



Water for wetlands

*Seasonal Watering Proposal for the Lower Latrobe Wetlands
2023-24*



Acknowledgement of Country

We acknowledge and pay our respects to the Traditional Owners of the region, the Gunaikurnai, their rich culture and spiritual connection to Country. We also acknowledge their responsibility to care for Country and pay our respects to Elders, past, present, and emerging.

Traditional Owner input and guidance on objectives and values was received from GLaWAC via the Gunaikurnai Cultural Water Team.

Cover photo: Lower Latrobe wetlands looking West from Allmans Levee. January 2023

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Water for wetlands

Seasonal Watering Proposal for the Lower Latrobe Wetlands 2023-24 V02

Executive Summary

The purpose of the document is to present the proposed watering actions and priorities for the Lower Latrobe Wetland environmental water entitlement (covering Dowd Morass, Heart Morass and Sale Common) entitlement for the 2023-24 water year.





The objectives, scenarios and associated potential watering actions in this proposal take into consideration the best available ecological and natural resource management science and the long-term environmental objectives for the wetlands. Also considered are the past and forecast seasonal conditions, and ongoing environmental monitoring which inform adaptive management. Various stakeholders including Traditional Owners, Parks Victoria, Field and Game Australia, and the Victorian Environmental Water Holder have been engaged during the preparation of these proposals. The risks associated with implementing the proposal have been identified through consultation with various stakeholders and appropriate mitigation strategies have been identified.

This proposal was developed along with seasonal watering proposals for the Latrobe, Thomson, and Macalister rivers in which consideration for wetland requirements are considered. This allows a landscape scale adaptive management when managing water for the environment in West Gippsland.

Environmental Objectives

The broad, system scale objectives for lower Latrobe Wetlands are summarised in Table 1-1

Table 1-1 Summary of the lower Latrobe Wetlands environmental objectives

Value	Lower Latrobe Wetlands
Birds, turtles, frogs and reptiles 	Maintain/ enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities. Maintain abundance of freshwater turtle and frog populations
Vegetation 	Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species
Water quality 	Provide suitable physio-chemical conditions to support aquatic biota including Acid Sulfate Soil inundation
Critical Watering 	Provide critical watering to avoid catastrophic conditions

Potential Watering Actions

Table 1-2 summarises the highest priority watering actions for each of the wetland system for 2023-24. The overarching objective for the year is to capitalise on the wet conditions but also allow the mudflat sections of the wetlands to experience some dry periods. This will allow soils to oxygenate, provide access to food for mudflat species of waterbird, and allow terrestrial and semi terrestrial plants to germinate and set seed, building the resilience of the wetlands.

Table 1-2 Summary of the highest priority watering actions for each environmental water entitlement

Flow Component	Primary Ecological Objectives
Partial drawdown (Summer-Autumn)	Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species
Top-up (anytime) following bird breeding event if required	Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities
Urgent fill (anytime)	To manage unexpected or out of season events which may lead to catastrophic conditions

Risk Assessment and Management

Potential risks arising from the implementation of the 2023-24 seasonal watering priorities were assessed and risk tables developed during the Gippsland Risk Planning Workshop in February 2023. Risks and mitigation strategies for each system are provided in section 6.

Engagement

Table 1-3 summarises the engagement that has occurred in the development of the West Gippsland Seasonal Watering Proposal for 2023-24.

Table 1-3 Partners and stakeholders engaged by West Gippsland CMA in developing seasonal watering proposal for the lower Latrobe wetlands as well as other engagement that supports environmental water planning and in-season delivery in the system.

Category	Stakeholder	IAP2 level
Community and Environment Groups	<ul style="list-style-type: none"> Birdlife Australia, Greening Australia, Latrobe Valley Field Naturalists, Waterwatch volunteers, 	Involve
	<ul style="list-style-type: none"> VR Fish, Native Fish Australia. 	Collaborate
Government agencies	<ul style="list-style-type: none"> VEWH, Gippsland Water Parks Victoria 	Collaborate
	<ul style="list-style-type: none"> DEECA (Waterways and Catchments) East Gippsland Catchment Management Authority 	Inform
Traditional owners	<ul style="list-style-type: none"> Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) 	Collaborate
Land managers/recreational users	<ul style="list-style-type: none"> Field & Game Australia (Sale) 	Collaborate
Landholders	<ul style="list-style-type: none"> Individual landholders 	Involve/consult
Local businesses	<ul style="list-style-type: none"> Port of Sale Heritage River Cruises Frog Gully Cottages 	Inform

Table of Contents

Executive Summary	iii
Environmental Objectives	iv
Potential Watering Actions.....	iv
Risk Assessment and Management	iv
Engagement.....	iv
1. Introduction	8
1.1 Landscape overview – Lake Wellington catchment	9
1.2 Gunaikurnai watering objectives and vision for the Lower Latrobe wetlands	11
1.2.1 Watering objectives.....	11
Keystone species	12
1.2.2 Vision.....	12
Healthy Country	12
Water access	12
Cultural and economic use.....	13
Connection.....	13
Climate change.....	13
1.3 Climate review and Climate outlook	13
1.3.1 Climate review	13
1.3.2 2023-24 Climate Outlook.....	15
2 Seasonal watering proposal	17
2.1 Environmental objectives	17
2.2 Wetting/drying requirements	18
2.2.1 Watering components.....	18
2.2.2 Wetting-drying recommendations.....	18
2.3 Scenario planning and prioritisation.....	18
2.3.1 Observations	18
2.3.2 Provision of wetting/drying recommendations.....	22
2.3.3 Potential watering actions.....	24
Gunaikurnai Dowd Morass event(s).....	24
2.3.4 Delivery constraints.....	31
2.3.5 Triggers for action	32
2.3.6 Scenario planning	33
3 Risk management & Engagement	36
3.1 Risk management	36
3.2 Engagement.....	36
4 Shared Benefits	42
5 Increasing knowledge and addressing constraints/ impacts	43

5.1	Monitoring.....	43
5.2	Reporting.....	43
5.3	Environmental effectiveness.....	43
6	Approval and endorsement.....	45
7	References	48

1. Introduction

This seasonal watering proposal outlines the West Gippsland Catchment Management Authority's (WGCMA) proposed priorities for use of environmental water in the Lower Latrobe Wetlands. This is as per the requirements under section 192A of the *Water Act 1989* and is a priority of the West Gippsland Waterway Strategy (WGCMA, 2014). This proposal covers the Lower Latrobe wetlands environmental entitlement managed on behalf of the Victorian Environmental Water Holder (VEWH) by the WGCMA.

This proposal will be used by the VEWH to inform the development of the Seasonal Watering Plan 2023-24. The plan will outline the full scope of state-wide priorities for use of environmental water, including the West Gippsland catchment environmental entitlements. Environmental water in the Latrobe, Thomson and Macalister rivers will be used to protect and enhance the ecological health of their respective waterways. Where applicable, coordinated management of the three river entitlements will also be used to protect and enhance the lower Latrobe Wetlands and the Latrobe Estuary. The extent to which this is achieved will be governed by the amount of water available and the relevant climatic scenario.

Climatic conditions and system regulation strongly influence river flows, and thereby the opportunities and need to actively manage environmental water. Flexibility is built into this proposal to enable adaptive management.

1.1 Landscape overview – Lake Wellington catchment

The Lake Wellington catchment extends from Lake Wellington to the slopes of the Great Dividing and Strzelecki Ranges. It includes almost 1.2 million hectares of land in the catchments of Latrobe, Thomson, Macalister and Avon Rivers and runs from Noojee and Warragul in the west to Stratford in the east. Lake Wellington is the most westerly of the Gippsland Lakes and forms part of the Gippsland Lakes Ramsar site, a wetland complex of international conservation significance. Three of the four major rivers in the catchment are regulated (Latrobe Thomson and Macalister rivers) and each have an environmental water entitlement. A fourth environmental water entitlement is held to divert water to the lower Latrobe wetlands (Dowd Morass, Heart Morass and Sale Common) (Figure 1-1).

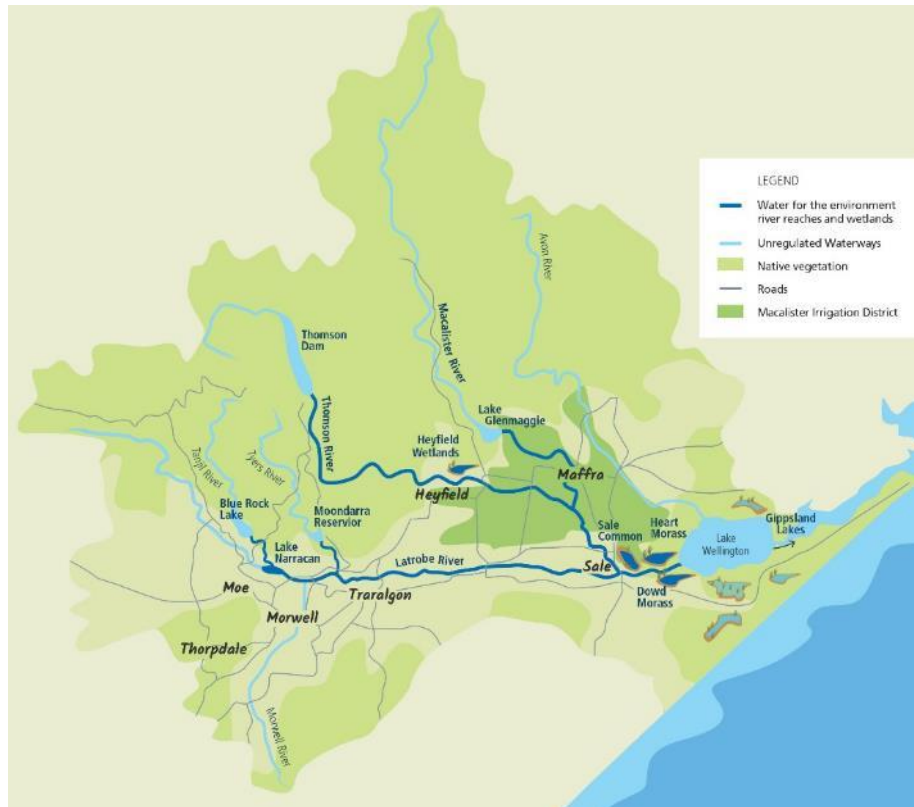


Figure 1-1 Map of the Lake Wellington Catchment, with environmental water receiving rivers and wetlands highlighted (dark blue)

The lower Latrobe wetlands are situated along the Latrobe River between its confluence with the Thomson River and Lake Wellington (Figure 1-2) and form part of the Gippsland Lakes Ramsar Site. This includes Sale Common (230 ha) and Heart Morass (1,870 ha) on the northern floodplain, and Dowd Morass (1,500 ha) on the southern floodplain. Sale Common (Sale Common Nature Conservation Reserve) and Dowd Morass (Dowd Morass State Game Reserve) are wholly Crown land reserves managed by Parks Victoria (PV). Heart Morass is comprised of Crown land (“Heart Morass State Game Reserve” managed by PV) and private land. Nearly 60% of the Heart Morass is owned by the Wetlands Environmental Taskforce Trust.

