue the migration of Australian grayling and other native fish may be timed to coincide with recreation events or holiday periods when people take advantage of favourable rafting or kayaking conditions. Kayaking and rafting activities have inherent risks, and large environmental flows are ramped up and down over several days to avoid sudden changes in water levels that may affect river users. The West Gippsland CMA also provides notification of planned large releases of water for the environment to alert river users about potential increases in the water level and velocity.

Interested community members can register on the West Gippsland CMA website to receive notifications of upcoming watering events.

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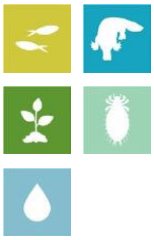
Scope of environmental watering

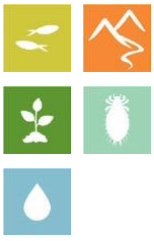
The term 'environmental watering' refers to the active delivery of water for the environment to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are also used to describe the delivery of water for the environment, 'environmental watering' is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.3.1 describes the potential environmental watering actions in 2023-24, their expected watering effect (that is, the intended physical or biological effects of the watering action) and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 2.3.1 Potential environmental watering actions, expected watering effects and associated environmental objectives for the Thomson system

Potential environmental watering action	Expected watering effects	Environmental objectives
Thomson River (targeting reach 3)		

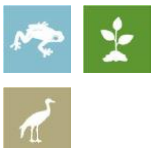
Winter/spring/autumn low flow (125-350 ML/day during July to November and 230-350 ML/day during April to June 2024)	• Maintain a minimum level of habitat and maintain water quality in pools and riffles for waterbugs and fish (when delivered at 125 ML/day); habitat availability and condition are increased when delivered at greater magnitudes
	• Regulate the water temperature and wet large woody debris to provide food and shelter for waterbugs and fish
	• Maintain sufficient water depth to facilitate platypus and fish movement between localised habitats and increase foraging opportunities (further enhanced when delivered at greater magnitudes)
	• Wet low-lying benches (when delivered at greater magnitudes) to prevent encroachment by invasive plants and permit seed dispersal
	• Additional benefits to the Thomson River estuary (reach 6) are expected when provided at 350 ML/day magnitude:
	  • partially flush the upper water column, helping to sustain waterbug communities and fish by maintaining oxygen levels
	  • prevent high salinity levels, helping to maintain emergent macrophyte vegetation
	  • provide freshwater to the Latrobe system
		

Spring fresh(es) (one to two freshes of 800-900 ML/day for five to seven days during September to November)  	• Trigger the migration of adult and juvenile native fish (in particular, the upstream migration of juvenile Australian grayling and Australian bass from marine/estuarine habitats)
	• Improve and maintain streamside vegetation by inundating the benches and providing variable water levels for plant zonation
	• Carry plant seeds from the upper catchment for deposition downstream
	• Deposit fine particulate sediments on the benches and prevent pools from infilling
	• Scour substrates to remove accumulated fine sediment and biofilms to improve habitat and food for waterbugs
	• Additional benefits to the Thomson River and its estuary (reach 6) are expected when provided at 900 ML/day magnitude:
	  • wet vegetation on higher benches
	  • partially flush the upper water column in the Thomson River estuary, helping to sustain waterbug communities and fish by maintaining oxygen levels
	  • prevent high salinity levels, helping to maintain emergent macrophyte vegetation
	  • provide freshwater to the Latrobe system
		

Potential environmental watering action	Expected watering effects	Environmental objectives
Summer/autumn low flow (125 ML/day during December to April)	• Maintain habitat and water quality in pools and riffles for waterbugs and fish • Facilitate localised movement between habitat types for small-bodied native fish and platypus • Prevent encroachment into the in-stream channel by invasive plants	

Summer/autumn fresh(es) (one to two freshes of 230-350 ML/day for seven days during December to March)	• Wet aquatic and fringing vegetation to maintain its condition and support its growth
	• Wet low-lying benches to prevent encroachment by invasive plants and enable vegetation zonation
	• Provide velocity and depth diversity and prevent sediment smothering by fine sediments
	• When delivered in February-March (at 230 ML/day), the fresh also aligns with and supports native fish movement:
	  • trigger downstream migration of adult short- and long-finned eel and upstream movement of juvenile Australian bass
	  • increase the water depth over riffles to facilitate local movement between habitats for large-bodied native fish
		

Autumn freshes (two freshes of 800 ML/day for five to seven days during April to May)  	• Trigger the migration of adult and juvenile native fish, in particular:
	  • the downstream migration and spawning of adult Australian grayling (April)
	  • the downstream migration of adult tupong and upstream migration of adult and juvenile Australian bass (May)
	• Carry plant seeds and propagules from the upper catchment for deposition downstream and help maintain the zonation of vegetation
	• Prevent infilling of pools by mobilising fine sediments and depositing them on existing bars and benches to provide substrate for vegetation
	• Scour substrates to remove accumulated fine sediment
		

Heyfield wetlands		
Fill (during August to September)	• Wet ponds to capacity to stabilise the banks and support the spring growth of semi-aquatic vegetation • Provide freshwater habitat for waterbirds and frogs (such as growling grass frogs and golden bell frogs)	
Top-ups as required to maintain water level (during October to May)	• Top up ponds before summer to maintain vegetation and enhance recruitment by triggering the release of seeds • Top up ponds in late summer to ensure the survival of newly planted wetland vegetation • Maintain habitat for waterbirds and frogs (such as growling grass frogs and golden bell frogs) • When delivered in April to May, top-ups provide drought refuge habitat for waterbirds and frogs following prolonged dry conditions	
Partial drawdown (during April to May)	• Oxygenate surface soils, break down accumulated organic matter and cycle nutrients • Enhance waterbird food availability by exposing the mudflats and providing access to burrowing invertebrates	

Scenario planning

Table 2.3.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The Thomson River has experienced wet conditions for the third consecutive year, which led to the Thomson Dam spilling in spring for the first time since 1996. This natural flow, combined with water for the environment, has created ideal conditions for native fish to breed and disperse throughout the system. Planned environmental flows for the Thomson River in 2023-24 will continue to focus on supporting the migration, spawning and recruitment of native fish.

