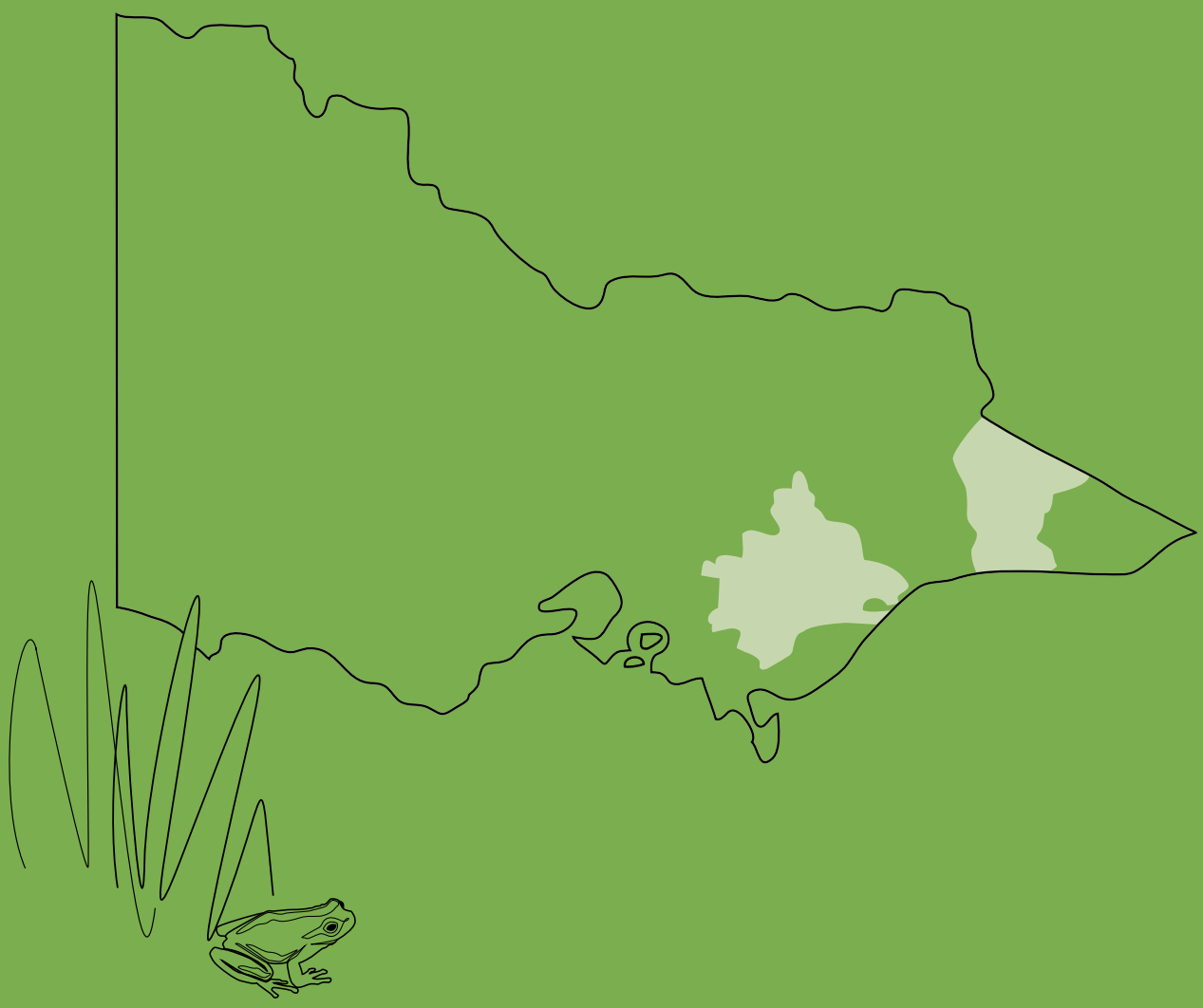
Section 2

Gippsland Region



2.1 Gippsland Region overview

The four river systems in the Gippsland Region that can receive water from the VEWH's environmental entitlements are the Latrobe (including the Latrobe River and lower Latrobe wetlands), Thomson River, Macalister River and Snowy River.

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

Traditional Owners in the Gippsland Region

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

The Registered Aboriginal Party (RAP) for part of the Gippsland Region in Victoria is the Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC). In 2010, the Victorian Government and the Gunaikurnai people entered into the Gunaikurnai Settlement Agreement under the *Traditional Owner Settlement Act 2010*. Under the agreement, the Gunaikurnai Traditional Owner Land Management Board was established to jointly manage parks and reserves between Warragul and Orbost.

The West Gippsland CMA has been working with GLaWAC for many years, and a memorandum of understanding between West Gippsland CMA and GLaWAC is in place to support working arrangements between the organisations. West Gippsland CMA and GLaWAC work together to identify actions and priorities to improve knowledge of cultural values, protect cultural heritage, incorporate traditional ecological knowledge and provide opportunities for cross-cultural learning and participation in CMA projects. West Gippsland CMA also works with the Boon Wurrung Foundation, Bunurong Land Council and Wurundjeri Tribal Council.

The NSW Department of Primary Industries (Water) have historically worked with Aboriginal communities that have a strong connection to waterways in the Snowy Mountains. These include the Maneroo-Ngarigo, Bidwell Maap, Southern Monero (Monero-Ngarigo / Yuin / Bolga), Wongalu and Wiradjuri people.

Community considerations

When planning to use water for the environment, the potential social, economic, Aboriginal cultural and community recreational benefits which could arise from the water's use are considered. Some scoped opportunities for shared community benefits of water for the environment in the Gippsland Region in 2018–19 include:

- timing environmental flows over long weekends in the upper Thomson River (where there is an overlap with migratory fish spawning and recruitment seasons), to increase whitewater rafting opportunities for kayakers and canoeists: for example, a spring fresh for Australian grayling recruitment in 2018 might be delivered over the Melbourne Cup weekend
- releasing environmental flows to support downstream migration and recruitment of Australian bass in the Thomson and Macalister rivers and estuary perch in the Thomson River, which increases opportunities for recreational anglers.

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

In addition to these opportunities, water for the environment has indirect benefits (such as improving amenity that benefits walkers, cyclists, birdwatchers and hunters around the lower Latrobe wetlands).

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

Integrated catchment management

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

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

- works to protect and enhance streambanks along priority reaches of rivers and their tributaries including fencing to exclude stock, revegetation of riverbanks, invasive species control (including willow) and waterway stabilisation
- working with farmers along the Thomson and Macalister rivers on grazing and soil management, and on nutrient and water-use-efficiency projects that help improve water quality and river health outcomes
- planning to build a fishway on the Thomson River, to improve fish passage near the heritage-listed Horseshoe Bend Tunnel; this project will allow migratory fish including Australian grayling, which are specifically targeted with releases of water for the environment, to move into an additional 85 km of river habitat in the upper reaches of the Thomson catchment
- a program of remote weed and willow control in the Snowy River catchment, which has led to 200 km of the river now being willow-free; native vegetation is flourishing in areas where willows have been removed and it provides a valuable food source and habitat for animals.

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

Upper Macalister River, by West Gippsland CMA

Seasonal outlook 2018–19

Water for the environment for the Latrobe, Thomson and Macalister systems is held in Blue Rock Reservoir, Thomson Reservoir and Lake Glenmaggie respectively.

The Thomson system receives a secure annual allocation which is available on 1 July each year, in addition to a share of the daily inflows to the Thomson Reservoir. In the Latrobe and Macalister systems, water availability depends on system inflows to Lake Glenmaggie and Blue Rock Lake. Most of these inflows occur in winter and spring, so annual allocations are usually known before the start of summer.

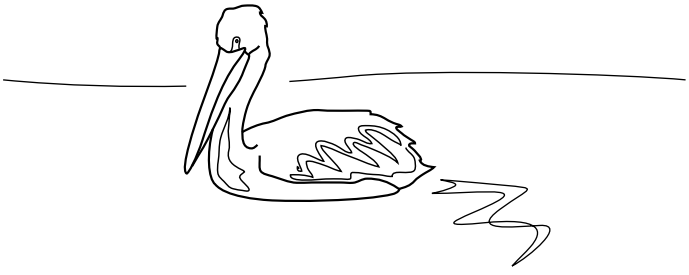
In all three systems, the VEWH will carry over water from 2017–18 into 2018–19. In the Macalister system, the carryover will be used to deliver priority flows in July and August, and we will rely on further inflows to provide sufficient allocations to meet high-priority watering demands later in 2018–19. In the Thomson and Latrobe systems, carryover water will be set aside to use in late winter and spring, by which time there should be more-reliable estimates of seasonal allocations and the overall availability of water for the environment in all three systems.