Together, the lower Latrobe wetlands provide habitat for a diverse range of water-dependent species, especially plants, waterbirds and frogs, including threatened species and communities. Individually, each wetland provides a range of ecological benefits.

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

of waterbirds for its relatively small size, particularly species that prefer densely vegetated freshwater and fish/frog feeders.

Dowd Morass is a large, brackish wetland that supports an important rookery of colonial nesting waterbirds which can include White and Straw-necked ibis, Little Black and Little Pied cormorants, Royal Spoonbills and Great Egrets.

Heart Morass is also a large brackish wetland. Its open expanses provide shallow feeding habitat for large numbers of waterfowl including Black Swans, Eurasian Coots and numerous species of ducks, waders, and other waterbirds.

Many of the fauna that these wetlands support are threatened, including some that are listed under the State's Flora and Fauna Guarantee (FFG) Act 1988, the Commonwealth's Environment Protection and Biodiversity Conservation (EPBC) Act 1999 or international agreements (Japan-Australia Migratory Birds Agreement (JAMBA), China-Australia Migratory Birds Agreement (CAMBA) and the Bonn Convention). For example:

- Great Egret (vulnerable in Victoria, FFG, JAMBA & CAMBA)
- Intermediate Egret (critically endangered in Victoria & FFG)
- Australasian Bittern (endangered in Victoria, FFG & EPBC (endangered))
- Royal Spoonbill (vulnerable in Victoria)
- White-bellied Sea-Eagle (vulnerable in Victoria, FFG, JAMBA & CAMBA)
- Dwarf Galaxias (vulnerable in Victoria, FFG & EPBC (vulnerable))
- Green and Golden Bell Frog (EPBC (vulnerable))
- Growling Grass Frog (endangered in Victoria, FFG & EPBC (vulnerable)).

The wetlands also contain vegetation types that are threatened in the Gippsland Plain Bioregion such as:

- Swamp Scrub (endangered)
- Brackish Herbland (rare)
- Aquatic Herbland (rare).

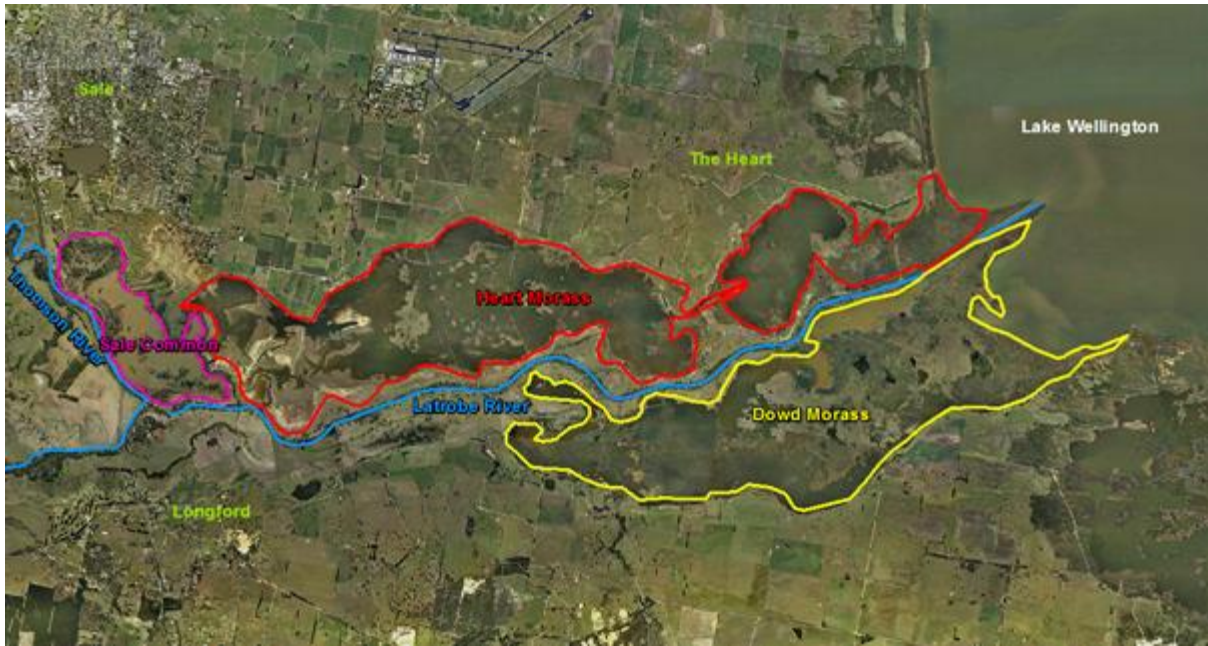


Figure 1-2 Satellite image showing the extent of Dowd Morass, Heart Morass and Sale common.

1.2 Gunaikurnai watering objectives and vision for the Lower Latrobe wetlands

The lower Latrobe wetlands are an important area for the Gunaikurnai as this is where Boran and Tuk, the Gunaikurnai People's creators, crossed the Durt-Yowan (Latrobe River) on their journey south. The area with its consistent water supply is seen as a supermarket with plentiful resources allowing for ongoing occupation with evidence of hunting and canoe building still present today. This is most prominent at Dowd with over thirty registered indigenous cultural heritage sites such as scarred trees, artefact scatters, earth features and shell deposits. Detailed surveys are yet to be completed at Heart Morass and Sale Common however are still an important place for the Gunaikurnai.

The following information has been provided by the Gunaikurnai Land and Waters Aboriginal Corporation, for the purpose of informing the seasonal watering proposal and outlining some key cultural objectives.

1.2.1 Watering objectives

The Lower Latrobe Wetlands are a place of spiritual and cultural connection for the Gunaikurnai people. Over many thousands of years, custom and lore has been passed orally from generation to generation on the cultural values and uses of the wetlands, and their importance to all Gunaikurnai people. The Brayakaulung clan of the Gunaikurnai owned the country comprising the Lake Wellington catchment including the lower Latrobe wetlands.

The overarching objective for the wetlands is to provide and maintain Gunaikurnai cultural values of healthy Country. Healthy Country includes the importance of place and the health of the entire ecosystem, such as water quality, controlling pest species, maintaining a natural, seasonal flow regime and overbank flood events. The concept of healthy Country includes the practices of only taking what you need and moving seasonally.

Environmental watering objectives for the lower Latrobe wetlands should maintain a cultural lens with a cultural landscape approach, and a focus on cultural values dependent or threatened by water impacts.

Keystone species

The following is a list of some of the keystone species important to the Gunaikurnai, however it should be noted that the health of all native flora and fauna are important and should be considered in planning for environmental water

- *Boran* (Pelican) and *Tuk* (Musk Duck) are significant totem species as highlighted in the Mother and Father song line within the Gunaikurnai creation story. If Boran and Tuk are living and breeding there, it is a sign Country is healthy. If they are not present, flows should be provided to promote required habitat/ecosystem services and Boran and Tuk will return.
- *Yeerung* and *Djeetgun* (Fairy wren) are also a totem species. While they are not considered water dependent and environmental flows may not directly support them, a diversity of flows supporting shrubs and riparian vegetation will provide habitat for fairy wren. For example, when flooding inundates wetlands, bush birds (including Yeerung and Djeetgun and other species) are known to increase in abundance and diversity (Parkinson et al. 2002; Baxter et al 2005; Ballinger and Lake 2006).
- *Other Birds* are important for Woorngan (hunting) / food, including Nalbong (water hens colloquially known as Bush Chooks, Gidai (black swans) and Boyangs (eggs), and Koortgan (ducks except Tuk, musk duck). Gidai (swans) require submerged and softer emergent vegetation to make nest mounds. The nest is placed either on a small island or floated in deeper water. Gidai breed in late winter to early spring following water level increases. Objectives which produce filling of the large wetlands and support the growth of Loombrak (water ribbon) and submerged aquatic plants will support Gidai (Pringle 1985). Ensuring the lower Latrobe wetlands and floodplain depressions (e.g., billabongs) receive freshwater flows in Winter / Spring will provide the conditions for submerged and emergent aquatic plants to grow and provide the food and nesting materials for the water birds (Alluvium 2020).
- *Fish* flows should be considered within natural cycles of events that prove reproduction. Early accounts from eastern Victoria describe a range of Aboriginal fishing practices including netting, spear fishing, trapping and opportunistic harvesting, with live storage pens also utilised (Clark 2002). Gippsland Perch / Bass were an abundant staple resources for thousands of years before they were out resourced by invasive species (carp). They were an endemic species to Gippsland. They have been fished for and cooked for a year-round freshwater diet, a freshwater diet is necessary and historically people with a freshwater diet of plants, fish and eels were healthier and had healthier bone structure

1.2.2 Vision

The following highlights other key issues and values provided by GLaWAC, providing an indication of the importance of the wetlands in a broader context than environmental values alone and, starting to articulate a vision for Country aligning with GLaWAC Whole of Country plan.

Healthy Country

Healthy Country is determined by Traditional Owners, knowing Country, and traveling Country. Country that is healthy will reflect the spiritual and cultural values of its Traditional Owner custodians. Healthy Country also contributes to wellbeing values for Traditional Owners.

Water access

Access to water is crucial for many cultural values, including identified identity and relational values, future economic values, place values and many others. Access to water – through ownership or management - means water being made available to Gunaikurnai people on the Latrobe system and the Thomson system that provide fresh water to the wetlands.

While the Lower Latrobe Wetlands were once a freshwater system, the system has been fundamentally changed since the opening of the Gippsland Lakes. This is acknowledged in the Ramsar objectives. Every effort should be made to maintain fresh water dependent values, which in turn deliver cultural values

Cultural and economic use

Returning to Cultural Practices and aboriginal informed management is key for development of the Lower Latrobe Wetlands in returning to a more freshwater habitat for cultural uses and cultural species. It will also provide for opportunities such as water-based tourism, cultural education and ecotourism (camping experiences)

Connection

Continual connection to Country was determined in the Native Title Settlement decision 2010. GLaWAC takes its responsibility very seriously to work closely with the people it represents on management decisions concerning Country and health of Country. Gunaikurnai cultural obligations reflect the Gunaikurnai Community's views on healthy Country and in turn, help Traditional Owners continue their ongoing connection to the land and waters of Country.