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It is important to deliver a mix of low flow and freshes throughout the year in the Thomson River, but the magnitude, duration and frequency of these events will generally be lower in the drought and dry planning scenarios than in the average and wet scenarios. More higher-magnitude, longer-frequency events may be delivered in all planning scenarios if enough water is available throughout the year, but lower-than-expected carryover due to the Thomson Dam spilling in 2022-23 means less water is available for use in 2023-24 than in recent years. The estimated water demands for planned watering actions in Table 2.3.2 do not account for potential unregulated flows. As seen in recent years, natural tributary inflows are likely to achieve many of the planned watering actions in the wetter planning scenarios, so most or all of tier 1a and tier 1b actions proposed for the Thomson River in the wet and possibly average scenarios should be achievable with the available supply.

In all planning scenarios, the highest-potential environmental watering actions for the Thomson River are 800 ML per day freshes in autumn (in April/May) and spring (in October/November), which target migratory fish movement into or out of the system. These events are essential to cue the spawning and recruitment of the threatened Australian grayling population and other native migratory fish species, which have shown positive signs of recruitment over the last three years. These events are necessary every year in the average and wet planning scenarios to ensure regular recruitment and to align with environmental cues in the broader landscape. They are generally less important in the dry and drought planning scenarios, but they are considered important to deliver even under drier conditions in 2023-24 to consolidate recent population growth following three consecutive wet years. If enough water is available and is not delivered naturally, an additional spring fresh may be delivered in September in the wet planning scenario to help mix the water in and improve the water quality of the upper Thomson estuary. Where possible, the spring and autumn freshes may be timed to coincide with long weekends to provide additional recreational benefits for river users. Two autumn freshes will likely be delivered in the wet planning scenario, but only one fresh will be delivered in the drought, dry and average scenarios to conserve water. It will be important to deliver two summer/autumn freshes in all planning scenarios to clear fine silt and biofilms from in-stream habitat and facilitate the movement of native fish and platypus.

Delivery of a low flow throughout the year is expected to change depending on the planning scenario. A flow of 125 ML per day in reach 3 is the target magnitude from December to April, and it is the minimum recommended flow between May and November. This flow magnitude is expected to be delivered with the operational passing flow in all planning scenarios.

Increasing the low-flow magnitude up to 350 ML per day in July and November (following a spring fresh) is recommended in all planning scenarios to improve water quality in the Thomson estuary, but it may not be possible in the drought and dry scenarios. The upper magnitude of 350 ML per day during April to June is preferred in all planning scenarios to improve outcomes for fringing and streamside vegetation, but it may only be possible in the wet scenario with the expected volume of water for the environment available. The magnitude and duration of the low flow throughout these months will be lowered in the drought, dry and average planning scenarios if water for the environment is limited. However, water will still be delivered at a rate that allows fish and platypus to move throughout the reach at critical breeding and dispersal times.

The recommended water regime for the Heyfield wetlands is the same in the dry, average and wet planning scenarios because the wetlands are expected to hold water for most of the year in these scenarios. Filling the wetlands in late winter or early spring and providing top-ups through summer and early autumn aim to help establish semi-aquatic and terrestrial fringing plants planted in the wetland and promote the natural recruitment of native wetland species. A partial drawdown in mid-to-late autumn will replicate a natural drying event and allow the breakdown of accumulated organic matter, promote nutrient cycling and provide mudflat habitats for waterbirds to feed. Ongoing top-ups will replace the planned autumn drawdown in the drought planning scenario to maintain some aquatic habitat for frogs and waterbirds in the region. In the average and wet planning scenarios, the natural run-off will likely meet some or all of the recommended watering actions at the Heyfield wetlands.

Table 2.3.2 Potential environmental watering for the Thomson system in a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Passing flow and limited natural flow from the Aberfeldy River and other tributaries contribute to low flow • A large volume of consumptive water is released from storage	• Passing flow and natural flow from the Aberfeldy River and other tributaries contribute to low flow and some freshes • A moderate volume of consumptive water is released from storage	• Passing flow and natural flow from the Aberfeldy River and other tributaries contribute to low flow and periods of high flow and freshes • A small volume of consumptive water is released from storage	• Natural flow from the Aberfeldy River and other tributaries is expected to meet most low-flow requirements and provide large freshes and sustained high flow • Minimal volume of consumptive water released from storage
Expected availability of water for the environment	• 15,800 ML	• 17,900 ML	• 20,100 ML	• 25,200 ML