The probability of exceeding median rainfall in the Gippsland Region in early winter 2018 is better than average, but it has been particularly dry during summer and autumn 2018 and the catchments are very dry. The catchments will need significant rain to saturate the ground before there is any marked effect on streamflow. There will be high reliance holdings of water for the environment to provide critical-flow components until natural run-off and unregulated flows increase.

Current holdings of water for the environment are likely to be sufficient to deliver the highest-priority watering actions in the Latrobe, Thomson and Macalister rivers in the first half of 2018–19. A return to drought conditions may significantly limit allocations of water for the environment during 2018–19 and therefore deliveries of water for the environment later in the year will need to be managed to provide enough carryover to meet critical demands in 2019–20. Additional water for the environment may be sought via transfers from within the Gippsland system or from another region, if allocations are inadequate to deliver important environmental outcomes.

Under an average-to-wet scenario, there will be sufficient water to meet all identified potential watering actions for the Macalister, Thomson and Latrobe systems. High inflows will also boost Water Holdings for 2019–20. Under a wet scenario, the Latrobe wetlands may be filled with natural flushing flows that have not occurred on a large-scale since 2011–12.

Planning of water for the environment in the Snowy system is managed by the NSW Department of Industry, which consults the Victorian and Australian governments and stakeholder groups about water for the environment released to the Snowy River. The total volume for release and daily release targets for the Snowy River from May 2018 to April 2019 are set in place and daily releases will not vary unless flows increase the risk of flooding downstream.



2.2 Latrobe system

Waterway manager – West Gippsland Catchment Management Authority

Storage manager – Southern Rural Water

Environmental water holder – Victorian Environmental Water Holder

The Latrobe system includes the Latrobe River and lower Latrobe wetlands: Sale Common, Dowd Morass and Heart Morass.

The Latrobe River, its tributaries and the Latrobe wetlands continue to be important places for Traditional Owners and their Nations. The Registered Aboriginal Party (RAP) in the region is the Gunaikurnai Land and Waters Aboriginal Corporation.

Engagement

Table 2.2.1 shows the partners with which West Gippsland CMA engaged when preparing the Latrobe system seasonal watering proposal.

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

Table 2.2.1 Partners and stakeholders engaged in developing the Latrobe system seasonal watering proposal

Partner and stakeholder engagement
• Field and Game Australia
• Latrobe Valley Field Naturalists Club
• Local irrigators and famers
• Parks Victoria
• Southern Rural Water
• Victorian Environmental Water Holder
• Wetlands Environmental Taskforce, a registered environmental organisation that purchases and restores wetlands in Victoria

2.2.1 Latrobe River

The Latrobe River originates on the Mount Baw Baw Plateau and passes through relatively flat to undulating plains cleared for agriculture, before flowing into Lake Wellington (the westernmost point of the Gippsland Lakes). Notable tributaries include the Tanjil River, Narracan Creek, Morwell River, Tyers River, Traralgon Creek and the Thomson River.

Environmental values

The upper Latrobe River flows through state forest and remains relatively intact and ecologically healthy. It contains some continuous stands of river red gums and intact riparian vegetation. This section of the Latrobe also supports native animal species including barred galaxias, river blackfish, Gippsland spiny crayfish and nankeen night herons.

The lower Latrobe River flows through the Latrobe Valley and is highly degraded due to historic river management practices. Most snags have been removed from the river and many sections have been artificially straightened. These practices have caused significant erosion and widened the channel, which has in turn reduced the quality and quantity of habitat for aquatic plants and animals.

Endangered and vulnerable vegetation communities are 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 several native estuarine and freshwater fish species including black bream, Australian bass, Australian grayling and short- and long-finned eel.

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.

Social and economic values

The Latrobe Valley remains central to Victoria's energy industry, and water extracted from the Latrobe River is used in the electricity generation process. The Latrobe River also provides water for irrigation, stock and domestic licences, commercial and industrial licences and urban water supplies. These industries, along with the businesses that exist to service them, provide employment opportunities in the region.

Water storages throughout the catchment are popular recreation areas. Lake Narracan hosts annual waterskiing events and Blue Rock Reservoir is becoming increasingly popular for recreational fishing. The lower Latrobe River is commercially fished for eel and carp. It also contains black bream and estuary perch, which are favoured by recreational fishers. Many of the region's wetlands attract walkers, birdwatchers and hunters.

Environmental watering objectives in the Latrobe River

	Form in-stream bars to help stabilise the structure and condition of the river channel: this will help to reduce the load of sediment and nutrients flowing into the Gippsland Lakes
	Establish native plants on bars and lower parts of the banks to stabilise the river channel
	Improve in-stream habitat for native fish including black bream and estuary perch
	Improve in-stream habitat for waterbugs

System overview

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 electricity generators in the Latrobe Valley and town water.

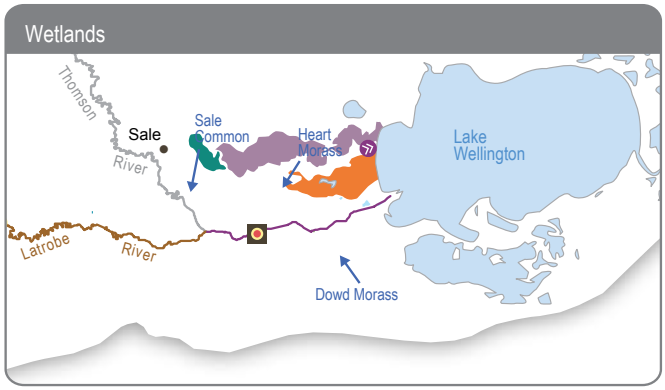
The Latrobe River from Rosedale to the Thomson River confluence (reach 5) is the priority reach for water for the environment because it contains endangered plant communities that have good potential for rehabilitation.

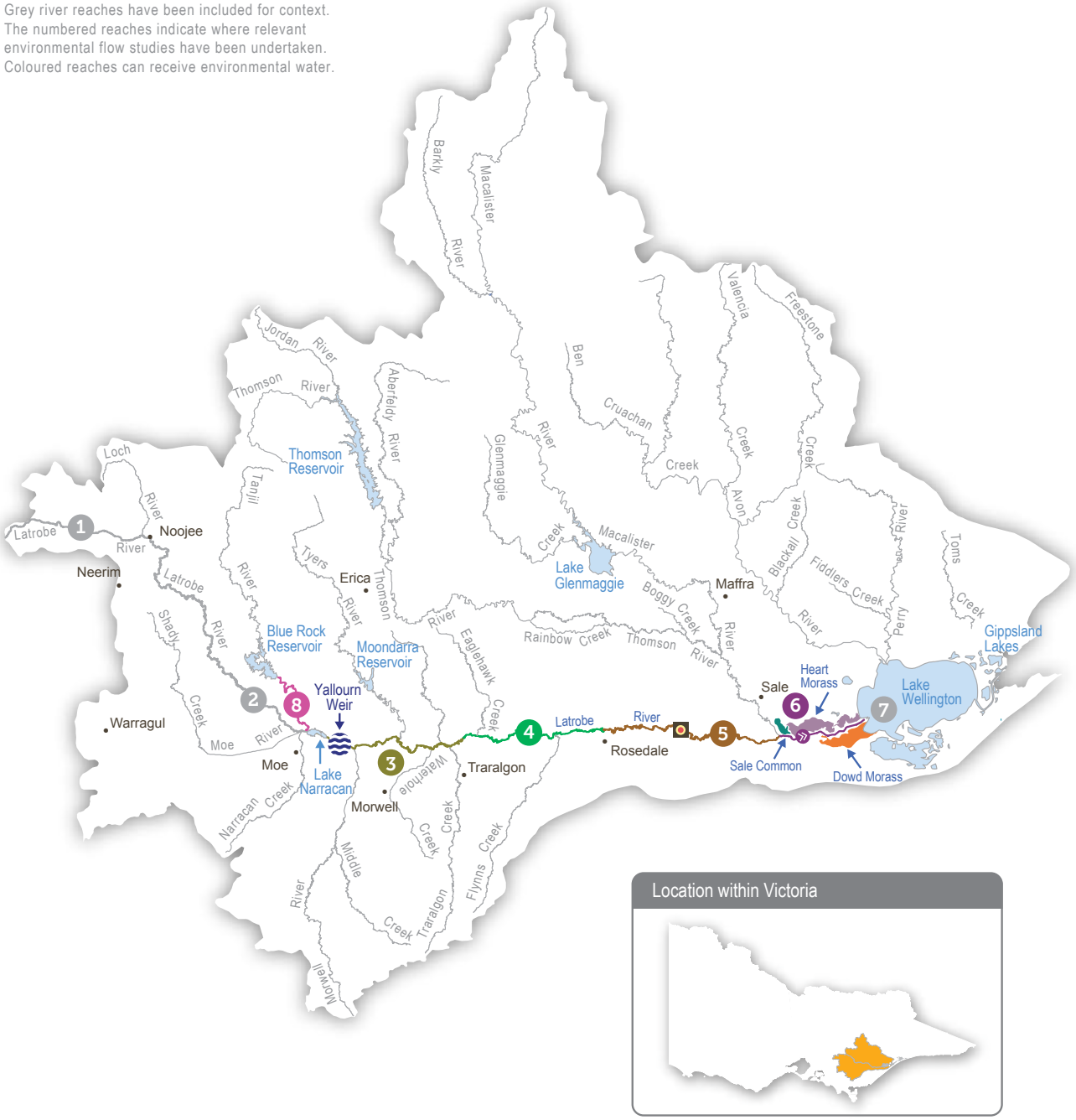
Upper Latrobe River, by Rachael Millar, West Gippsland CMA