Quarenook - Meeting Place is an important value. This includes lifestyle, family, storytelling, camping values as well as hunting, tool making and food / materials and providing fresh fish. These wetlands are an important Quarenook, including the rookery at Dowd Morass, Gidai (Black Swan) nesting at Sale Common and Heart Morass as well as Canoe Scar Trees. (Alluvium 2020)

Climate change

The Gunaikurnai Traditional Owners have cared for Country for thousands upon thousands of years, through many cycles of climatic change, and understand how to manage the landscape as it too changes. When cared for using traditional knowledge, Country can be healed.

Resources and water access should be made available to Traditional Owners to help realise self-determined objectives for healthy Country. Mitigation of climate change factors impacting the Lakes system, river systems and waterways at the lower latrobe wetlands can be effective with resources and empowerment provided to Traditional Owners.

Salinity, water users, agriculture and mining impacts should be considered through cumulative impact statements that should be developed for these wetlands and made available for Traditional owners to evaluate for healthy Country and future changes to the ecosystem. Each water use should have a cumulative impact statement.

1.3 Climate review and Climate outlook

1.3.1 Climate review

Following a very wet 2020 and 2021, rainfall for 2022 continued above average in West Gippsland. Autumn rainfall was average to above average, with warmer than average temperatures. Winter rainfall was also above average for many parts of West Gippsland,

particularly during June and August (Figure 1-3) Mount Baw Baw received its highest total rainfall for June in 24 years, recording 295 mm more than its usual monthly average. During mid-august rain fell heavily over several days leading to minor flooding at Traralgon. Morwell (Latrobe Valley Airport gauge) had its highest total winter rainfall for over 20 years, beating it's 1991 Winter record by 75 mm.

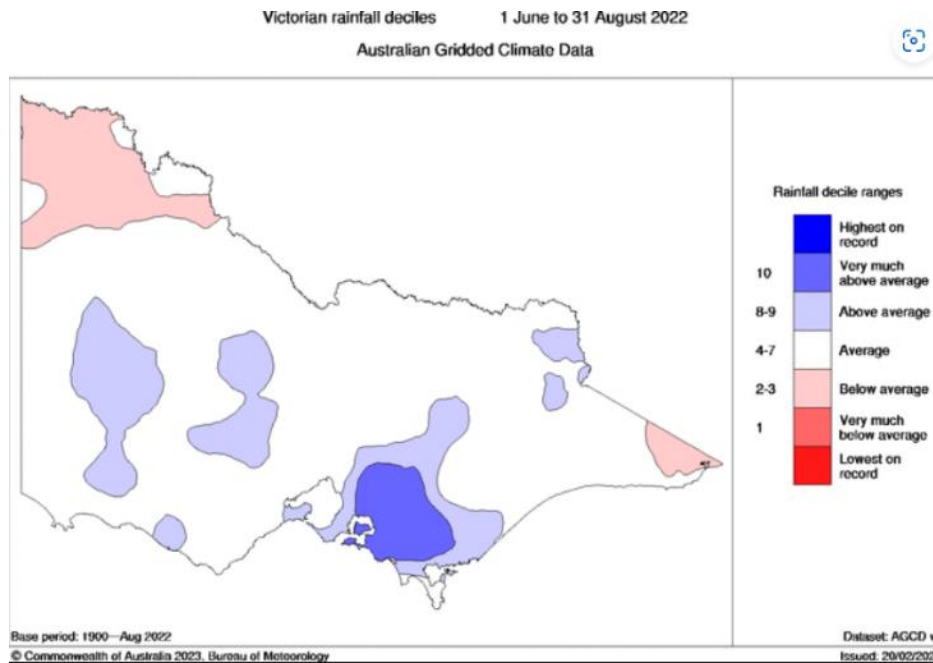


Figure 1-3 West Gippsland rainfall deciles from 1 June to 31st August 2022 (Source: BoM Victoria in Winter 2022, bom.gov.au)

Spring was much wetter than average across the state. The West Gippsland region saw higher than average spring rainfall, with some areas (e.g., Traralgon EPA station) showing the highest rainfall on record for November (see Figure 1-4 below). Notably, due to the high volume of rainfall in the Thomson catchment, in October the Thomson Dam spilt for the first time since 1996.

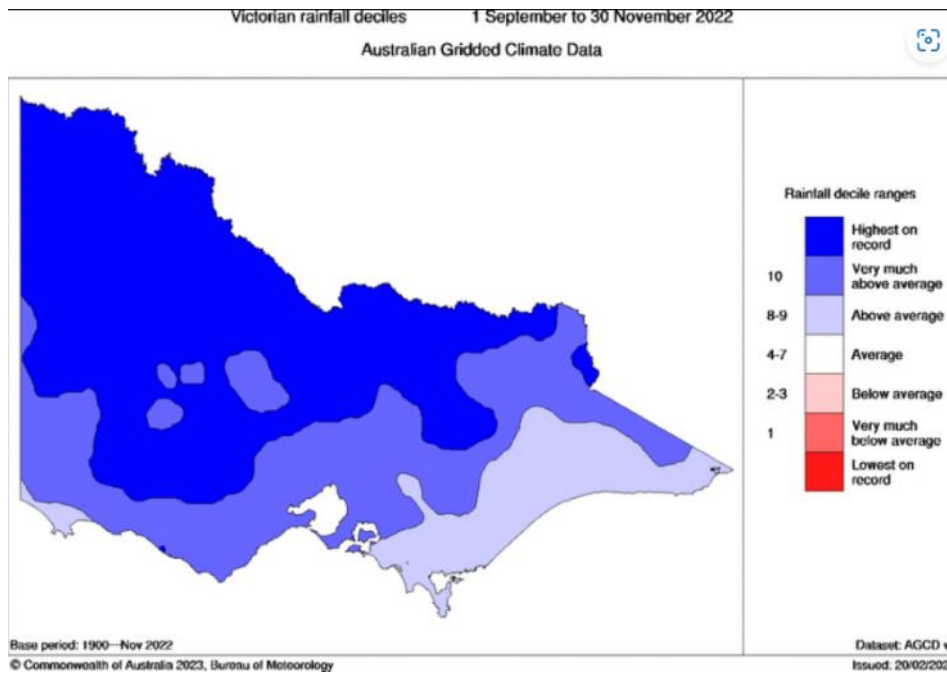


Figure 1-4 West Gippsland rainfall deciles from 1 September to 30th November 2022 (Source: BoM Victoria in Spring 2022 (bom.gov.au))

These natural rain events across Winter and Spring naturally flushed the Latrobe, Macalister and Thomson rivers and allowed them to retain high flows throughout the year. River and overland flows provided full inundation to Sale Common, Heart Morass and Dowd Morass, with no water for the environment being delivered to the Lower Latrobe wetlands in 2022.

A dry start to 2023 has seen above average temperatures and below average rainfall allowing the wetlands to begin to partially drawdown naturally, exposing mudflats and oxygenating soils.

1.3.2 2023-24 Climate Outlook

Available forecast information from the Bureau of Meteorology (BoM) indicates that La Niña continues but is slowly weakening. While models predict that there is an increased risk of El Niño developing in mid-late 2023, the accuracy of forecasting so far ahead is low so should be considered cautiously.

From March to June, the Macalister, Latrobe and Thomson River catchments are likely to have average rainfall. Most parts of West Gippsland are likely to get totals of 50 – 200 mm rainfall for the March to May and April to June quarters. There are very low chances of unusually wet or dry weather across West Gippsland during this time (Figure 1-5).

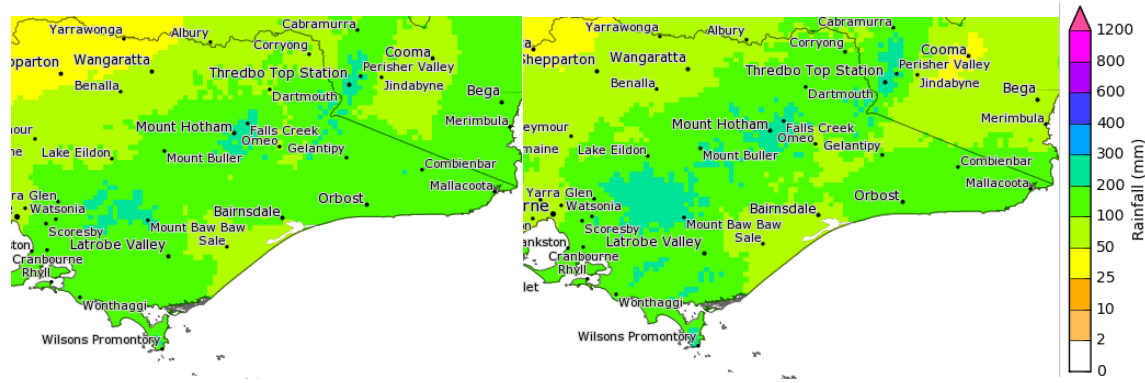


Figure 1-5 Rainfall totals that have a 75% chance of occurring for March to May (left) and April to June (right) (Source: www.bom.gov.au)

Long range forecasts also predict warm weather across many parts of West Gippsland. Temperatures are likely to very likely (60% to 80%) to be warmer than median from March to June 2023. Minimum median temperatures are also very likely (75%+) to be exceeded from March to June (Figure 1-6).

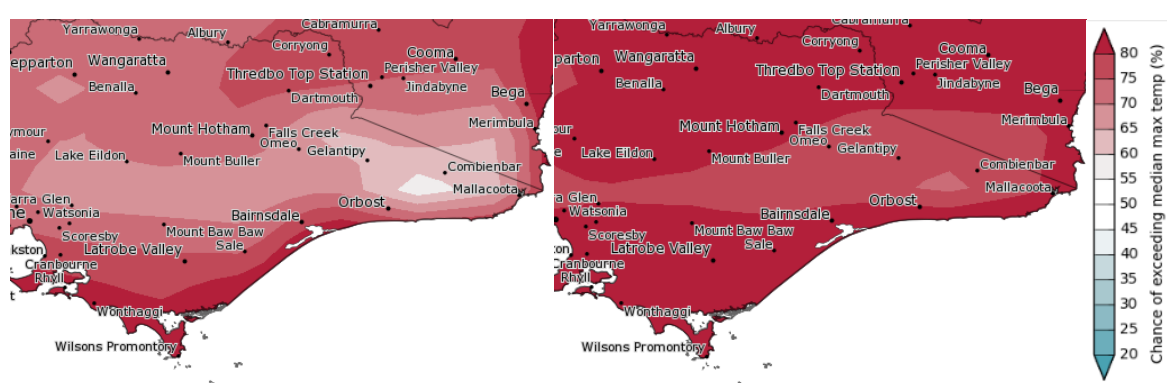


Figure 1-6 The chance of above median maximum temperature for March to May (left) and April to June (right) (Source: www.bom.gov.au)

2 Seasonal watering proposal

The following section provides details for the lower Latrobe wetlands 2023-24 proposed watering actions.