Planning scenario	Drought	Dry	Average	Wet
Thomson River (targeting reach 3)				
Potential environmental watering – tier 1 (high priorities)	**Tier 1a (can be achieved with predicted supply)**			
	• Winter/spring/ autumn low flow (partially delivered: 125 ML/day in July, 350 ML/ day in November following spring fresh and 230 ML/ day during mid-May to June) • Spring fresh (one fresh of lower magnitude in October or November) • Summer/autumn low flow • Summer/autumn freshes (two freshes, one at upper, one at lower magnitude) • Autumn fresh (one fresh of lower duration in April])	• Winter/spring/ autumn low flow (partially delivered: 125 ML/day in July, 350 ML/ day in November following spring fresh and 230 ML/ day during May to June) • Spring fresh (one fresh of lower magnitude in October or November) • Summer/autumn low flow • Summer/autumn freshes (two freshes, one at upper, one at lower magnitude) • Autumn fresh (one fresh in April)	• Winter/spring/ autumn low flow (partially delivered: 350 ML/day in July, 350 ML/ day in November following spring fresh and 300 ML/ day during May to June) • Spring fresh (one fresh of lower magnitude in October or November) • Summer/autumn low flow • Summer/autumn freshes (two freshes, one at upper, one at lower magnitude) • Autumn fresh (one fresh in April)	• Winter/spring/ autumn low flow (350 ML/day in July, 350 ML/ day in November following spring fresh and 350 ML/ day during April to June) • Spring fresh (one fresh of lower magnitude in October or November) • Summer/autumn low flow • Summer/autumn freshes (two freshes, one at upper, one at lower magnitude) • Autumn freshes (two freshes)
	Tier 1b (supply deficit)			
	• Winter/spring/ autumn low flow (at upper magnitude in July) • Autumn fresh (one fresh of lower duration in May)	• Winter/spring/ autumn low flow (at upper magnitude in July) • Autumn fresh (one fresh in May)	• Winter/spring/ autumn low flow (at upper magnitude during May to June) • Autumn fresh (one fresh in May)	• Spring fresh (one fresh in September)
Potential environmental watering – tier 2 (additional priorities)	• N/A			
Heyfield wetlands				
Potential environmental watering – tier 1 (high priorities)	**Tier 1a (can be achieved with predicted supply)**			
	• Fill • Top-ups as required to maintain water level (during October to May)		• Fill • Top-ups as required to maintain water level (during October to March) • Partial drawdown (during April to May)	
Potential environmental watering – tier 2 (additional priorities)	• N/A			
Possible volume of water for the environment required to achieve objectives	• 15,600 ML (tier 1a) • 7,700 ML (tier 1b)	• 17,800 ML (tier 1a) • 10,600 ML (tier 1b)	• 19,700 ML (tier 1a) • 7,300 ML (tier 1b)	• 24,400 ML (tier 1a) • 3,600 ML (tier 1b)
Priority carryover requirements for 2024-25	• 0 ML			

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2.4 Macalister system

Waterway manager – West Gippsland Catchment Management Authority

Storage manager – Southern Rural Water

Environmental water holder – Victorian Environmental Water Holder

System overview

***Wirn wirndook Yeerung* (Macalister River) flows from Mt Howitt in the Alpine National Park and joins *Carran Carran* (Thomson River) south of Maffra (Figure 2.4.1). The river winds its way to the southeast through mostly forested, confined valleys and narrow floodplains above Lake Glenmaggie. The downstream reaches flow through wide alluvial floodplains that have been cleared for agriculture. The Wellington River and Glenmaggie Creek are the main tributaries of the Macalister River.**

Lake Glenmaggie is the major water harvesting storage regulating the Macalister River. Maffra Weir is a small diversion weir located further downstream in Maffra.

Before the construction of Lake Glenmaggie, the Macalister River would regularly receive high and medium flows in winter and spring. Although Lake Glenmaggie regularly spills, high flows are less frequent than natural because the storage captures much of the water. A notable impact of irrigation and water harvesting is reversed seasonality of the flow between Lake Glenmaggie and Maffra Weir. Summer flows through this reach are much greater than natural due to the delivery of irrigation water. Winter flows in this reach are lower than natural because a large proportion of the inflows are captured and there are no irrigation demands over winter. Most irrigation water is diverted at Maffra Weir, and flow downstream of the weir is lower than natural year-round. The changed hydrology restricts fish migration, limits the growth and recruitment of in-stream and streamside plants and reduces the quality of in-stream habitat.

Water for the environment is stored in Lake Glenmaggie and released to the Macalister River. The river is divided into two reaches for the purposes of managing environmental flows: Lake Glenmaggie to Maffra Weir (reach 1) and Maffra Weir to the Thomson River (reach 2).

Maffra Weir is a major barrier to fish movement along the river, so delivery of water for the environment for migratory fish objectives mainly focuses on reach 2. All other objectives apply to both reaches 1 and 2. Construction of a new fish ladder on Maffra Weir to improve fish passage is scheduled to commence in 2024-25, and it is not expected to affect deliveries of water for the environment in 2023-24.