Figure 2.2.1 The Latrobe system

Reach 1 Upstream of Willow Grove
Reach 2 Willow Grove to Lake Narracan
Reach 3 Lake Narracan to Scarnes Bridge
Reach 4 Scarnes Bridge to Rosedale
Reach 5 Rosedale to Thomson River confluence
Reach 6 Downstream of Thomson confluence
Reach 7 Lake Wellington
Reach 8 Tanjil River
Water infrastructure
Measurement point
Town
Indicates direction of flow

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





Recent conditions

Climatic conditions in West Gippsland were warmer and drier than average during the 2017–18 water year. The only significant natural flow events were a minor flood in the Latrobe River that lasted less than six days in mid-September and an event downstream of the Thomson confluence in early December. More environmental flows were delivered to the Latrobe River in 2017–18 than in previous years. Freshes were delivered in November 2017 and March and April 2018.

The environmental flow provided in November was a first for the Latrobe River at that time of year. Several natural freshes had already occurred due to heavy rainfall and minor spills from Blue Rock Reservoir, and an extra release was necessary to bolster vegetation growth on the banks of the lower Latrobe during the peak growing season in spring. The fresh was also coordinated with releases made in the Thomson and Macalister rivers to deliver a large pulse through the system to support native fish migration.

Environmental flows in March 2018 complemented three smaller, unregulated freshes that occurred in January. The release in April 2018 was combined with releases made to the Thomson and Macalister rivers to maintain bank vegetation and improve water quality in the lower Latrobe River estuary.

Low-flow recommendations were achieved from passing flows and unregulated flows during July to December 2017, but summer/autumn low flows were below the minimum-flow recommendation. Low flows were not augmented with environmental flow releases because the two freshes were considered sufficient to provide in-stream habit throughout summer and autumn.

Scope of environmental watering

Table 2.2.2 shows potential environmental watering actions and their environmental objectives.

Table 2.2.2 Potential environmental watering actions and objectives for the Latrobe River

Potential environmental watering	Environmental objectives
Spring/summer freshes (1,300 ML/day for 2–4 days during September to February)	• Encourage vegetation zonation along lower banks and recruitment/maintenance of in-stream vegetation
Autumn/winter freshes (1,300 ML/day for 2–4 days during March to August)	
Winter/spring low flows (690–1,500 ML/day from June–November)	• Encourage the formation of in-stream bars (deposit sediment and gravel on slightly elevated features in the river channel)
Summer/autumn low flows (up to 690 ML/day from December to May)	• Provide in-stream habitat for aquatic biota, (especially waterbugs, fish and vegetation)

Scenario planning

Under drought and dry scenarios, there will not be many natural freshes in the regulated parts of the system, so water for the environment will likely be needed to deliver spring and summer freshes to achieve the vegetation objectives. Freshes and low flows may also be needed during winter–spring to help form in-stream bars and allow fish movement.

In average and wet scenarios, spring freshes are likely to be met naturally by spills from the Blue Rock Reservoir. If this occurs, water for the environment may not be used until summer or autumn.

Under the Blue Rock environmental entitlement, the VEWH accrues a share of inflows daily. It is important to consider rainfall, climate, river conditions and entitlement inflows between July and November when prioritising use of water for the environment. Environmental Water Holdings at the beginning of 2018–19 are lower than has been the case in previous years, due to the delivery of multiple freshes in 2017–18. Water Holdings are expected to increase with inflows under all climate scenarios, which will enable delivery of all high-priority flows.

Table 2.2.3 outlines the potential environmental watering and expected water use under a range of planning scenarios.

Habitat rehabilitation is the priority for environmental flows management in the Latrobe River, as it will help reduce sediment and nutrient loads in the river and support populations of native fish. To achieve these goals, spring freshes are prioritised for each planning scenario to encourage the recruitment and maintenance of in-stream vegetation and prevent the encroachment of terrestrial plants into the stream channel.

Under drought and dry scenarios, there will be few natural freshes in the regulated parts of the system, so environmental flows will likely be needed to deliver spring and summer freshes to achieve the vegetation objectives. Freshes and low flows may also be needed during winter–spring, to help form in-stream bars and allow fish movement.

In average and wet scenarios, spring freshes are likely to be met naturally by spills from the Blue Rock Reservoir. If this occurs, water for the environment may not be used until summer or autumn.

Under the Blue Rock environmental entitlement, the VEWH accrues a share of inflows daily. It is important to consider rainfall, climate, river conditions and entitlement inflows between July and November when prioritising use of water for the environment. Environmental Water Holdings at the beginning of 2018–19 are lower than has been the case in previous years, due to the delivery of multiple freshes in 2017–18. Water Holdings are expected to increase with inflows under all climate scenarios, which will enable delivery of all high-priority flows.

Table 2.2.3 Potential environmental watering for the Latrobe River under a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected river conditions	• Small contributions from unregulated reaches and tributaries of the Latrobe River with little opportunity for freshes to occur naturally • Consumptive demand from Blue Rock Reservoir will be very high and regular releases to the Tanjil River will contribute substantially to low flows	• There will be some unregulated flows that contribute to low flows and freshes • Consumptive demand from Blue Rock Reservoir will be high and contribute to low flows	• Unregulated flows will provide low flows throughout the year, and multiple freshes (most likely in winter and spring) • Some spills are likely and there will be releases for consumptive users which will partly contribute to low flows	• Strong summer and autumn low flows • Multiple spills from Blue Rock Reservoir will provide extended durations of freshes, high flows and overbank flows • No significant releases from consumptive entitlements in Blue Rock Reservoir are likely
Expected availability of environmental water	• 12,000–15,000 ML	• 12,000–17,000 ML	• 12,000–22,000 ML	• 12,000–30,000 ML
Potential environmental watering	• 1 spring/summer fresh • 1 autumn/winter fresh • Winter/spring low flows	• Up to three spring/summer freshes • Up to two autumn/winter freshes • Winter/spring low flows • Summer/autumn low flows	• Up to three spring/summer freshes • Up to two autumn/winter freshes • Winter/spring low flows • Summer/autumn low flows	• Up to four spring/summer freshes • Up to four autumn/winter freshes • Winter/spring low flows • Summer/autumn low flows
Possible volume of environmental water required to achieve objectives	• 12,300 ML	• 11,200 ML	• 15,900 ML	• 0–11,000 ML

Risk management

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

2.2.2 Lower Latrobe wetlands

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 a variety of waterbirds of state, national and international conservation significance. The wetlands are located on the floodplain of the Latrobe River between its confluence with the Thomson River, and they form part of the Gippsland Lakes system, with Dowd Morass and Heart Morass adjoining Lake Wellington.

Environmental values

Sale Common is one of only two remaining freshwater wetlands in the Gippsland Lakes system, and it provides sheltered feeding, breeding and resting habitat for a large range of waterbirds.

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 many species of ducks.

Together, the lower Latrobe wetlands function as a diverse and complementary ecological system. Colonial 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 summer. Waterfowl and fish-eating birds use open-water habitat at the wetlands year-round. The wetlands also contain vegetation types that are threatened (such as swamp scrub, brackish herbland and aquatic herbland).

Social and economic values

Sale Common, which is located close to the city of Sale, is a state game refuge with extensive walking tracks and boardwalks that provide opportunities for passive recreation including walking, bike riding and observing native plants and animals. Dowd Morass is a state game reserve commonly used for duck hunting. Heart Morass consists of mostly private landholdings and is also used for duck hunting.

Environmental watering objectives in the lower Latrobe wetlands

	Support the dispersal, germination and survival of wetland plant communities Manage the extent and density of invasive plants, particularly the spread of giant rush at Sale Common
	Provide foraging and breeding habitat for waterbirds including threatened, migratory and colonial nesting species
	Reduce the abundance of carp
	Provide breeding habitat for frogs including threatened species such as the green and golden bell frog and the growling grass frog
	Mitigate impacts of adverse salinity and acid sulphate soils, particularly at Dowd Morass and Heart Morass Oxygenate surface soils and break down accumulated organic matter

System overview

River regulation and water extraction from the Latrobe, Thomson and Macalister rivers has reduced the frequency of small and medium-sized floods that naturally inundate the lower Latrobe wetlands. Construction of levees and drains and filling in 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.