2.1 Environmental objectives







Objectives for environmental flows in 2023-24 are derived from the Latrobe Environmental Water Requirements Investigation (LEWRI) (Alluvium, 2020).

The objectives set reflect the environmental values of the Latrobe system considered important by waterway managers, scientists, Gunaikurnai and the broader community. Objectives were determined in the context of the current water resource management, likely environmental conditions, including the likely trajectory of the system over the next 50 years, and the social and economic values of the region. In any given year the level at which an objective can be met will vary depending on the extant weather and climate conditions. For this reason, the goals for environmental water management (wetting and drying) for each of the four climactic conditions used in this proposal are as follows:

- Drought — **Protect** high priority environmental assets, key functions, and priority refuges to ensure chance of future recovery and avoid catastrophic events such as saltwater inundation of ASS activation,
- Dry — **Maintain** high priority environmental assets, key functions, and priority refuges to ensure chance of future recovery and avoid catastrophic events such as saltwater inundation of ASS activation,
- Average — **Recover** by improving ecological health and resilience and enhance recruitment opportunities for key flora and fauna,
- Wet — **Enhance** by maximising recruitment opportunities for flora and fauna species.

Table 2-1 shows the overarching environmental objectives for the wetting and drying of the lower Latrobe wetlands. The specific values and functions achieved addressing each objective with the wetting/drying actions are shown in Alluvium (2020).

Table 2-1 Overarching environmental objectives for the lower Latrobe Wetlands (adapted from Alluvium, 2020).

Symbol	Environmental objective
	Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species
	Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities
	Maintain abundance of freshwater turtle populations
	Maintain abundance of frog populations
	Provide suitable physio-chemical conditions to support aquatic biota including Acid Sulfate Soil inundation
	Provide critical watering or drawdown to avoid catastrophic conditions

2.2 Wetting/drying requirements

2.2.1 Watering components

Table 2-2 summarises functional objectives for the three main watering components for the lower Latrobe wetlands. These components are used to describe the wetting and drying recommendations in section 2.2.2.

Table 2-2 Summary of functional objectives for each watering component for the lower Latrobe wetlands.

Watering component	Objective
Fill/partial fill	inundation event or events sufficient to fill or partially fill the wetland, typically aimed at supporting waterbird breeding as well as inundating aquatic and semi-aquatic vegetation
Drawdown	a period of receding water levels resulting in large areas of the wetland surface drying out. Allowing soil to oxygenate and terrestrial vegetation to set seed
Flushing flow	inflow sufficient to push water into and out of the wetland and fill it. Typically allowing for import and export of nutrients and dissolved organic carbon

2.2.2 Wetting-drying recommendations

The water levels, timing, duration, and frequency outlined in the wetting and drying recommendations are derived from objectives, using conceptual models as described in the Latrobe Environmental Water Requirements Investigation (Alluvium, 2020).

Flushing flows are currently undeliverable flow components at Dowd Morass and Sale Common due to limitations of infrastructure. Partial flushing flows are achievable at Heart Morass, however, outflows from the wetland are affected by river heights at the outflow regulator limiting the volume of water which can be returned to the river.

2.3 Scenario planning and prioritisation

2.3.1 Observations

After four consecutive wetter than average years, the lower Latrobe wetlands have each received full flushing flows. Water quality and vegetation responses continue and are showing signs of ed ecological condition.

High river levels have continued throughout the year. Managed spills from Lake Glenmaggie (July-November), a natural high flow event (late August) and Thomson Dam spill each contributing to high estuary water levels and wetland inundation in September, November and December (Figure 2-1)

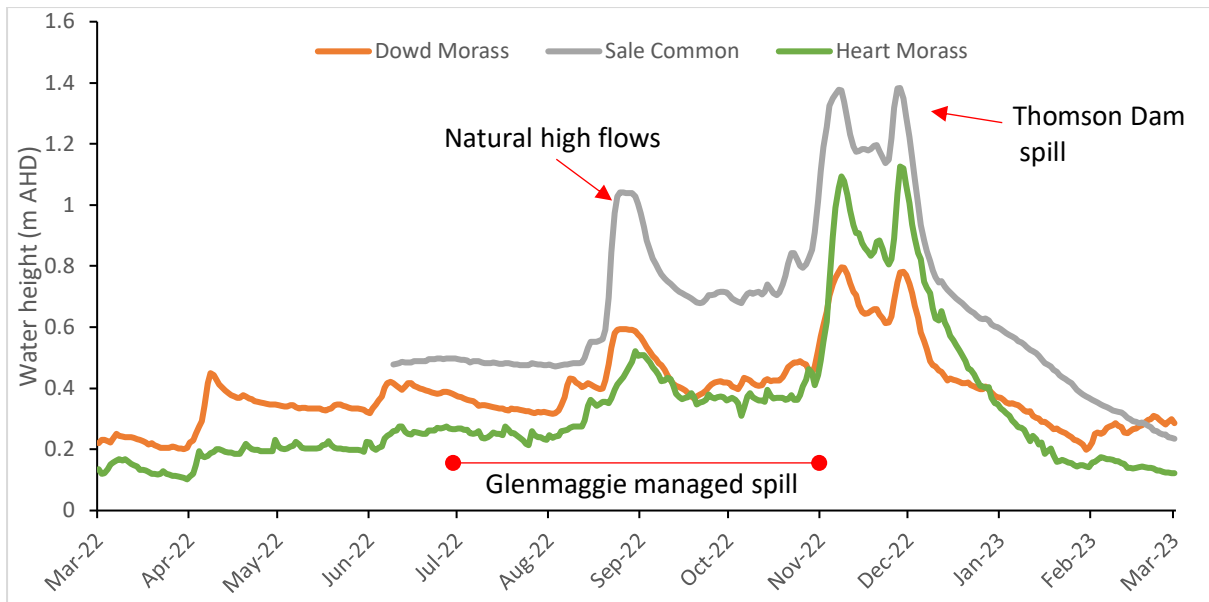


Figure 2-1 Water heights (m AHD) at Dowd Morass, Heart Morass and Sale Common from March 22-Feb 23. Also shown are significant water flow events contributing to the water levels.

Salinity levels (measured as electrical conductivity) in Lake Wellington remain low which gives an indication of the condition of the wetlands fringing the lake (including the lower Latrobe wetlands) and the significance of the flooding experienced (Figure 2-2). The spill of Thomson Dam and sustained high river flows throughout the Lake Wellington Catchment have contributed to a significant drop in salinity and the lower Latrobe wetlands have remained fresh (electrical conductivity <1,200 $\mu\text{s}/\text{cm}$) throughout the year.

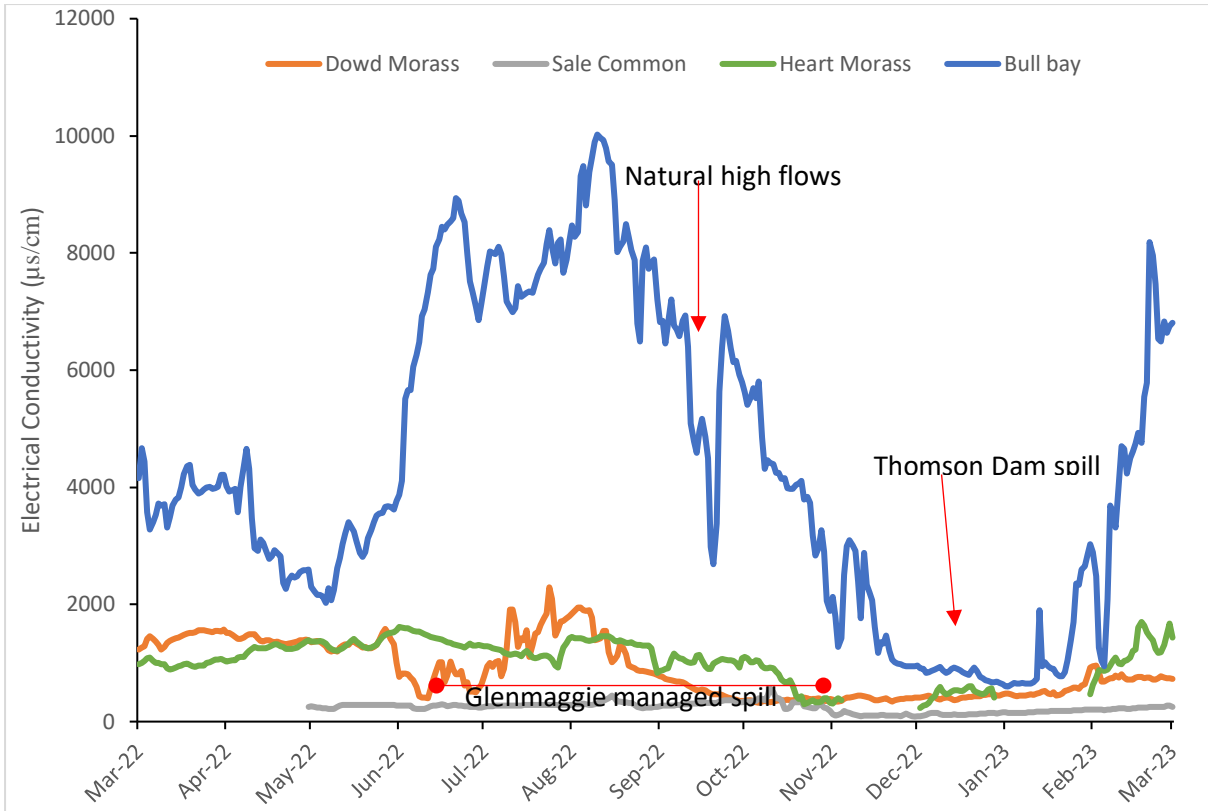


Figure 2-2 Changes in salinity (measured as Electrical Conductivity ($\mu\text{s}/\text{cm}$) at Dowd Morass, Heart Morass Sale Common and Lake Wellington (measured at Bull Bay) from March 2022 to February 2023. Also shown are significant water flow events contributing to the salinity levels

The high-water levels and low salinity have seen the ecological responses observed in 2021-22 continue throughout 2022-23. Ribbon weed (*Vallisneria australis*) extent has expanded and a second large-scale waterbird breeding event was detected again in Dowd Morass (December 2022), with over 100 nests observed, attributed to Little Black Cormorants, Black Cormorants, Little Pied Cormorants, Pied Cormorants and Australasian Darter (Photo 2-1).