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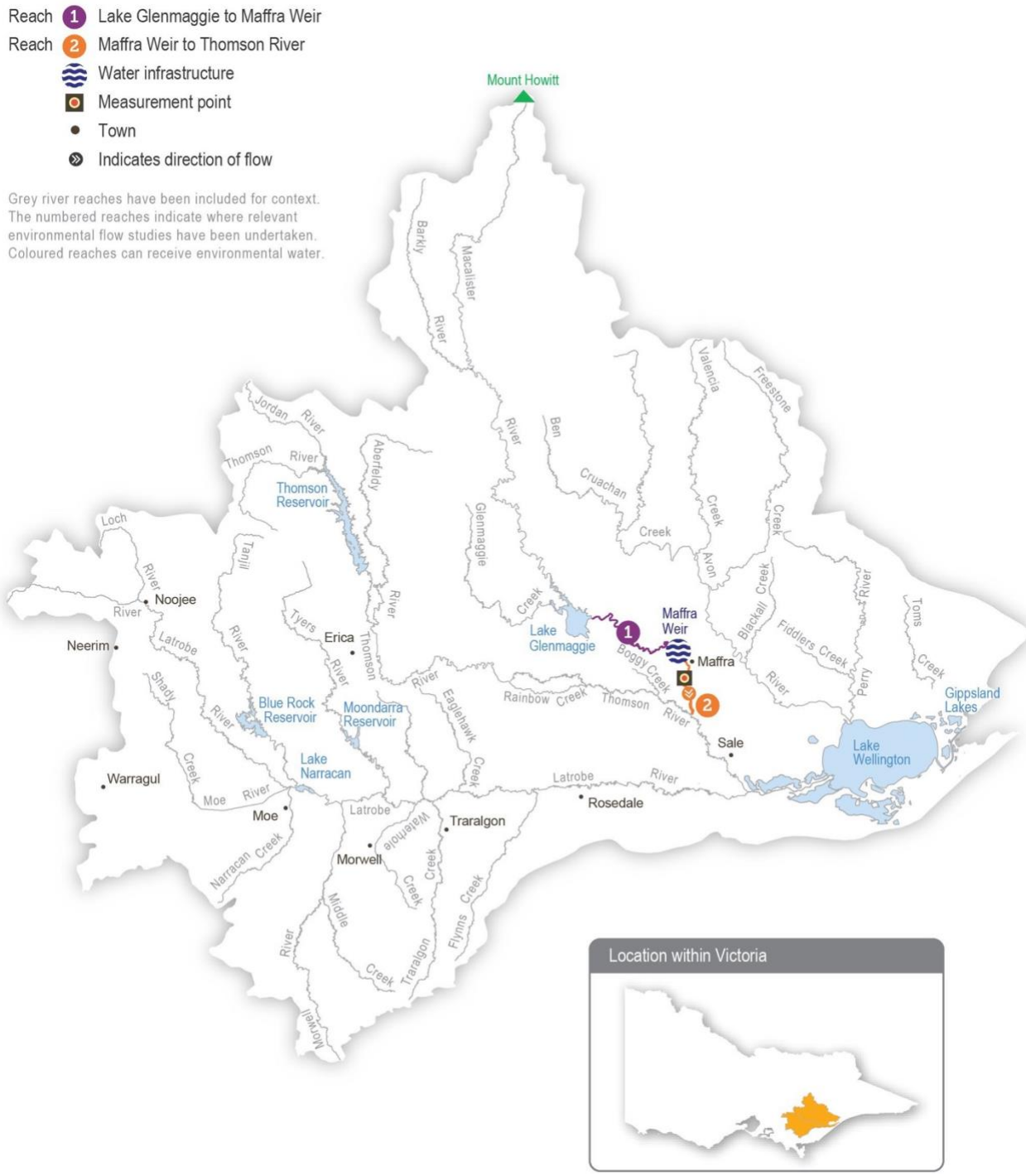
Figure 2.4.1 The Macalister system



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Environmental values

Seven migratory native fish species move between the Macalister River, the estuary and the sea to complete their life cycle. These species include the Australian grayling, short-finned eel, long-finned eel, tupong, Australian bass, short-headed lamprey and common galaxias. Yellow-eye mullet, an estuarine species, has been recorded in the river. Platypus and rakali (water rats) are widely distributed through the Macalister River and its tributaries.

The streamside vegetation corridor along the regulated reaches of the Macalister River is fragmented. Immediately below Lake Glenmaggie, the vegetation is in good condition. It includes remnant river red gums and good-quality stands of shrubs, particularly in areas where revegetation has occurred in combination with stock exclusion. Further downstream, the vegetation is degraded. In recent years, the cover of in-stream vegetation has declined, possibly due to increased water turbidity, erosion and a lack of an appropriate water regime to encourage plant growth. The cover of non-woody plants (such as reeds, sedges and rushes) along the river's fringes is patchy.

Environmental objectives in the Macalister system
Increase the distribution, recruitment and abundance of all native fish, and increase opportunities for the spawning and recruitment of native migratory fish (such as the Australian grayling)
Maintain the form of the riverbank and bed to provide physical habitat for aquatic animals and plants
Increase the abundance of platypus and rakali (water rats)
Maintain emergent (non-woody) and fringing (woody) vegetation in the streamside zone Reinstate submerged aquatic vegetation
Increase the abundance and number of functional groups of waterbugs
Improve water quality during periods of reduced or no passing flow from Lake Glenmaggie

Traditional Owner cultural values and uses

Wirn wirndook Yeerung (Macalister River) is a very important river to the Gunaikurnai people. It is a pathway that connects the Snow Country to the heart of Gippsland. It is a pathway to ceremonial grounds and a known special men's place to Elders. Its traditional name is *Wirn wirndook Yeerung*, which translates to '*song of the male fairy wren*'.

Yeerung is the men's totem. This river has many cultural resources and extensive important sites along the whole system.

The Gunaikurnai have had a continued connection to Gunaikurnai Country for over 50,000 years, including with the waterways in the Latrobe system into which *Wirn wirndook Yeerung* (Macalister River) feeds. For the Gunaikurnai as Traditional Owners, there are immense challenges to heal, protect and manage Country which has been drastically altered since colonisation. *"As Gunaikurnai, we see our land (Wurruk), waters (Yarnda), air (Watpootjan) and every living thing as one. All things come from Wurruk, Yarnda and Watpootjan and they are the spiritual life-giving resources, providing us with resources and forming the basis of our cultural practices. We have a cultural responsibility to ensure that all of it is looked after" (Water is Life: Traditional Owner Access to Water Roadmap 2022 - Gunaikurnai Nation Statement)*. This cultural landscape is dependent on culture and Aboriginal management.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is working with the West Gippsland CMA to determine how to express Gunaikurnai objectives for water in a way that contributes to seasonal watering proposals from the perspective of traditional custodians, with traditional knowledge. GLaWAC has membership on the Macalister Environmental Water Advisory Group (EWAG).

GLaWAC has expressed that more water needs to go down *Wirn wirndook Yeerung* (Macalister River) between Lake Glenmaggie and Lake Wellington to improve water quality, including to address the threat of salinity and to support plants and animals that have cultural values and uses.

GLaWAC has also questioned the timing of watering events and a desire to provide increased water depth to promote downstream fish migration and spawning, deeper water pools to prevent water-quality degradation, and more variation in water levels to better mimic natural conditions.