Recent conditions

Climatic conditions in West Gippsland were warmer and drier than average during the 2017–18 water year. Minor flooding in the Latrobe River occurred in September and December 2017, but the flows were not of sufficient duration to deliver meaningful inflows to the wetlands.

The regulator to Dowd Morass was opened from October to December 2017 and again in April 2018. The regulator was opened when the Latrobe River was high, to allow low-salinity water from the Latrobe River to reduce salinity in Dowd Morass.

At Heart Morass, flows through the regulator raised the water level by 5 cm and surface coverage at the wetland increased from about 40 to 80 percent. The managed inflows reduced salinity in the wetland and inundated the aquatic grasses, which provided food for waterbirds. Water was allowed to draw down naturally in Heart Morass and Dowd Morass from the middle of summer.

Sale Common was fully dry in June 2017, and after three days of inflows in September 2017 it was one-third full. By November 2017, the site was completely dry, apart from the long waterhole. Large stands of amphibious wetland vegetation (such as knotweed and club-rush) dominated the wetland over summer. By autumn, the amphibious vegetation began to desiccate and was replaced by terrestrial grasses. Sale Common has a more-varied water regime than Heart Morass and Dowd Morass, mainly because it is smaller but also because it received managed and unregulated inflows and drawdowns.

Scope of environmental watering

Environmental watering in the lower Latrobe wetlands aims to maintain and improve existing values and manage threats. Specific threats to the wetlands include saltwater intrusion and invasive species.

Saltwater intrusion from the Gippsland Lakes is a constant threat to Dowd Morass and Heart Morass. Rising sea levels due to climate change and reduced flows from the Latrobe River increase the threat. Heart Morass' vegetation has been degraded by many years of grazing, but much of the wetland is now recovering with the aid of restoration programs.

The lower Latrobe wetlands are affected by several invasive species. Carp limit the growth and recruitment of native aquatic vegetation in all wetlands. Brazilian milfoil, which is an invasive aquatic weed, has colonised much of the fringe of Sale Common; higher salinity levels have likely limited its spread to Heart Morass and Dowd Morass.

Table 2.2.4 shows potential environmental watering actions and their environmental objectives.

Table 2.2.4 Potential environmental watering actions and objectives for the lower Latrobe wetlands

Potential environmental watering	Environmental objectives
Sale Common	
Partial fill (any time)	• Control of invasive vegetation and algae • Mimic the natural inundation regime
Fill or partial fill (July–November)	• Encourage the growth and recruitment of wetland plants, particularly tall marsh, aquatic herbland and aquatic sedgeland • Provide feeding and breeding habitat for wetland animals, particularly waterbirds and frogs
Fill or partial fill (February–May)	• Provide feeding and sheltering habitat for wetland animals, particularly waterbirds and frogs • Discourage the spread of giant rush
Partial drawdown (primarily August–March)	• Oxygenate surface soils, break down accumulated organic matter and cycle nutrients • Encourage the growth and recruitment of wetland plants across the wetland bed • Reduce the abundance of carp
Dowd Morass and Heart Morass	
Partial fill (Dowd Morass: July–November) (Heart Morass: July–December)	• Encourage colonial waterbird breeding • Reduce salinity • Encourage the growth and recruitment of wetland plants, particularly swamp scrub, tall marsh, aquatic herbland and brackish herbland • Provide feeding and breeding habitat for wetland animals, particularly waterbirds and frogs
Partial drawdown (year-round, primarily August–March)	• Oxygenate surface soils, break down accumulated organic matter and cycle nutrients • Increase the growth and recruitment of wetland plants, particularly swamp shrub, tall marsh, aquatic herbland and brackish herbland • Reduce the abundance of carp
Partial fill (any time)	• Avoid or mitigate risks to wetland plants due to adverse salinity and pH • Mimic the natural inundation regime
Fill or partial fill (February–May)	• Provide feeding habitat for wetland animals, particularly waterbirds

Scenario planning

Table 2.2.5 outlines the potential environmental watering and expected water use under a range of planning scenarios.

Unregulated flows, climatic conditions and site observations are important considerations for managing the lower Latrobe wetlands. The planned approach in 2018–19 is to permit water levels to fluctuate in accordance with natural seasonality and mimic natural events with small-scale inflows, when conditions and environmental objectives allow.

It is highly likely that under drought and dry conditions, the wetlands will be drawn down and completely dry by the end of summer or during autumn, but small-scale inflows to the wetlands will still be provided through managed environmental flows through regulators at any time. Small-scale inflows will quickly dissipate and evaporate, and they are important to provide temporary, open-water habitat and to mitigate the risks of increasing salinity and acid sulphate soils in Heart Morass and Dowd Morass.

Under average conditions, the wetlands are likely to receive moderate, unregulated flows in winter and spring and partially draw down in summer and autumn. Under average conditions, the rate and extent of a drawdown is likely to be moderated by small-scale natural or managed environmental flows through regulators, while in wet conditions unregulated flows are likely to cause greater inundation and widespread drying is unlikely.

Under each planning scenario in Table 2.2.5, there are multiple potential watering actions in each scenario; and in some cases the timing of watering actions overlaps. This enables a flexible approach whereby small-scale inflows and drainage to and from wetlands through regulators can be managed to mimic natural conditions and optimise environmental outcomes.

Swan nest at Sale Common, by David Stork, West Gippsland CMA

Table 2.2.5 Potential environmental watering for the lower Latrobe wetlands under a range of planning scenarios

Planning scenario	Drought	Dry	Average	Wet
Expected catchment conditions	• No natural inflows from the Latrobe River and wetlands are likely to dry completely	• Minor natural inflows from the Latrobe River in winter/spring; expect moderate-to-substantial drawndown in summer	• Moderate winter and spring flows in the Latrobe River likely to fill or partially fill the wetlands; expect minor drawdown in summer	• Major flows in the Latrobe River in winter /spring and possibly autumn/winter, likely to fill all wetlands with very little drawdown over summer
Sale Common[1]				
Potential environmental watering	• Complete drawdown (July–June) • Partial or complete fill (any time)	• Partial or complete fill (July–November) • Partial or complete fill (any time) • Drawdown (August–April)	• Partial or complete fill (July– November) • Partial or complete fill (any time) • Partial drawdown (August–March) • Partial or complete fill (February–May)	• Partial or complete fill (July–November) • Partial or complete fill (any time) • Partial drawdown (December–March) • Partial or complete fill (February–May)
Possible volume of water for the environment required to achieve objectives	• 0–1,300 ML	• 0–2,600 ML	• 0–2,600 ML	• 0 ML
Dowd Morass[1]				
Potential environmental watering	• Complete drawdown (July–June) • Partial or complete fill (any time)	• Partial or complete fill (July–November) • Partial or complete fill (any time) • Drawdown (August–April) • Partial or complete fill (February–May)	• Partial or complete fill (July–November) • Partial or complete fill (any time) • Partial drawdown (August–March) • Partial or complete fill (February–May)	• Partial or complete fill (July–November) • Partial or complete fill (any time) • Partial drawdown (December–March) • Partial or complete fill (February–May)
Possible volume of water for the environment required to achieve objectives	• 0–5,800 ML	• 0–11,600 ML	• 0–11,600 ML	• 0 ML
Heart Morass[1]				
Potential environmental watering	• Complete drawdown (July–June) • Partial or complete fill (any time)	• Partial or complete fill (July–December) • Partial or complete fill (any time) • Drawdown (August–April) • Partial or complete fill (February–May)	• Partial or complete fill (July–December) • Partial or complete fill (any time) • Partial drawdown (August–March) • Partial or complete fill (February–May)	• Partial or complete fill (July– December) • Partial or complete fill (any time) • Partial drawdown (December–March) • Partial or complete fill (February–May
Possible volume of water for the environment required to achieve objectives	• 0–7,100 ML	• 0–14,200 ML	• 0–14,200 ML	• 0 ML

[1] *Potential watering actions are listed in priority order for each scenario and timing. The order and timing may vary within scenarios depending on prevailing seasonal conditions*

Risk management

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

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

The Thomson River flows from the slopes of the mountains of the Baw Baw Plateau to join the Latrobe River south of Sale. The major tributaries of the Thomson River are the Aberfeldy and Jordan rivers in the upper reaches and the Macalister River in the lowest reach. Most unregulated flows originate from the Aberfeldy River. 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 which supplies irrigation water to parts of the Macalister Irrigation District.