Photo 2-1 Photo of Pied Cormorants nesting in Dowd Morass. Photo taken in March 2023

2.3.2 Potential negative impacts of flooding

While the wet conditions have largely shown positive outcomes for each of the wetlands, some potential negative impacts have been overserved this year including die back of Swamp Paperbark (*Melaleuca ericifolia*) at Dowd Morass and potential increased extent of Giant Rush (*Juncus ingens*) at Sale Common.

Dieback of Swamp Paperbark was observed in the fringing areas of Dowd Morass (Photo 2-2). This is possibly due to the consistent high-water levels experienced over the last 18 months. *Melaleuca* situated within the wetland have developed hummocks, lifting most of the plant above high water levels while maintaining root contact to the ground when water levels drop. These hummocks are developed over years and in response to a variable water regime (Salter et al., 2010; Wallis & Raulings, 2011). *Melaleuca* on the fringes of the wetlands have experienced less high-water levels over time and therefore have not developed hummocks and are therefore more susceptible to sustained high water levels. A conceptual model of this hypothesis is presented in Figure 2-3. The full extent and likely causes of this dies back are yet to be investigated.



Photo 2-2 Photo showing die back of Swamp Paperbark (*Melaleuca ericifolia*) at Dowd Morass. Photo taken in March 2023

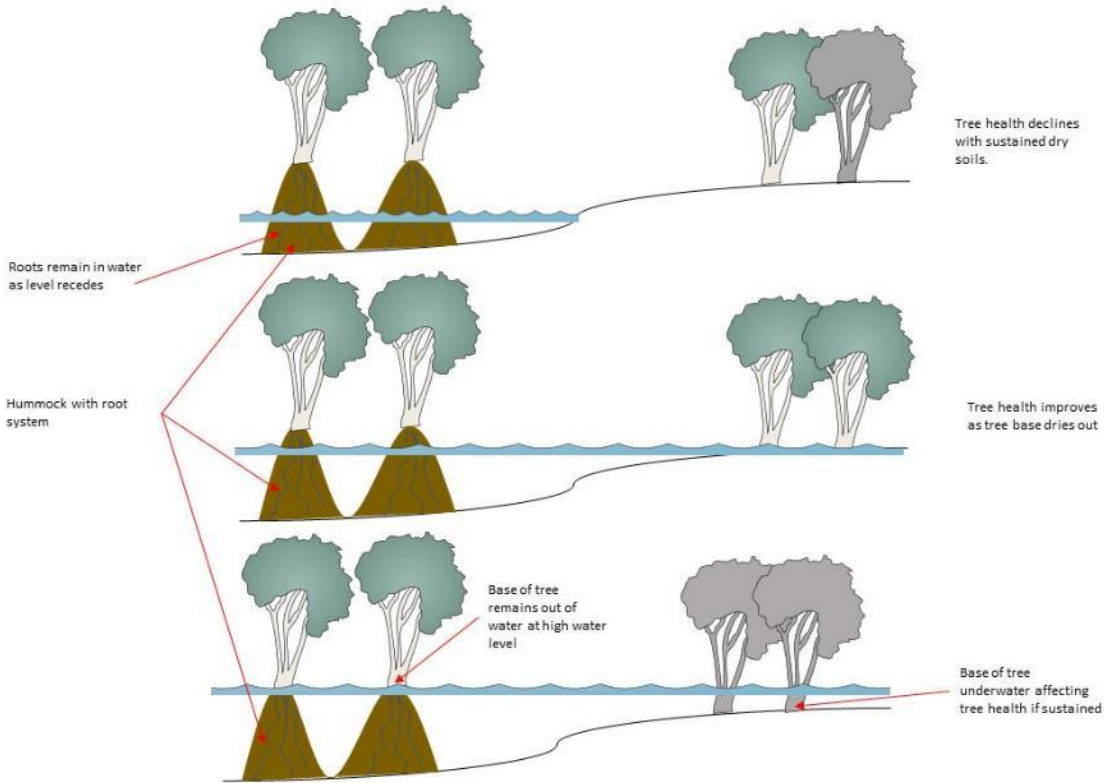


Figure 2-3 Conceptual model demonstrating possible causes of Swamp Paperbark (*Melaleuca ericifolia*) dieback in Dowd Morass

While formal surveys are yet to be completed, informal observation of Sale Common indicates that the extent of Giant Rush (*Juncus ingens*) may be expanding. This is likely due to the slower drawdown of water in warmer months favouring the rush. Further investigation is needed to determine whether the extents has expanded or shifted within the wetland.

Consultation with wetland vegetation and ecology experts will occur throughout the year to determine the likely causes and appropriate responses to the Swamp Paperbark and Giant Rush issues will occur throughout the year and implemented accordingly.

2.3.3 Provision of wetting/drying recommendations

The table below outlines the historical water regime which has been provided to the three Lower Latrobe wetlands over the past twelve years. As can be seen, all wetlands over the past year have received natural fills and flushing flows again as well as partial completed partial drawdown. The last time this was achieved was in the 2010-11 water year.

Table 2-3 Historical achievement of water regime recommendations at Dowd Morass, Heart Morass and Sale Common.

Water regime component	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	23/24
Dowd Morass														

Fill/partial fill	N	N	A/N	N	N	N	A/N	A	A	A/N	A/N	A/N	N	N
Flushing flow		N	N	N			N			N	N	N	N	N
Drawdown			N	N	N	N	A/N	N	N	N	N	N		N
Heart Morass														
Fill/partial fill	N	N	N	N	N		A/N	A	A	A	A	A	N	N
Flushing flow		N	N	N			N		A	A	A	A	N	N
Drawdown			N	N	N	N	N	N	N	N	N	N		A/N
Sale Common														
Fill/partial fill	N	N	A/N	N	N		A/N	A	A	A	A	A	N	N
Flushing flow		N	N										N	N
Drawdown			N	N	N	N	N	N	N	N	N	N		A/N

Key to table

Blank cells = no data; N=provided naturally; A = provided through active management.

	No significant part of the water regime component provided naturally or through active management
	Water regime component partially provided
	Water regime component completely provided

2.3.4 Potential watering actions

Potential watering actions for 2023-24 are focused on enhancing the achievements of 2022-23, protecting high priority environmental assets as well as protecting key ecohydrological functions and high priority refuges. The watering actions are also aimed at preventing catastrophic reduction in water quality resulting in vegetation die off and acid events caused by drying and rewetting acid sulfate soils. Each of the wetlands have experienced recent drying, however, while it is important to capitalise on the natural filling experienced this year (and previous), it is equally important to ensure the shallow fringes are not inundated for long periods of time. For this reason, there is a higher priority put on partial drawdowns which will see the fringing sections of the wetlands intermittently dried allowing soils to oxygenate and vegetation to germinate and set seed. Potential watering actions for 2023-24 are shown in Table 2-4 (Dowd Morass), Table 2-5 (Heart Morass), and Table 2-6 (Sale Common)

Gunaikurnai Dowd Morass event(s)













Opportunities to enhance environmental watering with Traditional Owner outcomes continue to be explored for the Lower Latrobe Wetlands. Through engagement with the Gunaikurnai Lands and Water Aboriginal Corporation (GLaWAC), WGCMA and GLaWAC have agreed to again pursue a Gunaikurnai Cultural event/meeting at Dowd Morass. The overarching purpose of the event is to reconnect people with Country and Culture. The event may include but not limited to; demonstrations of cultural practices or various ecological survey techniques as well as a watering action (as proposed in the previous seasonal watering proposals). The timing of the event(s) is to be determined but will at a time of cultural significance to the Gunaikurnai people.

Operation of the existing infrastructure will complement the intended outcome of the event and monitoring of water quality, floras and/or fauna will be conducted before the event to gauge appropriate timing as well as during and after the event.

Monitoring was highlighted as a key issue by GLaWAC in determining the timing of this event.














Preliminary estimated cost of one Cultural event (including one water pumping event) is \$30,000 which allows for monitoring costs before during and after the event as well as event costs. Appropriate works approvals, cultural heritage approvals and risk assessments will be completed in partnership with interested parties (Parks Victoria, GLaWAC and the VEWH).

Table 2-4 Dowd Morass prioritised potential watering actions.

Potential Watering Action	Expected Watering Effects	Environmental Objectives	Rationale	Priority
Top-up (anytime) following bird breeding event (if required)	<ul style="list-style-type: none"> Prolong wetting of reed beds to maintain habitat and food resources for nesting waterbirds and protect chicks from predators 	 <p>Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities</p>	In the event of bird breeding, water should be provided to maintain habitat and food to support the breeding event and fledging. This action is a high priority given the colonial bird breeding event observed in Dowd Morass in 2021- 22 and 2022-23 and may occur again this year	High
Fill with top ups as required to manage salinity (anytime)	<ul style="list-style-type: none"> 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 	 <p>Provide critical watering or drawdown to avoid catastrophic conditions</p> <p>Provide suitable physio-chemical conditions to support aquatic biota including Acid Sulfate Soil inundation</p>	This watering action is likely to be triggered if electrical conductivity reaches 7,000 µS/cm. Given the wet/flooding conditions experienced over the last two years, it has been determined that partial drawdowns are a higher priority than fills. If drought/dry conditions arise and are sustained, this action may be required to prevent potentially catastrophic conditions.	Medium
Partial fill with top ups as required to maintain a minimum water depth 0.3 m AHD (April-December)	<ul style="list-style-type: none"> 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 water bugs 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 	 <p>Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species</p>	Ten partial fills over ten years are the long term frequency recommendations for Dowd Morass. This watering action, along with the partial drawdown will help maintain the wetland ecosystem after a wet few years. This action is a medium priority this year as partial drawdowns are a higher priority.	Medium
		 <p>Maintain abundance of freshwater turtle populations</p>		
		 <p>Maintain abundance of frog populations</p>		
		 <p>Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities</p>		
Fill with top-ups as required to maintain a minimum water depth of 0.6 m AHD (August-November)	<ul style="list-style-type: none"> Reduce salt water incursion from Lake Wellington Wet reed beds and deep water next to reedbeds to provide waterbird nesting habitat and to stimulate bird breeding Wet high-elevation banks and 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 water bugs 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 	 <p>Provide critical watering or drawdown to avoid catastrophic conditions</p>	This watering action has a low priority as it was met in the last two years. It still remains a priority as it is recommended to occur six times in every ten years and is an important part of the water regime.	Low
		 <p>Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species</p>		
		 <p>Maintain abundance of freshwater turtle populations</p>		
		 <p>Maintain abundance of frog populations</p>		
		 <p>Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities</p>		
Partial drawdown (0 m to -0.1 m AHD (January-March))	<ul style="list-style-type: none"> Oxygenation of sediment for aquatic vegetation germination and recruitment 	 <p>Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species</p>	Partial drawdowns are recommended to occur two to five times over ten years. It is likely to occur naturally through evaporation. Sustained wet conditions appear to be impacting fringing vegetation (particularly Swamp Paperbark), therefore this year it is a high priority to partially draw the wetland down to oxygenate soils and allow fringing vegetation to recover.	High