Traditionally the landscape – which includes *Wirn wirndook Yeerung* (Macalister River), and branches and associated floodplains – has been a rich source of food, medicine and resources for the Gunaikurnai people. In the area, there are many sites of cultural significance near the river and around Lake Glenmaggie. The Gunaikurnai have moved through the landscape along the waterways for thousands of years, sourcing food and plants along the way.

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From the perspective of the Gunaikurnai, the land and waterways flowing to the Gippsland Lakes are interconnected and cannot be considered separately where decisions can impact downstream areas. The lower Latrobe wetlands and the rivers that feed them, including *Wirn wirndook Yeerung* (Macalister River), have important cultural significance to the Gunaikurnai.

Watering requirements to support cultural values and uses include:

- timing the delivery of water for the environment planned in partnership with GLaWAC to support a seasonal flow regime and wet and dry periods that embody healthy Country
- maintaining freshwater supply to the *Durt-Yowan* (Latrobe River) estuary, Dowd Morass, Sale Common and Heart Morass, and associated freshwater habitats. The lower Latrobe wetlands are an important resource for the Gunaikurnai
- providing connectivity between reaches and onto floodplains to support dependent plants and animals with cultural values and uses of significance to the Gunaikurnai
- maintaining water quality to support the health of native plants and animals with cultural values and uses of significance to the Gunaikurnai.

West Gippsland CMA engaged with the GLaWAC Cultural Water Team about Macalister watering priorities for 2023-24, with engagement planned to continue in the 2023-2024 water year.

Social, recreational and economic values and uses

In planning the potential environmental watering actions in Table 2.4.1, the West Gippsland CMA considered how environmental flows could support values and uses, including:

- water-based recreation (such as canoeing, kayaking and swimming)
- riverside recreation and amenity (such as fishing)
- socioeconomic benefits (such as preventing erosion and potentially losing private and public land).

Scope of environmental watering

The term ‘environmental watering’ refers to the active delivery of water for the environment to support particular environmental objectives by altering the flow in a river or the water level in a wetland. While other terms are also used to describe the delivery of water for the environment, ‘environmental watering’ is deliberately used here and in seasonal watering statements to ensure consistency in the legal instruments that authorise the use of water for the environment in Victoria.

Table 2.4.1 describes the potential environmental watering actions in 2023-24, their expected watering effect (that is, the intended physical or biological effects of the watering action) and the longer-term environmental objectives they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

Table 2.4.1 Potential environmental watering actions, expected watering effects and associated environmental objectives for the Macalister system

Potential environmental watering action	Expected watering effects	Environmental objectives
Macalister River (targeting reach 2)[1]		
Winter/spring low flow (300 ML/day for at least 120 days during July to November 2023 and June 2024)	• Provide permanent wetted habitat for waterbugs and maintain water depth over riffles to enable fish passage between local habitats • Provide sustained wetting of low-level benches to limit the encroachment of terrestrial vegetation	
Spring fresh (one fresh of 700 ML/day for five days during September to November)	• Cue the upstream migration of adult fish (e.g. short-headed lamprey) and the recruitment of juveniles (e.g. Australian grayling, tupong, common galaxias, Australian bass and short- and long-finned eels) from marine/ estuarine environments • Wet mid-level benches to water woody vegetation, limit the encroachment of terrestrial vegetation and facilitate the dispersal of emergent and fringing vegetation seeds and propagules throughout the reach	

Potential environmental watering action	Expected watering effects	Environmental objectives

Spring/summer fresh following spill (one fresh peaking at 1,500-1,800 ML/day for three to 10 days during September to December)	• Shape the recession of a 1,500 ML/day or 3,000 ML/day spill to:
	  • wet mid- and higher-level benches to water emergent and woody vegetation and move organic matter into the channel to transport food resources downstream
	  • provide flow with sufficient shear stress to scour biofilms and flush fine sediment from pools and small gaps in the substrate to improve geomorphic habitat and food resources for waterbugs
	  • cue the upstream migration of adult fish (e.g. short-headed lamprey) and the recruitment of juveniles (e.g. Australian grayling, tupong, common galaxias, Australian bass and short- and long-finned eels) from marine/ estuarine environments
		

Spring/summer low flow (60-90 ML/day during September to January)	• Maintain the water depth in pools and hydraulic habitat for native fish • Maintain permanent wetted habitat in pools and riffles for waterbugs • Provide longitudinal connectivity for local movement of platypus and rakali (water rats), as well as protection from predation, access to food sources and maintenance of refuge habitats Note: At 90 ML per day, expected watering effects are met in reach 1 and 2. At 60 ML per day, expected watering effects are met in reach 2 only	
Trigger-based summer/ autumn low flow (40-60 ML/day for five to 13 days during December to May) *Trigger: extended periods of reduced passing flow or no flow being released from Lake Glenmaggie*	• Maintain permanent wetted habitat in pools and riffles for fish and waterbugs to survive • Provide shallow, slow-flowing habitat to maintain in-stream vegetation • Maintain a minimum depth in pools to allow for turnover of water and to slow degradation of water quality to support aquatic life	
Summer/autumn fresh(es) (one to three freshes of 140 ML/day for three days during December to March)	• Increase water depth to allow fish to move throughout the reach • Flush pools to maintain water quality for aquatic animals • Flush substrates and improve the quality of existing waterbug habitat and food supply • Wet low benches to facilitate the dispersal of seeds and propagules from emergent vegetation throughout the reach • Provide flow with sufficient shear stress to flush fine sediment from small gaps to improve geomorphic habitat	
Autumn fresh (one fresh of 350 ML/day for five days during April to May)	• Cue the downstream migration of Australian grayling towards the estuary for spawning • Additional benefits for the Thomson River and the Latrobe system are expected when delivered for greater than three days: • Fully flush the upper Thomson River estuary when delivered for more than three days and combined with freshes in the Thomson River, and contribute freshwater to the lower reaches of the Latrobe River and wetlands	
Autumn/winter low flow (60-90 ML/day during March to August)	• Maintain pool and riffle habitat for waterbugs and a minimum depth over riffles to allow fish to move throughout the reach • Provide connectivity throughout the river for the local movement of platypus and rakali (water rats), and provide protection from predation and access to food • Provide a low-velocity flow and clear water to enable the establishment of submerged vegetation Note: At 90 ML per day, expected watering effects are met in reach 1 and 2. At 60 ML per day, expected watering effects are met in reach 2 only.	