The Thomson River and its tributaries continue to be an important place for Traditional Owners and their Nations. The Registered Aboriginal Party in the region is the Gunaikurnai Land and Waters Aboriginal Corporation.

Environmental values

The Thomson River supports six species of migratory fish that need to move between the sea and freshwater environments to complete their life cycles. A focus for environmental flows management is the Australian grayling, which has national conservation importance. Australian grayling spawn in response to autumn high flows, and the larvae and juveniles spend time at sea before returning to the freshwater sections of coastal rivers.

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

Social and economic values

Thomson Reservoir is the largest storage in Melbourne's water supply system, and it supplies water for irrigation, industry and towns in Gippsland. The Macalister Irrigation District is the largest irrigation area in southern Victoria and a major economic driver for the region.

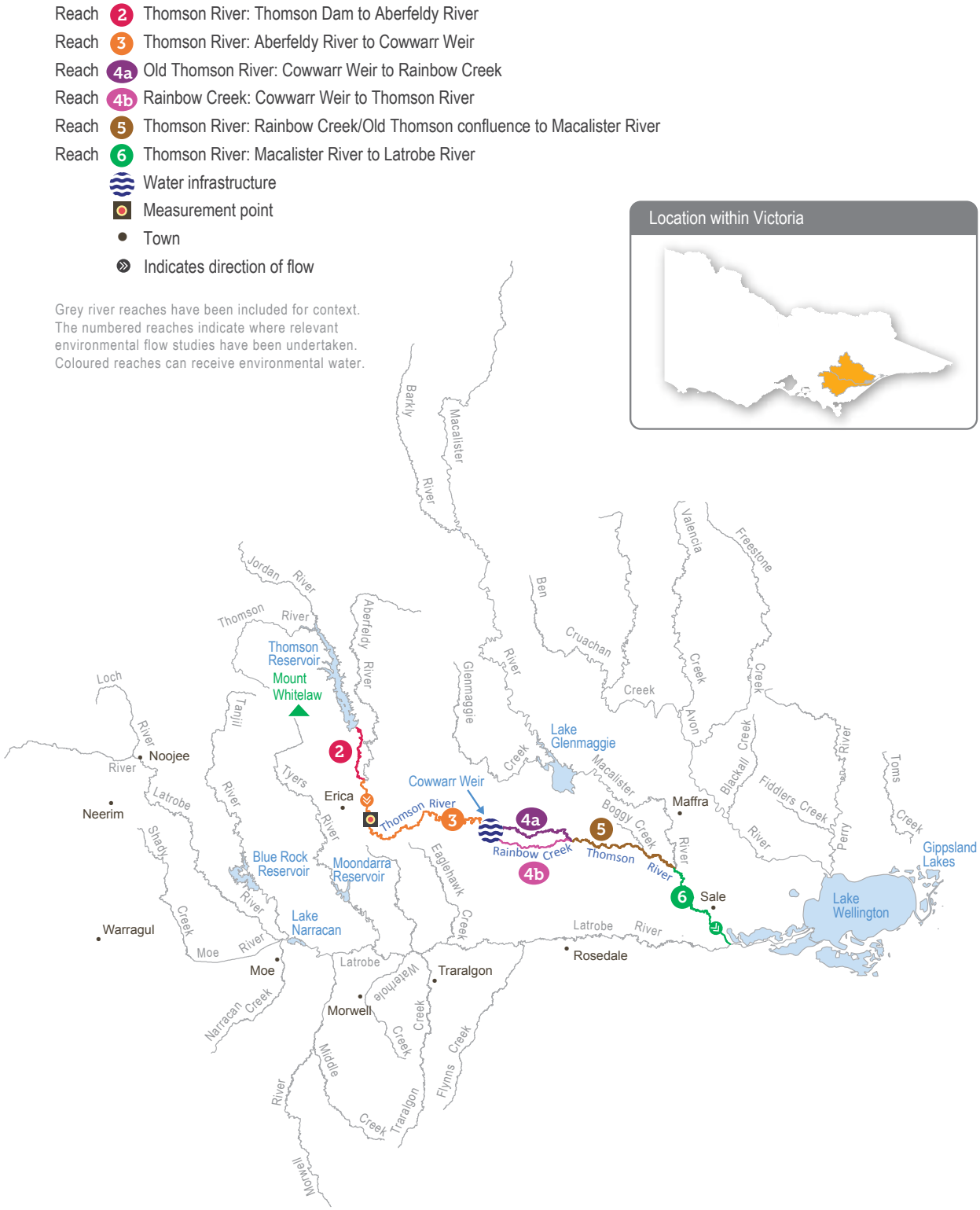
The upper reaches of the Thomson River — from Thomson Reservoir to Cowwarr Weir — and its tributary the Aberfeldy River — in the Baw Baw National Park — are classified as heritage river areas under the *Heritage Rivers Act 1992*, based on their ecological, historical and recreational values. The Horseshoe Bend tunnel is an important European heritage site in this area; it is a legacy of early gold mining in the area. The tunnel is a significant barrier to fish movement and therefore limits the ability to meet all environmental flow objectives in the upper reaches of the system.

The Thomson River is highly valued for recreation downstream of the Thomson Reservoir to Cowwarr Weir. The area is popular for camping, kayaking and canoeing. Avid kayakers, canoeists and outdoor recreational operators often take advantage of the whitewater conditions provided with releases of water for the environment in the upper reaches of the Thomson River. The local communities have a strong connection with the waterways and the visual amenity and recreational opportunities they provide.

Environmental watering objectives in the Thomson system

	Restore populations of native fish, specifically Australian grayling, by providing pool habitat and flows for fish to move and to cue spawning
	Scour silt build-up within the river bed to improve the quality of in-stream habitat for aquatic plants and animals Prevent encroachment of terrestrial vegetation into the stream channel
	Increase recruitment and growth of native riparian vegetation Prevent encroachment of terrestrial vegetation into the stream channel
	Provide waterbug habitat

Figure 2.3.1 The Thomson system



System overview

Due to the size of Thomson Reservoir, most flows from the Thomson River upper catchment are harvested in the reservoir and do not make it through to the rest of the river. The Aberfeldy River is an unregulated river and the major tributary of the Thomson River in the upper catchment. It meets the Thomson River downstream of Thomson Reservoir, and its unregulated flows are essential for providing natural freshes and high flows in the Thomson River.

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

At Cowwarr Weir, the Thomson River splits in two and water can flow down the old Thomson River course (reach 4a) and Rainbow Creek (reach 4b). The preference is to deliver water for the environment to the old Thomson River course to allow for fish migration, as Cowwarr Weir is a barrier to fish migration through Rainbow Creek. Throughout the year, passing flows are split two-thirds down reach 4a and one-third down 4b to avoid impacts to irrigators located on Rainbow Creek.

Recent conditions

Releases of water for the environment in recent years have focused on providing autumn and spring freshes for spawning and recruitment opportunities for native fish species including Australian grayling, tupong and Australian bass. Low flows have also been provided to enable fish to move between habitats along the river.

The Thomson system has experienced variable climate conditions over the past two years. There was average-to-above-average rainfall in winter and spring 2016–17 resulting in several unregulated flow peaks and minor flooding, while dry conditions followed in summer, autumn and winter. Dry conditions persisted into 2017–18 with below-average rainfall throughout most of the year. Environmental flows in 2017–18 aimed to deliver freshes to provide spawning and recruitment opportunities for Australian grayling and low flows in winter and spring to maintain the quality of fish habitat.

Passing flows in the Thomson River were modified for July 2017 to allow some water for the environment to be saved for use later in the year. The modification was agreed by the VEWH, West Gippsland CMA, Southern Rural Water, Gippsland Water and Melbourne Water, and it saved 2,500 ML of water for the environment. Those savings, and additional allocations associated with the new environmental entitlement for the Thomson River which was gazetted in June 2017, enabled a range of environmental flows to be delivered through spring, summer and autumn.

From October to November 2017, spring low flows were delivered to allow fish to move between habitats in individual river reaches. An unregulated event provided a short fresh in mid-September 2017, and water for the environment was used to extend its duration to attract Australian grayling into the upper reaches of the river. Low flows in May to June 2018 were met through a combination of managed releases for environmental and consumptive use. In April 2018, an autumn fresh was provided to prompt migration and spawning of Australian grayling.

Scope of environmental watering

Table 2.3.1 shows potential environmental watering actions and their environmental objectives.