<i>Potential Watering Action</i>	<i>Expected Watering Effects</i>	<i>Environmental Objectives</i>		<i>Rationale</i>	<i>Priority</i>
	<ul style="list-style-type: none"> • Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly Swamp Scrub and Tall Marsh) • Breakdown organic matter and promote nutrient cycling • Additional function supported: Minimise European Carp (reduce habitat) 			<p>Depending on the conditions, drawdown is likely to occur earlier than the colonial bird breeding. If this occurs, it is unlikely the birds will breed. If a breeding event does occur, this will be supported, and drawdown resume at the next opportunity.</p>	



Table 2-5 Heart Morass prioritised potential watering actions

Potential Watering Action	Expected Watering Effects	Environmental Objectives	Rationale	Priority (H/M/L)
Top ups as required to maintain a minimum water height of -0.3 AHD (anytime)	<ul style="list-style-type: none"> Minimise acid sulphate soil risk by keeping high risk areas inundated 	 Provide suitable physio-chemical conditions to support aquatic biota including Acid Sulfate Soil inundation	This watering action is required to minimise the risk of exposing acid sulfate soils to the air. Given the wet conditions over the two years it is unlikely the wetland will drawdown this low. However, the significant environmental consequences if it was to occur sees this action remain a high priority.	High
		 Provide critical watering or drawdown to avoid catastrophic conditions		
Top-up (anytime) following bird breeding event if required)	<ul style="list-style-type: none"> Prolong wetting of reed beds to maintain habitat and food resources for nesting waterbirds and protect chicks from predators 	 Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities	In the event of bird breeding, water should be provided to maintain habitat and food to support the breeding event and fledging. This action is a high priority given the colonial bird breeding event observed at Dowd Morass and unofficially observed at Heart Morass, and may occur again this year.	High
Partial fill with top ups as required to maintain a minimum water depth 0.3 m AHD (August-December)	<ul style="list-style-type: none"> Encourage growth and flowering of submerged and emergent vegetation Provided habitat for frogs and turtles Provide conditions that support macroinvertebrate and zooplankton communities, and food resources for waterbirds Additional functions supported: Macroinvertebrate populations expand, and Fish grow 	 Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species	Ten partial fills over ten years are the longer term frequency recommendations for Heart Morass. This watering action, along with the partial drawdown will help maintain the wetland ecosystem after a wet few years. This action is a medium priority this year as partial drawdowns are a higher priority.	Medium
		 Maintain abundance of frog populations		
		 Maintain abundance of freshwater turtle populations		
		 Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities		
Fill with top-ups as required to maintain a minimum water depth of 0.5 m AHD (August – November)	<ul style="list-style-type: none"> Inundate fringing vegetation reproduction water bird habitat and foraging and terrestrial avian species foraging Provide connectivity and support food sources for frogs and Turtles , and support nesting for turtles Inundate fringing wetland vegetation E.g. Floodplain Riparian Woodland (EVC 56) Allow macroinvertebrate populations to expand, stimulate fish growth and breeding 	 Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species	This watering action has a low priority as it was met last year. It still remains a priority as it is recommended to occur six times in every ten years and is an important part of the water regime.	Low
		 Maintain abundance of frog populations		
		 Maintain abundance of freshwater turtle populations		
		 Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities		
Partial flushing flow (July – November) (combination or fill and drawdown actions)	<ul style="list-style-type: none"> Export sulfides and salt 	 Provide suitable physio-chemical conditions to support aquatic biota including Acid Sulfate Soil inundation	Outcomes from previous years suggest this watering action is contributing to the overall decline in salinity and increase in pH. We will continue to provide these flows if the conditions allow. However, significant flushing has occurred because of major floods, lowering the priority of this action	Low
Partial drawdown (-0.3 m AHD (January- March)	<ul style="list-style-type: none"> Oxygenation of sediment for aquatic vegetation germination and recruitment Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly Swamp Scrub and Tall Marsh) 	 Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species	<p>Partial drawdowns are recommended to occur five times over ten years. It is likely to occur naturally through evaporation. Water levels at Heart Morass have remained high over the past 18-24 months with only minor drawdowns occurring. To continue to build resilience in the wetland it is a high priority to draw the wetland down substantially.</p> <p>Depending on the conditions, drawdown is likely to occur earlier than the colonial bird breeding. If this occurs, it is unlikely the birds will breed. If a breeding event does occur, this will be supported, and drawdown resume at the next opportunity.</p>	High

Potential Watering Action	Expected Watering Effects	Environmental Objectives		Rationale	Priority (H/M/L)
	<ul style="list-style-type: none"> • Breakdown organic matter and promote nutrient cycling • Additional function supported: Minimise European Carp (reduce habitat) 				

Table 2-6 Sale Common prioritised potential watering.

Potential Watering Action	Expected Watering Effects	Environmental Objectives		Rationale	Priority (H/M/L)
Partial fill with top ups as required to maintain a minimum water height of 0.3 AHD (July to December)	<ul style="list-style-type: none"> Encourage growth and flowering of submerged and emergent vegetation Provided habitat for frogs and turtles Provide conditions that support macroinvertebrate and zooplankton communities, and food resources for waterbirds Additional functions supported: Macroinvertebrate populations expand, and Fish grow 		Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species	Ten partial fills over ten years are the longer term frequency recommendations for Sale Common. This watering action, along with the partial drawdown will help maintain the wetland ecosystem after a wet few years.	Medium
			Maintain abundance of frog populations		
			Maintain abundance of freshwater turtle populations		
			Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities		
Fill with top ups as required to maintain a minimum water height of 0.4 AHD (August to November) for at least 2 months	<ul style="list-style-type: none"> Encourage growth and flowering of submerged and emergent vegetation Inundate fringing wetland vegetation Provide food source and connectivity for frogs Provide food source and nesting opportunities for turtles Support breeding and provide food source for waterbirds and other threatened fauna Support terrestrial and water bird foraging by Inundate fringing vegetation Provide conditions that support macroinvertebrate and zooplankton communities, and food resources for waterbirds Additional functions supported: Macroinvertebrate populations expand, and Fish grow and stimulated to breed 		Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species	Given the wet conditions observed over the last two years, maintaining a fill is a low priority for 2023-24 as most objectives related to this action have been met.	Low
			Maintain abundance of frog populations		
			Maintain abundance of freshwater turtle populations		
			Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities		
Top-up (anytime) following bird breeding event if required)	<ul style="list-style-type: none"> Prolong wetting of reed beds to maintain habitat and food resources for nesting waterbirds and protect chicks from predators 		Maintain or restore condition and diversity of aquatic, fringing, and riparian vegetation, and reduce extent of invasive plant species	In the event of bird breeding, water should be provided to maintain habitat and food to support the breeding event and fledging. This action is a high priority given the colonial bird breeding event observed in Dowd Morass in 2021-22 and 2022-23 and may occur again in 2023-24.	High
			Maintain or enhance waterbird and threatened fauna breeding, recruitment, foraging and nesting/sheltering opportunities		

Potential Watering Action	Expected Watering Effects	Environmental Objectives	Rationale	Priority (H/M/L)
Fill/top-up as required to 0.5 AHD (December – January) to drown out and prolong inundation of invasive vegetation	<ul style="list-style-type: none"> Discourage undesirable/invasive plant species 	 <p>Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species</p>	<p>This watering action remains a high priority as informal observations (i.e. formal surveys are yet to be completed) indicate that Giant Rush extent has increased. If warm, dry conditions prevail and wetland water levels drop, Giant rush are likely to proliferate. It will be important to provide adequate depth to reduce the extent of giant rush throughout the wetland.</p>	High
Partial drawdown to -0.2 m AHD (December - March)	<ul style="list-style-type: none"> Oxygenation of sediment for aquatic vegetation germination and recruitment Provide water level fluctuations for emergent vegetation reproduction and expansion (particularly Swamp Scrub and Tall Marsh) Breakdown organic matter and promote nutrient cycling Additional function supported: Minimise European Carp (reduce habitat) 	 <p>Maintain or restore condition and diversity of aquatic, fringing and riparian vegetation, and reduce extent of invasive plant species</p>	<p>Partial drawdowns are recommended to occur ten times over ten years. It is likely to occur naturally through evaporation. Given the long-wet period, this action is a medium priority and may increase in priority if wet conditions continue. However, drawdowns to the full recommendation of -0.2 m AHD will not be actively pursued as current infrastructure limits the ability to refill the wetland. Once watering infrastructure is upgraded, more ambitious drawdown targets may be pursued.</p> <p>Following a survey of the wetland establishing the extent of Giant Rush and expert analysis, this action may form part of the plan to control Giant Rush extent.</p>	Medium

2.3.5 Delivery constraints

The delivery constraints within the lower Latrobe wetlands expose the wetlands to two major threats: salinity and Acid Sulfate Soils.

The most significant threat to ecological condition, particularly at Sale Common, is the availability of freshwater. Watering of all three wetlands is reliant on Latrobe River heights and hydraulic head difference between the river and wetlands. This is largely because the infrastructure used was originally designed to drain the wetlands for agricultural purposes as opposed to filling them or retaining floodwaters for ecological benefit. Furthermore, the movement of marine water through McLennan Straits to Lake Wellington has acted to increase salinity in the waterways of the lower Latrobe further reducing the availability of suitable water for the wetlands.

Acid Sulfate Soils (ASS) are prevalent in Dowd and Heart Morass. As the wetlands dry, there is a potential for activation of the ASS if the soils oxidise and is then rewet. The ASS risk is most prevalent at Heart Morass where the effected soils are more exposed to drying. With dry conditions, the threat of an acid event in Heart Morass (and Dowd to a lesser extent) is increased.

State funding to contribute to the lower Latrobe wetland Infrastructure upgrades was announced in 2022. The detail of the funding arrangements is being finalised however at this stage, the WGCMA has commenced preparation for the installation of a new inlet structure at Dowd Morass. It is hoped that construction will begin in Summer 2023. Funding for the remaining infrastructure is yet to be determined.

Operating Arrangements for the Lower Latrobe River Wetlands Environmental Entitlement have been signed by stakeholders (Victorian Environmental Water Holder, Southern Rural Water, West Gippsland Catchment Management Authority, & Parks Victoria, 2015). Refer to this document for delivery and operating processes and constraints. Additional delivery constraints are listed in Table 2-7.

Table 2-7 Delivery constraints for carrying out the watering regime for the lower Latrobe wetlands.