Potential environmental watering action	Expected watering effects	Environmental objectives
Autumn/winter fresh (one fresh of 700 ML/day for five days during July to August 2023 or May to June 2024)	• Cue the downstream migration of Australian bass and tupong towards the estuary for spawning/breeding • Increase the wetted area and improve water quality by flushing pools, providing habitat and conditions for waterbugs • Wet low and mid-level benches to facilitate the dispersal of emergent and fringing vegetation seeds and propagules throughout the reach	

1 All freshes target reach 2 specifically. Low flows target reaches 1 and 2, but the magnitudes targeted apply to both reaches.

Scenario planning

Table 2.4.2 outlines potential environmental watering and expected water use in a range of planning scenarios.

The Macalister River has experienced wet conditions for the third consecutive year, with natural flow and storage spills from Lake Glenmaggie meeting or exceeding environmental flow recommendations throughout winter and spring 2022. Preliminary results of recent monitoring show that wet conditions have again provided ideal breeding conditions for native fish within the system. Planned environmental watering actions in 2023-24 will continue to focus on supporting the migration, spawning and recruitment of native fish within the system. They are generally the same for all planning scenarios, but the duration and magnitude may vary depending on water availability throughout the year.

Providing a year-round low flow to maintain habitat connectivity for aquatic animals in the Macalister River is the highest-priority watering action in all planning scenarios to maintain critical habitat and food for native fish and platypus. The year-round operational passing flow of 60 ML per day will meet the minimum low-flow objectives for reach 2. Increasing the flow to 90 ML per day will meet the minimum low-flow objectives for both reaches 1 and 2 and will provide more habitat and food to help grow waterbugs, fish and platypus populations and exclude terrestrial vegetation from the main channel. A higher-magnitude low flow is therefore preferred and may be partly met by operational releases and natural inflows at certain times. Water for the environment will be used where possible to deliver a higher-magnitude low flow, but it will be prioritised in November in all planning scenarios when operational and consumptive water deliveries are expected to be low.

In the drought planning scenario, the passing flow from Lake Glenmaggie may be reduced during summer and autumn, and there may not be enough water for the environment to maintain a flow of at least 60 ML per day. If this happens, water for the environment may be used to deliver a trigger-based low flow of 40 ML per day for five to 13 days and summer/autumn freshes to maintain pool habitats that will serve as important refuges for native fish and platypus. The West Gippsland CMA will monitor water quality during such conditions and adapt the flow if necessary to limit stress on aquatic fauna. In the wet planning scenario, the low flow may be increased to 300 ML per day during winter and spring to wet the lower benches over a sustained period to discourage the encroachment of terrestrial vegetation.

Delivering at least one fresh of 350 ML per day in autumn and 700 ML per day in spring (both for five days) is a high priority in all planning scenarios to provide a migration trigger for native fish to move into or out of the system to complete their life cycles. An additional 700 ML per day fresh may be delivered in late autumn or winter to increase fish migration. These events are necessary yearly in the average and wet planning scenarios to ensure regular recruitment and align with environmental cues in the broader landscape. They are generally a lower priority in the dry and drought planning scenarios when environmental allocations are low, but they are important to deliver even under drier conditions in 2023-24 to consolidate recent population growth following three previous wet years. Several other large freshes are recommended to slow the recession of flows following spills from Lake Glenmaggie, but they are a lower priority and will likely be at least partly met by operational releases in most planning scenarios.

As seen in recent years, natural tributary inflows and operational releases to manage storage levels are likely to achieve many of the planned watering actions in the wetter planning scenarios, so most or all tier 1a and tier 1b actions proposed for the Macalister River in the wet scenario should be achievable with the available supply.

A minimum carryover target of 1,400 ML has been prioritised in the dry and average planning scenarios to support early-season low flow requirements in the Macalister River in 2024-25. There is no carryover target in the drought planning scenario, as water for the environment will be prioritised for use to meet critical watering events in 2023-24 in this scenario. In the wet planning scenario, opening allocations in 2024-25 are expected to be high enough to meet early-season low-flow requirements.