Table 2.3.1 Potential environmental watering actions and objectives for the Thomson system

Potential environmental watering	Environmental objectives
Spring freshes (1–2 freshes of 800 ML/day for 4 days each in October–November)	• Encourage juvenile Australian grayling to recruit into the river from the estuary or ocean
Autumn/winter low flows (up to 230 ML/day from May–July)[1]	• Provide passage along the river to enable localised fish movement between habitats
Spring low flows (230 ML/day November)	• Provide improved passage along the river to enable fish to move between habitats
Winter freshes (up to 4 freshes of 800 ML/day for 4 days in June–August)	• Provide a migration and spawning cue for migratory fish species including tupong and Australian bass • Maintain diversity and increase riparian vegetation
Autumn freshes (1–2 freshes of 800 ML/day for 4 days each in April–May)	• Provide a migration and spawning cue for migratory fish species including tupong and Australian bass • Maintain diversity and increase riparian vegetation
Summer/autumn freshes (up to 7 freshes of 230 ML/day for 4 days in December–April)	• Provide habitat for native fish • Maintain diversity and increase growth of submerged aquatic vegetation • Scour sediment exposing fresh habitat areas • Provide habitat for waterbugs

[1] *Passing flows may be flexibly managed at rates less than 230 ML per day in July.*

Scenario planning

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

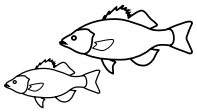
The highest priorities for water for the environment in the Thomson River in 2018–19 are spring freshes, autumn low flows and spring low flows. Spring freshes encourage recruitment of juvenile migratory fish to move into the river from the estuary. Low flows over autumn and winter provide opportunities for fish to move along the river between habitats. There is sufficient water for the environment available to deliver these flow components under all climate scenarios.

In average-to-wet scenarios, unregulated flows are likely to meet many environmental flow objectives (such as winter freshes to maintain riparian vegetation or scour sediment). In these scenarios, spring freshes and additional winter freshes provide further recruitment and migration opportunities for native fish. Under all scenarios, 5,600 to 8,200 ML of water for the environment is expected to be carried over at the end of the 2018–19 water year to meet critical minimum demands for water for the environment at the start of 2019–20.

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

Planning scenario	Drought	Dry	Average	Wet
Expected river conditions	• Unregulated flows very limited • Large volumes of consumptive water released from storage	• Unregulated flows from the Aberfeldy River and other tributaries contribute to baseflows and freshes • Moderate volumes of consumptive water released from storage	• Unregulated flows from the Aberfeldy River and other tributaries contribute to baseflows, freshes and high flows • Some consumptive water released from storage	• Unregulated flows from the Aberfeldy River and other tributaries contribute to baseflows, freshes and sustained high flows • Minimal consumptive water released from storage
Expected availability of water for the environment	• 12,500–21,800 ML	• 15,500–24,800 ML	• 18,500–27,800 ML	• 21,500–>30,800 ML
Potential environmental watering – tier 1 (high priorities)	• 1 spring fresh • Spring low flows • Autumn/winter low flows • 1 autumn fresh • Summer freshes as required	• 1 spring fresh • Spring low flows • Autumn/winter low flows • 1 autumn fresh • Summer freshes as required	• 1 spring fresh • Spring low flows • Autumn/winter low flows • 1 autumn fresh • Summer freshes as required • 1 winter fresh	• 1 spring fresh • Spring low flows • Autumn/winter low flows • 1 autumn fresh • Summer freshes as required • 1 winter fresh
Potential environmental watering – tier 2 (additional priorities)	• 1 winter fresh	• 1 winter fresh	• 1 additional spring fresh	• 1 additional winter fresh
Possible volume of water for the environment required to achieve objectives[1]	• 9,500 ML (tier 1) • 5,200 ML (tier 2)	• 9,500 ML (tier 1) • 5,200 ML (tier 2)	• 20,500 ML (tier 1) • 3,900 ML (tier 2)	• 23,600 ML (tier 1) • 5,200 ML (tier 2
Priority carryover requirements	• 5,600–8,200 ML			

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



Risk management

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

Engagement

Table 2.3.3 shows the partners with which West Gippsland CMA engaged when preparing the Thomson system seasonal watering proposal.

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

Table 2.3.3 Partners engaged in developing the Thomson system seasonal watering proposal

Partner engagement
• Melbourne Water • Southern Rural Water • Victorian Environmental Water Holder

Thomson River, by West Gippsland CMA

2.4 Macalister system

Waterway manager – West Gippsland Catchment Management Authority

Storage manager – Southern Rural Water

Environmental water holder – Victorian Environmental Water Holder

The Macalister River flows from Mt Howitt in the Alpine National Park and joins the Thomson River south of Maffra. The river winds its way in a south-easterly direction through mostly forested, confined valleys and narrow floodplains upstream of 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, and the Maffra Weir is a small diversion weir located further downstream in Maffra.

The Macalister River and its tributaries continue to be an important place for Traditional Owners and their Nations. The Registered Aboriginal Party (RAP) in the region is the Gunaikurnai Land and Waters Aboriginal Corporation. The West Gippsland CMA engaged with representatives from the RAP during the preparation of the Macalister River seasonal watering proposal.

Environmental values

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

The riparian vegetation corridor along the regulated reaches of the Macalister River is fragmented. Immediately downstream of Lake Glenmaggie, the vegetation is in good condition and includes remnant river red gums and good-quality stands of shrubs, particularly in areas where there has been revegetation and from which stock have also been excluded. Further downstream, the vegetation is degraded. In recent years, the cover of in-stream vegetation has declined, which may be due to a combination of increased water turbidity, erosion and a lack of an appropriate water regime to encourage plants to grow. The cover of non-woody plants (such as reeds, sedges and rushes) along the fringes of the river is patchy.

Social and economic values

Lake Glenmaggie is the primary source of water for the Macalister Irrigation District, a major economic driver in the area and highly valued by the local community. As a result, there is strong interest in the health of the Macalister River, particularly around water quality, erosion and vegetation condition issues. The river is also a popular location for recreational fishing and birdwatching.

Environmental watering objectives in the Macalister system

	Increase the range and population size of native fish species including Australian grayling and other native fish Improve spawning and recruitment opportunities for native migratory fish
	Restore aquatic vegetation Improve native emergent and fringing vegetation communities
	Increase the abundance of waterbugs Maintain water quality throughout the year for waterbug habitat
	Improve and maintain the form of the riverbank and bed
	Increase abundance of aquatic mammals