Potential Constraint	Dowd Morass	Heart Morass	Sale Common	Impact
Environmental flows from the Latrobe, Thomson and Macalister rivers not delivered or delayed	✓	✓	✓	Limited capacity to deliver priority actions due to river conditions.
Lack of resources to operate infrastructure.	✓	✓	✓	Missed watering opportunities.
Size of infrastructure		✓	✓	Unable to deliver sufficient volumes of water
Lack of water quality	✓	✓	✓	Limited capacity to deliver priority actions due to river conditions
Lack of river height			✓	Unable to deliver sufficient volumes of water
Only one inlet/outlet structure	✓		✓	Missed watering opportunities or unable to deliver sufficient volumes of water

Infrastructure vulnerable to vandalism	✓	✓	Unauthorised watering or drawdown allowing water of poor quality to enter wetland
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2.3.6 Triggers for action

A water management risk assessment performed for the lower Latrobe wetlands (Hale & Boon, 2019). As part of this risk assessment the following recommendations was proposed:

- For Sale Common, it is far better to allow the wetland to dry than to put water in it with a salinity of > 5000 $\mu\text{S}/\text{cm}$. There is some risk to the site at the upper end of this range
- For Dowd Morass, there is only a small risk if water up to 15,000 $\mu\text{S}/\text{cm}$ is used to fill the wetland. When it comes to allowing the wetland to dry, however, while a dry cycle would be beneficial, we do not believe that this is likely to be achievable. It is more likely that if there is no (or little) water in Dowd Morass, then much more saline water will flow in from Lake Wellington, and this is a considerable risk, particularly if the site is not able to be flushed and there is a continued build-up of salts
- For Heart Morass, the situation is more difficult to interpret. Certainly, there is low risk in filling the wetland with water in the 5000 – 10,000 $\mu\text{S}/\text{cm}$ range. There is a great deal of uncertainty surrounding the potential effects of activation of ASS and using more saline water to fill the wetland. While the empirical evidence would suggest that low pH and high salinity both represent a risk to values, there is historical evidence that the site is resilient to both these conditions. The question remains about how long this resilience can be expected to continue (in the absence of a flushing flow) and are we approaching a critical threshold with respect to the duration, frequency or severity of low pH and / or high salinity at this site

Table 2-8 summarises these recommendations into triggers for actions for each wetland.

Table 2-8 Triggers for the implementation of the seasonal watering proposal for the lower Latrobe wetlands EC = Electrical Conductivity, a measure of salinity. Swing bridge is the location and name of the gauge used to monitor water level and quality in the lower Latrobe River.

Watering action	Wetland	Trigger
Partial fill (April - December)	Dowd Morass	Divert water if Latrobe River EC is substantially less than Lake Wellington, up to 15,000 $\mu\text{S}/\text{cm}$
Acid sulfate soils inundation (any time)	Heart Morass	Divert water in to maintain water levels above - 0.3 m AHD, preferable EC < 1,500 $\mu\text{S}/\text{cm}$, however if critical < 10,000 $\mu\text{S}/\text{cm}$ may be used
Fill and partial fills (any time)	All	Divert water if EC in the Latrobe River (Swing bridge) at the top of the water column is <1,500 $\mu\text{S}/\text{cm}$. If > 1,500 $\mu\text{S}/\text{cm}$, undertake spot readings at each regulator, open if EC is <1,500 $\mu\text{S}/\text{cm}$ (<1,000 $\mu\text{S}/\text{cm}$ for Sale Common), Continue to monitor
Fill and partial fills (any time)	Sale Common	Assuming the water quality conditions above are met, divert water in if the water level at Swing Bridge is: <ul style="list-style-type: none"> a) greater than 0.4 m AHD and will potentially remain above the threshold for more than 10 days (i.e. no strong wind or storm forecasts); and

		b) the water level in Sale Common is not higher than the Latrobe River
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2.3.7 Scenario planning

Four scenarios have been identified for the lower Latrobe wetlands system: drought, dry, average and wet. They were developed in conjunction with Southern Rural Water to be consistent with the scenarios for the rivers that supply the wetlands for which seasonal watering proposals are also being prepared (Latrobe, Thomson and Macalister rivers). The scenarios are defined in terms of the likelihood and magnitude of overbank flooding as this is the major determinant of changes in environmental watering decisions with climatic variation.

Table 2-9 shows the expected climactic conditions, estuary conditions and the general environmental objectives likely to be achieved for each wetland. Table 2-10 shows the scenario planning and tiered watering actions for the upcoming water year. Tier 1a actions have been split into those actions which will be met naturally and those which will require intervention. This is particularly relevant for draw down events which are most likely to require intervention in average a wet climate in order to achieve them, however they are likely to occur natural through evaporation in drought and dry conditions.

Table 2-9 Expected climactic and estuary conditions, and environmental objectives for the Lower Latrobe Wetlands.

		Drought	Dry	Average	Wet
Expected climatic conditions and water availability	Dowd Morass	No riverine inflows. Likely to dry completely.	Minor winter/spring inflows to western Dowd Morass if minor flooding occurs (unlikely). Moderate-substantial drawdown likely over summer/autumn depending on volume of natural inflows	Moderate winter/spring inflows (some flushing), and possibly also in autumn/winter. Wetland could be filled naturally, with minor drawdown over summer	Major flushing in winter/spring and probably also autumn/winter. Wetland will be filled naturally, with very minor drawdown over summer
	Heart Morass		Minor winter/spring inflows to eastern Heart Morass if minor flooding occurs (unlikely). Moderate-substantial drawdown likely over summer/autumn depending on volume of natural inflows		
	Sale Common		No riverine inflows. Likely to dry completely		
Expected estuary conditions	Upper Estuary	Low river levels, extended periods of saline conditions	Low river levels, periods of saline conditions	Average river levels (fluctuating), 1-2 overbank flows, mostly freshwater conditions	Extended periods of high river levels, two or more overbank flows, mostly freshwater conditions
	Mid Estuary	Low river levels, saline conditions	Low river levels, saline conditions	Average river levels (fluctuating), 1-2 overbank flows, periods of saline conditions	
	Lower Estuary				
General focus for environmental water management		Protect <ul style="list-style-type: none"> Promote oxygenation of surface soils, breakdown of accumulated organic matter and nutrient recycling Encourage the growth and reproduction of wetland plants across the bed of the wetland Reduce the number and size of European carp Avoid/mitigate risks to wetland plants and waterbird habitat from adverse salinity/pH conditions (Dowd Morass and Heart Morass) Mimic the natural inundation regime 	Recover <ul style="list-style-type: none"> Promote oxygenation of surface soils, breakdown of accumulated organic matter and nutrient recycling Encourage the growth and reproduction of wetland plants across the bed of the wetland Reduce the number and size of European carp Encourage the growth and reproduction of wetland plants, particularly Swamp Scrub, Tall Marsh, Aquatic Herbland and Brackish Herbland Discourage the spread of Giant Rush (<i>Juncus ingens</i>) (Sale Common). Provide feeding habitat for wetland fauna, particularly waterbirds Import organic matter and nutrients. Reduce salinity and maintain/increase pH Import seed/propagules. Avoid/mitigate risks to wetland plants and waterbird habitat from adverse salinity/pH conditions Mimic the natural inundation regime 	Maintain <ul style="list-style-type: none"> Encourage the growth and reproduction of wetland plants across the bed of the wetland Encourage the growth and reproduction of wetland plants, particularly Swamp Scrub, Tall Marsh, Aquatic Herbland and Brackish Herbland. Provide feeding habitat for wetland fauna, particularly waterbirds Encourage the growth and reproduction of wetland plants across the bed of the wetland Discourage the spread of Giant Rush (<i>Juncus ingens</i>) (Sale Common). Import organic matter and nutrients Reduce salinity and maintain/increase pH (Dowd Morass and Heart Morass) Import seed/propagules. Avoid/mitigate risks to wetland plants and waterbird habitat from adverse salinity/pH conditions (Dowd Morass and Heart Morass) Mimic the natural inundation regime. Reduce the number and size of European carp Promote oxygenation of surface soils, breakdown of accumulated organic matter and nutrient recycling 	Enhance <ul style="list-style-type: none"> Maximise colonial waterbird breeding opportunities Encourage the growth and reproduction of Aquatic Herbland and Brackish Herbland (Dowd Morass and Heart Morass) and Tall marsh (Sale Commons) Encourage recolonisation of submerged aquatic plants Maintain/enhance condition and extent of structurally dominant plants such as Swamp Paperbark (<i>Melaleuca ericifolia</i>), Common Reed (<i>Phragmites australis</i>) and River Red Gums (<i>Eucalyptus camaldulensis</i>). Maximise waterbird and fauna breeding, recruitment, foraging and sheltering opportunities Maximise importation of organic matter and nutrients Export salt and increase pH (Dowd and Heart Morass) Maximise dispersal of seed/propagules. Provide breeding habitat for Growling Grass Frog and Green and Golden Bell Frog Facilitate movement of Dwarf Galaxias (<i>Galaxiella pusilla</i>) from/to Flooding Creek and Cox's Bridge populations (Sale Common) Mimic the natural inundation regime

Table 2-10 Scenario planning for environmental water deliver to the Dowd Morass, Heart Morass and Sale Common

		Drought	Dry	Average	Wet
Dowd Morass	Likely natural watering	Partial drawdown (January- March)	Partial drawdown (January- March) Partial fill (April-June)	Partial fill (April- December) Fill (August-November)	Partial fill (April- December) Fill (August-November)
	Tier 1 potential watering intervention	Bird breeding top-up (anytime) Salinity management fill (anytime) Partial fill (April- December)	Partial fill (June - December) Bird breeding top-up (anytime) Salinity management fill (anytime)	Bird breeding top-up (anytime) Salinity management fill (anytime) Partial drawdown (January- March)	Bird breeding top-up (anytime) Salinity management fill (anytime) Partial drawdown (January- March)
	Tier 1 estimated environmental water demand	0-9,000 ML	0-9,000 ML	0-9,000 ML	0-9,000 ML
	Tier 2 potential watering actions	Fill (August-November)	Fill (August-November)		
	Tier 2 estimated environmental water demand	0-9,000 ML	0-9,000 ML		
Heart morass	Likely natural watering	Partial drawdown (January- March)	Partial drawdown (January- March)	Partial fill (August- December) Fill (August – November)	Partial fill (August- December) Fill (August – November) Partial flushing flow (July – November)
	Tier 1 potential watering intervention	ASS top ups (anytime) Bird breeding top-up (anytime) Partial fill (August- December)	ASS top ups (anytime) Bird breeding top-up (anytime) Partial fill (August- December)	ASS top ups (anytime) Bird breeding top-up (anytime) Partial drawdown (January- March)	ASS top ups (anytime) Bird breeding top-up (anytime) Partial drawdown (January- March)
	Tier 1 estimated environmental water demand	0-24,000 ML	0-24,000 ML	0-24,000 ML	0-24,000 ML
	Tier 2 potential watering actions	Fill (August – November) Partial flushing flow (July – November)	Fill (August – November) Partial flushing flow (July – November)	Partial flushing flow (July – November)	
	Tier 2 Estimated water requirement	0-24,000 ML	0-24,000 ML	0-24,000 ML	
Sale Common	Likely natural watering	Partial drawdown (December -March)	Partial drawdown (December -March)	Partial drawdown (December -March)	Partial fill (July to December) Fill (August to November)
	Tier 1 potential watering intervention	Partial fill (July to December) Bird breeding top-up (anytime) Invasive veg top up (December-January)	Partial fill (July to December) Bird breeding top-up (anytime) Invasive veg top up (December-January)	Partial fill (July to December) Bird breeding top-up (anytime) Invasive veg top up (December-January)	Bird breeding top-up (anytime) Invasive veg top up (December-January) Partial drawdown (December -March)
	Tier 1 estimated environmental water demand	0-5,000 ML	0-5,000 ML	0-5,000 ML	0-5,000 ML
	Tier 2 potential watering actions	Fill (August to November)	Fill (August to November)	Fill (August to November)	
	Tier 2 estimated environmental water demand	0-5,000 ML	0-5,000 ML	0-5,000 ML	