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Table 2.4.2 Potential environmental watering for the Macalister system in a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected conditions	• Limited natural flow; freshes or high flow are unlikely • Passing flow at Maffra Weir may be reduced	• Possible spills from Lake Glenmaggie in spring, minor flood levels may occur • Passing flow at Maffra Weir may be reduced	• Regular spills from Lake Glenmaggie in spring, minor to moderate flood levels may occur	• Large and frequent spills from Lake Glenmaggie, moderate to major flood levels may occur
Expected availability of water for the environment	• 15,500 ML	• 18,300 ML[1]	• 19,200 ML[1]	• 23,600 ML[1]
Potential environmental watering – tier 1 (high priorities)	**Tier 1a (can be achieved with predicted supply)**			
	• Spring fresh (one fresh) • Spring/summer low flow (delivered at upper magnitude in November following the fresh, and lower magnitude at other times) • Trigger-based summer/autumn low flow • Summer/autumn fresh (one fresh) • Autumn fresh (one fresh) • Autumn/winter low flow (delivered at upper magnitude during April to June and lower magnitude at other times)	• Spring fresh (one fresh) • Spring/summer low flow (delivered at upper magnitude in November following the fresh, and lower magnitude at other times) • Summer/autumn freshes (three freshes) • Autumn fresh (one fresh) • Autumn/winter low flow (delivered at upper magnitude during April to mid-August and lower magnitude at other times) • Autumn/winter fresh (one fresh)	• Spring fresh (one fresh) • Spring/summer low flow (delivered at upper magnitude in November following the fresh, and lower magnitude at other times) • Summer/autumn freshes (three freshes) • Autumn fresh (one fresh) • Autumn/winter low flow (continuous at upper magnitude) • Autumn/winter fresh (one fresh)	• Spring fresh (one fresh) • Spring/summer low flow (delivered at upper magnitude in November to January and lower magnitude at other times) • Summer/autumn freshes (three freshes) • Autumn fresh (one fresh) • Autumn/winter low flow (continuous at upper magnitude) • Autumn/winter fresh (one fresh)
	Tier 1b (supply deficit)			
	• Spring/summer low flow (upper magnitude continuous) • Autumn/winter low flow (continuous at upper magnitude) • Autumn/winter fresh (one fresh)	• Spring/summer low flow (upper magnitude continuous) • Autumn/winter low flow (continuous at upper magnitude)	• Spring/summer low flow (continuous at upper magnitude) • Spring/summer fresh following 1,500 ML/day spill (one fresh)	• Winter/spring low flow • Spring/summer fresh following 3,000 ML/day spill (one fresh)
Potential environmental watering – tier 2 (additional priorities)	• N/A			
Possible volume of water for the environment required to achieve objectives	• 15,100 ML (tier 1a) • 11,500 ML (tier 1b)	• 16,800 ML (tier 1a) • 4,700 ML (tier 1b)	• 17,800 ML (tier 1a) • 6,700 ML (tier 1b)	• 19,900 ML (tier 1a) • 6,700 ML (tier 1b)
Priority carryover requirements for 2024-25	• 0 ML	• 1,400 ML		• 0 ML

1 Carryover from 2022-23 may be forfeited in the event of spill releases from Lake Glenmaggie.

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2.5 Snowy system

Waterway managers – East Gippsland Catchment Management Authority and New South Wales Department of Planning and Environment

Storage manager – Snowy Hydro Limited

Environmental water holders – Victorian Environmental Water Holder and New South Wales Department of Planning and Environment

System overview

The Snowy River originates on the slopes of Mount Kosciuszko. It drains the eastern slopes of the Snowy Mountains in New South Wales before flowing through the Snowy River National Park in Victoria and into Bass Strait (Figure 2.5.1).

There are four major dams and multiple diversion weirs in the upper Snowy River catchment that capture and divert water to the Murrumbidgee River and Murray River valleys. The hydrological effects of the Snowy Mountains Scheme are substantial, but they are partly alleviated by the contribution of flows from tributaries (such as the Delegate River in NSW and the Buchan and Brodribb rivers in Victoria).

The construction and operation of the Snowy Mountains Hydro-electric Scheme previously diverted 99 percent of the Snowy River's mean annual natural flow at Jindabyne. The loss of flow changed the structure and function of the river, reduced the opening of the Snowy River entrance to Bass Strait and resulted in a decline in environmental values.

The Victorian, NSW and Commonwealth governments agreed to recover some of the water and, in 2002, delivered the first environmental flow to the Snowy River below Jindabyne Dam to help restore the damage done by decades of limited flow. The Victorian share of water for the environment available for use in the Snowy system is held in the Victorian Murray, Goulburn and Loddon systems. The NSW share of water for the environment available for use in the Snowy system is held in the NSW Murray and Murrumbidgee systems. Collectively, the water is made available for environmental flows in the Snowy River via a substitution method, whereby water for the environment allocated in Victoria and NSW replaces water earmarked for transfer from the Snowy to Victoria and NSW to support irrigation demands. The NSW Department of Planning and Environment plans environmental flows in the Snowy River in consultation with the Snowy Advisory Committee. The committee includes representatives of the Aboriginal community, the local community, the Victorian Government, the NSW Government and environmental experts. The committee brings together local knowledge and expert advice to help inform the management and delivery of water for environmental outcomes.

The water year in the Snowy system runs from 1 May to 30 April, and the Snowy Advisory Committee plans the daily flow regime. Water for the environment is delivered daily to the Snowy River below Jindabyne Dam. The annual allocation of water for the environment varies based on water availability, rainfall and inflows. Environmental releases aim to deliver an average of 212,000 ML per year, the equivalent of 21 percent of the average annual natural flows before the construction of the Jindabyne Dam.