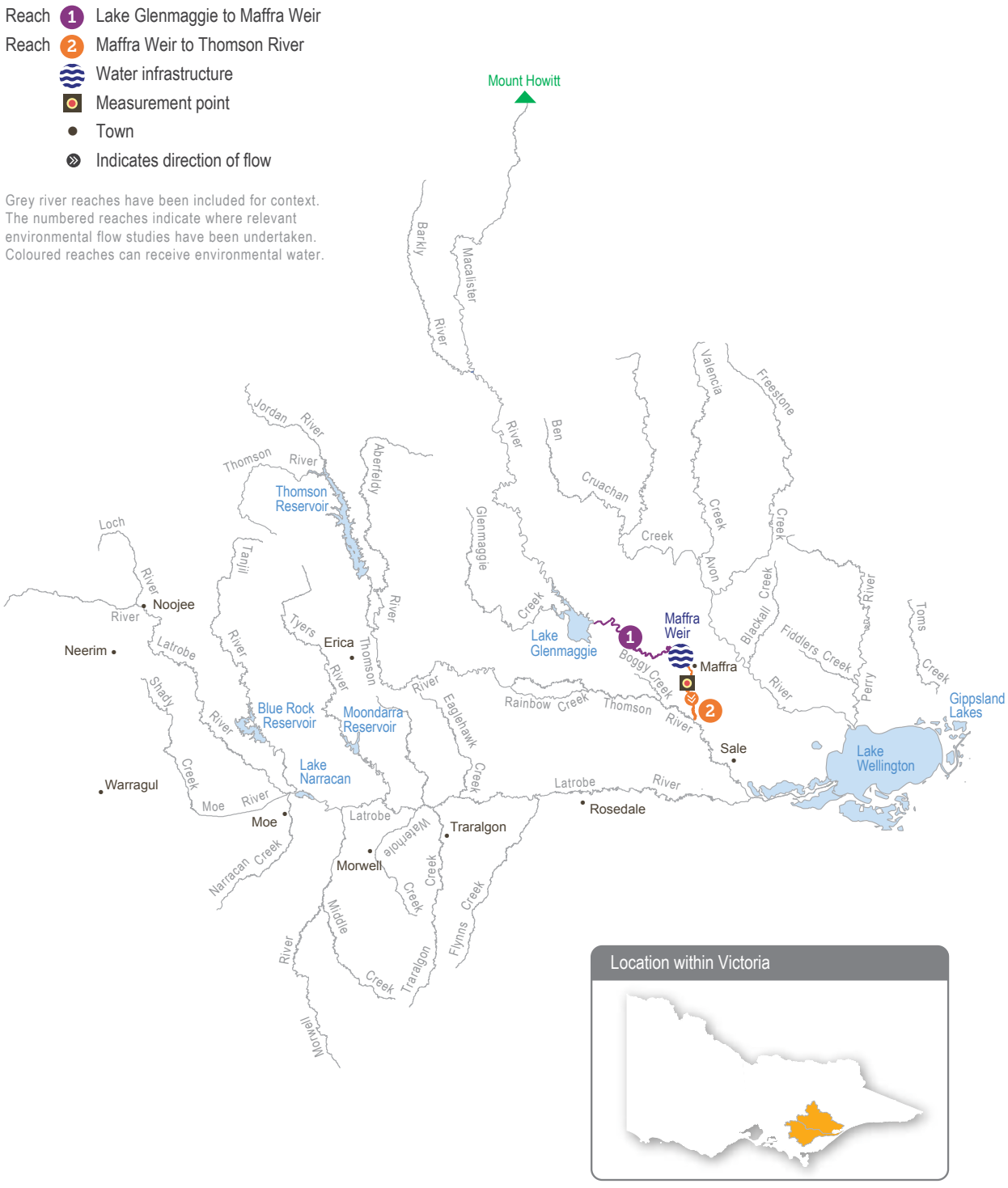
System overview

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 they were before regulation because much of the water is captured by the storage. A notable impact of irrigation and water harvesting is reversed seasonality of flows between Lake Glenmaggie and Maffra Weir, where summer flows are much higher than natural due to the delivery of irrigation water. Winter flows are lower than natural because a high proportion of the inflows are captured and there are no irrigation demands over winter. Downstream of Maffra Weir, most flows are diverted for irrigation in summer and autumn. The changed hydrology restricts fish migration, limits the growth and recruitment of in-stream and riparian 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 water for the environment: 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 environmental watering actions to achieve migratory fish objectives mainly focus on reach 2, which is downstream of the weir. All other objectives apply to both reaches 1 and 2.

Figure 2.4.1 The Macalister system



Recent conditions

Climatic conditions in the Macalister River catchment have varied widely over the last two years. Winter and spring 2016 had above-average rainfall and minor flooding, but the rest of the 2016–17 water year was significantly drier than average. Dry conditions persisted through much of 2017–18, and the only moderate-to-large. Unregulated flows occurred in December 2017 and January 2018.

In response to the dry conditions, irrigation demands have been high, and the reach of the Macalister River between Lake Glenmaggie and Maffra Weir has therefore carried consistently high irrigation flows since the start of the irrigation season in August 2017. Water for the environment was used to provide freshes in autumn, winter and spring and increased baseflows over the autumn/winter period, when there was less irrigation demand.

Dry conditions in the second half of 2016–17 restricted environmental allocations at the start of the 2017–18 water year, and water for the environment carried over from 2016–17 was needed to deliver target low flows and freshes through winter and spring 2017. A winter fresh was delivered in August 2017 to trigger migration and spawning of tupong and Australian bass. A spring fresh was delivered in early November 2017, to encourage juvenile fish to migrate into the Macalister River from the sea and to wet bankside vegetation and enable native seed dispersal. Lake Glenmaggie spilled in early December 2017, but it was a comparatively small spill and later in the year than is usually the case. The storage manager (Southern Rural Water) managed flows during and after the spill to prevent a sudden drop in water levels that might have stranded fish or caused banks to slump. An autumn fresh was delivered in April 2018 to trigger Australian grayling to migrate and spawn.

Scope of environmental watering

Table 2.4.1 shows potential environmental watering actions and their environmental objectives.

Table 2.4.1 Potential environmental watering actions and objectives for the Macalister system

Potential environmental watering	Environmental objectives
Macalister River reaches 1 and 2	
Autumn/winter low flow (90 ML/day in May–August)	• Provide longitudinal connectivity • Provide habitat for waterbugs • Maintain water quality in pools • Maintain areas of slow-moving water for submerged aquatic vegetation
Spring low flow (90 ML/day in September–December)	• Provide longitudinal connectivity
Spring fresh (1,500 ML/day for 3 days in September–October)	• Scour sediment exposing fresh habitat areas • Provide food and habitat for waterbugs
Macalister River reach 2	
Autumn fresh (350 ML/day for 4–5 days in April–May)	• Trigger downstream migration and spawning of Australian grayling
Winter fresh (700 ML/day for 4–5 days in June–August)	• Trigger downstream migration and spawning of tupong and Australian bass
Spring/summer fresh (700 ML/day for up to 5 days in September–December)	• Trigger upstream migration and recruitment for juvenile fish • Trigger upstream migration for lampreys and eels
Summer/autumn fresh (140 ML/day for 3 days in December–May)	• Provide sufficient depth to allow fish to move throughout the reach • Flush pools to maintain water quality

Scenario planning

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

Providing year-round low flows and freshes in winter, spring and autumn are the highest priorities for 2018–19 under all climate scenarios, to provide connectivity through the river system so fish and other biota can move. Spring freshes are needed to encourage migratory fish in their first year of life to move into the Macalister River from the Latrobe River estuary and the sea. In some years, spring freshes are delivered by spills from Lake Glenmaggie, but early forecasts suggest Lake Glenmaggie may not spill in spring 2018 and therefore a managed spring fresh has been prioritised under all scenarios. In a drought scenario, a summer fresh may also be required to improve water quality and to prevent low levels of dissolved oxygen affecting aquatic biota.

Autumn freshes are needed in the Macalister River to cue Australian grayling to breed. Australian grayling only live for up to three years, so autumn freshes are a priority in most years and under most climate scenarios, to ensure regular recruitment and the ongoing sustainability of the population.

If additional water for the environment is available in average or wet conditions, winter freshes may be provided to trigger tupong and Australian bass to migrate downstream to the sea. Carrying over some water into July 2019 is a high priority under all scenarios to ensure there is sufficient water for the environment available to deliver winter low flows in July 2019.

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

Planning scenario	Drought	Dry	Average	Wet
Expected river conditions	• No unregulated flows • Passing flows at Maffra Weir reduced	• Possible spills from Lake Glenmaggie in spring, minor flood levels may occur • Passing flows 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	• 11,600 ML	• 14,900 ML	• 16,900 ML	• 21,400 ML
Potential environmental watering – tier 1 (high priorities)	• Autumn/winter low flow (reach 1 & 2) • Spring low flow (reach 1 & 2) • 1 spring fresh (reach 2) • 1 summer fresh (reach 2) • 1 autumn fresh (reach 2)	• Autumn/winter low flow (reach 1 & 2) • Spring low flow (reach 1 & 2) • 1 spring fresh (reach 1 & 2) • 1 autumn fresh (reach 2)	• Autumn/winter low flow (reach 1 & 2) • Spring low flow (reach 1 & 2) • 1 spring fresh (reach 2) • 1 autumn fresh (reach 2) • 2 winter freshes (reach 2)	• Autumn/winter low flow (reach 1 & 2) • Spring low flow (reach 1 & 2) • 1 spring fresh (reach 2) • 1 autumn fresh (reach 2) • 2 winter freshes (reach 2)
Potential environmental watering – tier 2 (additional priorities)	• 1 winter fresh	• 1 winter fresh	• Increase duration of spring fresh	• 1 winter fresh
Possible volume of water for the environment required to meet objectives[1]	• 10,700 ML (tier 1) • 4,000 ML (tier 2)	• 13,400 ML (tier 1) • 4,000 ML (tier 2)	• 15,600 ML (tier 1) • 1,200 ML (tier 2)	• 19,000 ML (tier 1) • 4,000 ML (tier 2)
Priority carryover requirements	• 900 to 1,800 ML			

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

Risk management

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

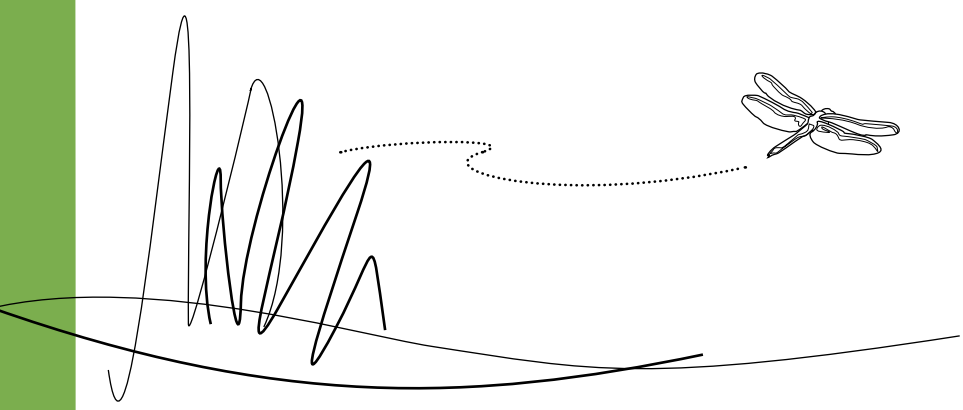
Engagement

Table 2.4.3 shows the partners and stakeholder organisations with which West Gippsland CMA engaged when preparing the Macalister system seasonal watering proposal.