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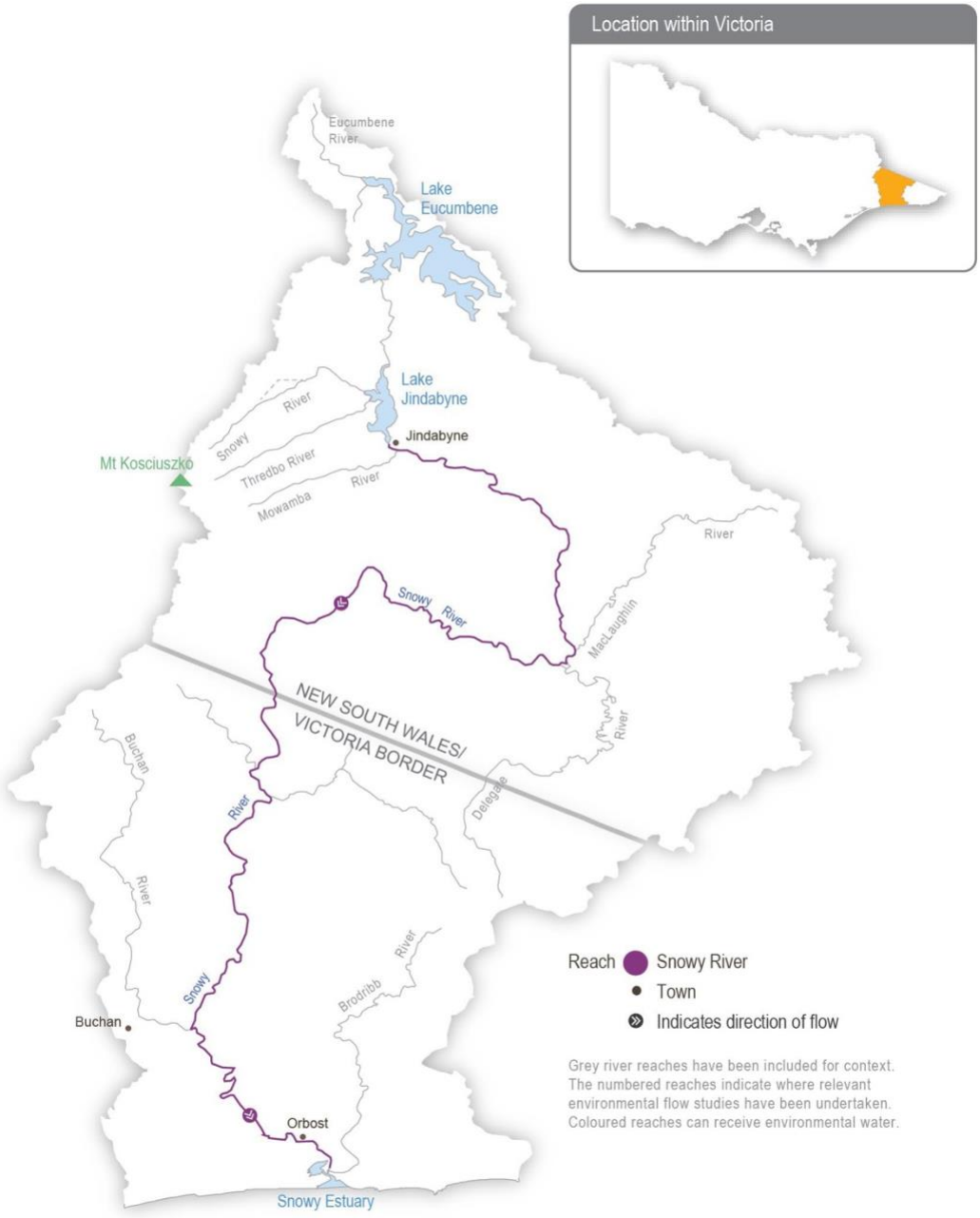
Figure 2.5.1 The Snowy system



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Environmental values

Environmental values in the upper reaches and tributaries of the Snowy River include water-dependant plants and animals, including freshwater native fish (such as river blackfish and Australian grayling), platypus and frogs. The lower reaches support estuary perch and Australian bass that move between saltwater and freshwater systems. The estuary contains estuarine and saltwater species (such as flathead and black bream). The floodplain wetlands of the Snowy River near Marlo provide feeding and breeding areas for wetland and migratory birds.

Traditional Owner cultural values and uses

Traditional Owners with links to the Snowy River system Include the Gunaikurnai, Monero Ngarigo, and Bidhawal peoples.

The river and its associated systems and lands have significant cultural values, including as a functional and spiritual connective pathway. The Snowy River has enduring cultural importance as a place for the gathering of different Nations; ceremonies; access to food, fibre and other resources; stories; spirituality; and songlines.

The Gunaikurnai Land and Waters Aboriginal Corporation holds Registered Aboriginal Party status across a large section of East Gippsland, including the lower Snowy River, associated with the Krauatungalung clan. This landscape was largely a transitionary landscape, with people migrating seasonally from the high country to the coast and back, depending on

availability of different food sources throughout the year. Many trade routes travel through freshwater river systems, such as the Snowy River system.

GLaWAC provided input to the draft Snowy River estuary flows study.

Scope of environmental watering

The total volume available for release to the Snowy River in 2023-24 is 220,500 ML, which for the third year in a row is one of the highest volumes of water for the environment ever available for the Snowy River.

Due to operating rules in the system, the daily flow regime that will be delivered in 2023-24 is pre-planned. The storage manager will make daily releases of varying magnitudes from Lake Jindabyne between May 2023 and April 2024 to mimic the typical flow patterns of a mixed snowmelt/rainfall river system characteristic of the Snowy Mountains. A ‘natural flow

scaling’ approach is applied, and the continuous daily releases aim to support ecological processes in the Snowy River below Jindabyne Dam and maintain a healthy river that is much smaller than the natural channel that existed before the river was regulated.

Following wet years in 2021-22 and 2022-23, the availability of water for the environment will again allow for a large number of high-flow releases in 2023-24 to improve ecological conditions and build additional resilience into the system. The flow pattern is similar to previous years and mimics a snowmelt river, with a greater flow during winter and spring. Eight high-flow events exceeding 2,500 ML per day are scheduled between May and November 2023 to move sediment and improve in-stream habitat for native fish, platypus, frogs and waterbugs. The largest release, known as a flushing flow, will occur in either May

or October 2023 if Lake Jindabyne is high enough to enable delivery through the required infrastructure. It has a target peak flow rate of at least 5,000 ML per day, which will be held for about eight hours to flush fine sediment and wet high benches and backwaters. Other peak flows will mimic winter rainfall and spring snowmelt events. Moderate-to-high flow rates will be sustained from the end of May to December 2023 to mix water in the estuary to benefit plants and fish (such as Australian bass). Lower flow rates will be maintained from January until the end of the water year in April 2024, but peaks of over 1,000 ML per day will be provided each month where possible.

For further information, visit the NSW Department of Planning and Environment’s Water for the environment website at https://www.environment.nsw.gov.au/topics/water/water-for-the-environment/snowy-and-montane.

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