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

Table 2.4.3 Partners and stakeholders engaged in developing the Macalister system seasonal watering proposal

Partner and stakeholder engagement
• Environment Victoria • Gippsland Water • Gurnaikurnai Land and Waters Aboriginal Corporation • Macalister Irrigation District irrigators and diverters • Maffra & Districts Landcare Network • Native Fish Australia • Southern Rural Water • Victorian Environmental Water Holder • VRFish • Wellington Shire Council



2.5 Snowy system

Waterway managers – New South Wales Department of Industry and East Gippsland CMA

Storage manager – Snowy Hydro Limited

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

The Snowy River originates on the slopes of Mount Kosciuszko. It drains the eastern slopes of the Snowy Mountains in NSW before flowing through the Snowy River National Park in Victoria and into Bass Strait.

The Snowy River and its tributaries continue to be an important place for Traditional Owners and their Nations. This includes the Gunaikurnai, the Maneroo-Ngarigo, the Bidwell Maap, the southern Monero people (Monero-Ngarigo / Yuin / Bolga), the Wongalu and the Wiradjuri people.

In recognition of Traditional Owner groups, five high-flow releases to the Snowy River in 2017–18 were given Aboriginal names: Djuran (running water), Waawii (water spirit), Billa bidgee kaap (big water season), Wai-garl (river blackfish) and Bundrea Nooruun Bundbararn (waterhole big lizard).

Environmental values

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 remaining environmental values in the upper reaches and tributaries of the Snowy River include freshwater fish (such as river blackfish and Australian grayling). 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, mulloway and black bream. The floodplain wetlands of the Snowy River near Marlo provide feeding and breeding areas for wetland and migratory birds.

Social and economic values

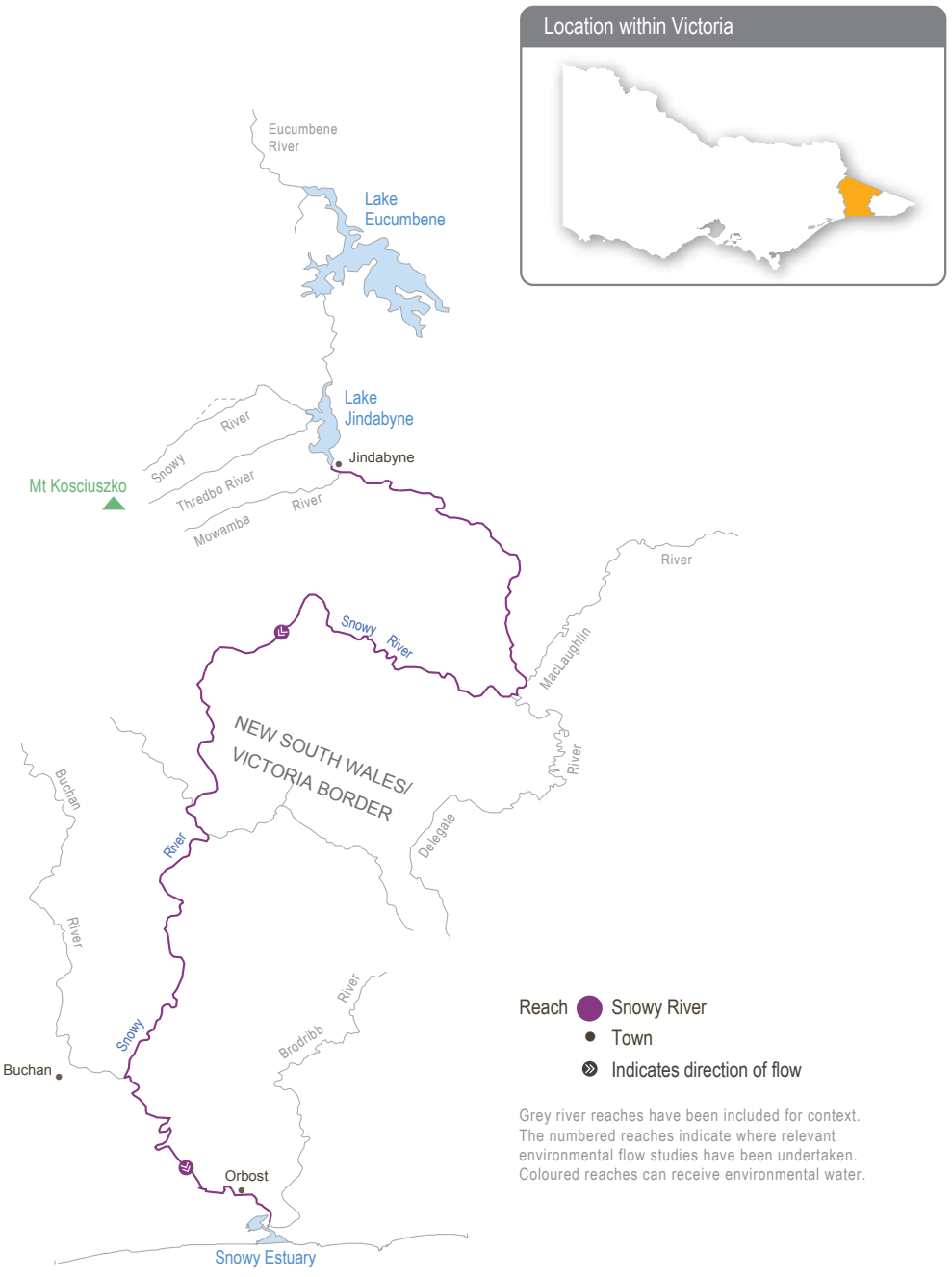
The Snowy Mountains Hydro-electric Scheme provides substantial economic value as a major generator of renewable electricity. Water diverted from the Snowy River also supports irrigated agriculture in NSW and Victorian parts of the Murray–Darling Basin. The Snowy River and its estuary are a drawcard for the many tourists who enjoy camping, boating, kayaking, swimming and recreational fishing.

System overview

There are four major dams and multiple diversion weirs in the upper Snowy River catchment that divert water to the Murrumbidgee and River Murray valleys. The hydrological effects of the Snowy 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 Victorian, NSW and Commonwealth governments have recovered water to help restore damage done by decades of limited flow. Victorian water for the environment available for use in the Snowy system is held in the Murray, Goulburn and Loddon systems. This water is made available for environmental flows in the Snowy River via a substitution method, whereby Victorian water for the environment replaces water that was earmarked for transfer from the Snowy to Victoria to support irrigation demands.

Figure 2.5.1 The Snowy system



Recent conditions

The water year in the Snowy system runs from May to April. In the 2017–18 water year, 214,400 ML of water for the environment was released to the Snowy River, which is the largest volume of water ever released from Lake Jindabyne to the Snowy River in one year. The water for the environment was used to deliver five, high-flow events, with peak flows up to 8,000 ML per day in winter and spring.

Scope of environmental watering

Environmental watering from May 2018 to April 2019 aims to mimic the typical flow pattern of a mixed snowmelt/rainfall river system characteristic of the Snowy Mountains. The 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.

The aim of environmental flows in the Snowy River is to restore physical and ecological processes that support aquatic habitats and productivity. East Gippsland CMA has monitored the lower reaches and estuary over the past six years. The results show that the managed environmental flows contribute to these physical and ecological outcomes.

Five peak flows are scheduled between August and October 2018. A large, flushing flow is scheduled for mid-October 2018 and includes an eight-hour peak equivalent to 4,800 ML per day. Other peak flows will mimic winter rainfall events. These peak flows aim to improve the physical attributes of the river by scouring and depositing sediment and increasing available aquatic habitat. High flows are sustained from July–December to help mix water in the estuary for the benefit of plants and fish (such as Australian bass). Low flows will then be released until the end of the water year in April 2019.

The total volume planned for release in 2018–19 (including contributions from water savings in Victoria and NSW) is 136,677 ML.

Risk management

When weather conditions cause increased risk of flooding, The NSW Department of Industry works with the NSW State Emergency Service, the Bureau of Meteorology, East Gippsland CMA and the VEWH to provide information to the community regarding the management of planned releases. Releases may be cancelled or rescheduled to limit flood impacts to private land.

Engagement

The NSW Government is responsible for planning environmental flow releases in the Snowy River and consults the Victorian Government about the planned releases.

In 2018, the Snowy Advisory Committee will be formed. Its members will represent Aboriginal, local community and environmental interests, alongside relevant NSW and Victorian government agencies. The role of the Snowy Advisory Committee will be to provide community and expert input about the pattern of environmental flow releases to the Snowy River and Snowy montane rivers, to ensure their ongoing health.

Snowy River, by East Gippsland CMA