3 Risk management & Engagement

3.1 Risk management

A risk assessment workshop hosted by the Victorian Environmental Water Holder (VEWH) was held in February 2023. The workshop participants identified the key potential risks that may occur in the 2023-24 water year to prevent the objectives of the environmental watering program being achieved. The risks were considered within the context of the likely watering actions proposed for 2023-24, and the current conditions of environmental assets across each system considering the extensive natural watering that had been achieved in the current water year.

The risk assessment was undertaken using the likelihood, consequence and risk rating tables contained in the updated Victorian Environmental Watering Program Risk Management Framework. The risk assessment process also had regard for dynamic risks that are more likely to vary from year to year, depending on seasonal conditions or the specific watering actions proposed.

The approach to the risk assessment was to use the 2022-23 risk assessment as the starting point and identify any new risks (including those arising from the risk learnings discussions) and any risks that were no longer relevant. By exception, participants were also asked to identify any changes to the existing pre-mitigations risk assessments or the identified mitigation actions and lead organisations.

The results of this risk analysis are set out in the spreadsheet included in Appendices Appendix 1. The analysis found all risks to be low after mitigations are put in place.

Stranding and subsequent concentration of fish, particularly carp, during and after drawdown was identified as a potential environmental and reputational risk after the risk workshop. Environmentally, high concentrations of carp can degrade aquatic vegetation and water quality which, in turn, can impact other native fauna in the water body. As the condition of the water body degrades, the potential of fish kill event increases. This is also potential reputational risk for both the water and land managers with a fish kill potentially gaining negative attention from media and community. This risk is most prevalent at Sale Common as the billabong on the western bank becomes an isolated, permanent, waterbody once the wetland has drawn down. The wetland is also near the town of Sale with high public visitation.

This is a common risk across Victoria and should be assessed by the VEWH appropriately as part of the 2024-25 seasonal water planning. For 2023-24, a supplementary risk assessment will be undertaken by WGCMA towards the end of the wet period (August/September) for each of the lower Latrobe wetlands.

3.2 Engagement

This section outlines the engagement that has occurred in the development of the Lower Latrobe Wetlands Seasonal Watering Proposal for 2023-24. Significant engagement was made through the Project Advisory Group for the Latrobe Environmental Water Requirements Investigation. As part of this project participants were informed of the use of environmental objectives and flow recommendations established through for the seasonal watering proposals. It is anticipated that members from this group will for part of the Environmental Water Advisory Group for the lower Latrobe wetlands at commencement of the project soon, lifting the level of engagement from “inform” to “involve”. Levels and purpose of engagement are shown in Table 3-1.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) have Registered Aboriginal Party (RAP) status under the *Aboriginal Heritage Act (2006)* and their area of determination covers all West Gippsland rivers that receive environmental water. The WGCMA has a Memorandum of Understanding (MoU) in place with GLaWAC. In this MoU the WGCMA agrees to involve the Aboriginal corporation in all WGCMA projects from the beginning as well as build capacity of GLaWAC to protect and conserve natural resources. In this instance, this was achieved by having direct one-on-one engagement with GLaWAC cultural water officers, planning an event together as well as their inclusion in all three EWAGs. This provided them an opportunity to not only provide feedback on the proposed watering actions and observations of previous deliveries on behalf of their community, but also to look for opportunities where environmental water can support shared values or objectives. The WGCMA is working towards supporting GLaWAC to progress from 'collaborate' to 'empower' into the future.

Other engagement that supports environmental water planning and in-season delivery in the Lower Latrobe Wetlands system includes:

- In person gatherings such as field visits e.g., with the Sale Field and Game group, meetings with partners, speaking at community meetings (e.g., Field Naturalists group), coordinating public events with partners e.g., World Wetland Day celebration at Heart Morass,
- Media such as informative social media posts, photography competition, videos, and print media such as posters, fliers and fact sheets,
- Partnering to collect environmental data used for monitoring purposes e.g., the Sale Field and Game group collecting water quality data via the Waterwatch program, Birdlife Australia conducting bird monitoring at the Lower Latrobe wetlands.
- Subscriber E-flows notifications via email and text message to inform community members on planned flows.

Table 3-1 Summary of the parties engaged and the levels and purpose of engagement for the 2023-24 Seasonal Watering Proposal.

Category	Stakeholder	IAP2 level	Engagement method	Engagement purpose
Community and Environment Groups	<ul style="list-style-type: none"> Birdlife Australia, Greening Australia, Latrobe Valley Field Naturalists, Waterwatch volunteers, 	Involve	<ul style="list-style-type: none"> Direct engagement (one-on-one, emails), Community environmental monitoring, Project advisory groups, Collaboration on public events. 	<ul style="list-style-type: none"> Seek feedback on previous environmental water actions including observations. Identify opportunities to achieve shared benefits. Increase collaboration and shared knowledge of environmental water.
	<ul style="list-style-type: none"> VR Fish, Native Fish Australia. 	Collaborate	<ul style="list-style-type: none"> Formal advisory groups e.g., EWAGs Direct engagement (one-on-one, emails). 	<ul style="list-style-type: none"> Provide an opportunity to represent their interests in the development of the proposed watering actions and intended outcomes. Seek feedback on previous environmental water actions including observations. Identify opportunities to achieve shared benefits. Increase collaboration and shared knowledge of environmental water
Government agencies	<ul style="list-style-type: none"> VEWH, Gippsland Water Parks Victoria 	Collaborate	<ul style="list-style-type: none"> Formal advisory groups (EWAGs), Project advisory groups e.g., Latrobe Environmental Water Requirements Investigation Project advisory group, Direct engagement (one-on-one, emails). 	<ul style="list-style-type: none"> Provide an opportunity to represent their interests in the development of the proposed watering actions and intended outcomes. Seek feedback on previous environmental water actions including observations. Identify opportunities to achieve shared benefits. Increase collaboration and shared knowledge of environmental water.
	<ul style="list-style-type: none"> DEECA (Waterways and Catchments) 	Inform	<ul style="list-style-type: none"> Project advisory groups e.g., Latrobe Environmental Water 	<ul style="list-style-type: none"> Seek feedback on previous environmental water actions

Category	Stakeholder	IAP2 level	Engagement method	Engagement purpose
	<ul style="list-style-type: none"> East Gippsland Catchment Management Authority 		Requirements Investigation Project advisory group, <ul style="list-style-type: none"> Direct engagement (one-on-one), Collaboration on community events. 	including observations and monitoring data. <ul style="list-style-type: none"> Identify opportunities to achieve shared benefits. Increase collaboration and shared knowledge of environmental water.
Traditional owners	<ul style="list-style-type: none"> Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) 	Collaborate	<ul style="list-style-type: none"> Formal advisory groups, Project steering committees, Participation in monitoring programs e.g., eel surveys, Collaboration on filming projects such as the Latrobe River story, Direct engagement (one-on-one). 	<ul style="list-style-type: none"> Provide an opportunity to represent their group's interests, cultural knowledge and concerns in the development of the proposed watering actions and intended outcomes. Seek feedback on previous environmental water actions including observations. Identify opportunities to achieve shared benefits. Increase collaboration and shared knowledge of environmental water. Provide opportunities for on-country learning and connection.
Land managers/recreational users	<ul style="list-style-type: none"> Field & Game Australia (Sale) 	Collaborate	<ul style="list-style-type: none"> Project advisory groups (e.g., Latrobe Environmental Water Requirements Investigation project), Direct engagement (one-on-one, emails), Participation in water quality monitoring program, Collaboration on public events e.g., WGCMA World Wetland Day event, E-flows distribution list (email, SMS notifications). 	<ul style="list-style-type: none"> Provide an opportunity to represent their group's interests in the development of the proposed watering actions and intended outcomes. Seek feedback on previous environmental water actions including observations and monitoring data. Identify opportunities to achieve shared benefits. Increase collaboration and shared knowledge of environmental water.

Category	Stakeholder	IAP2 level	Engagement method	Engagement purpose
Landholders	<ul style="list-style-type: none"> Individual landholders 	Involve/consult	<ul style="list-style-type: none"> Direct engagement (one-on-one, emails), E-flows distribution list (email, SMS notifications). Information sharing via social media and public events. 	<ul style="list-style-type: none"> Identify opportunities to achieve shared benefits. Increase collaboration and shared knowledge of environmental water, Increase advocacy of environmental water.
Local businesses	<ul style="list-style-type: none"> Port of Sale Heritage River Cruises Frog Gully Cottages 	Inform	<ul style="list-style-type: none"> E-flows subscriber notifications and newsletters (email, SMS) 	<ul style="list-style-type: none"> Share information with businesses that have an interest in the Lower Latrobe wetlands and its health who can share information with residents and visitors to the region.

Actions in the 'Water for the Environment Community Engagement Plan' for 2019 – 2024 are being progressively completed by the WGCMA. Looking into the 2023-24 water year the following engagement activities are planned:

Activity	Engagement purpose:
New interpretative signage emphasising the importance of environmental water at publicly accessible sites. E.g., Dowd Morass	<ul style="list-style-type: none"> Inform and engage the recreational user. Increase advocacy for environmental water in the community. Work collaboratively with our partners to strengthen relationships
Commission new drone images of the Latrobe river and wetlands	<ul style="list-style-type: none"> Compare against previous images to show natural landscape changes and impacts from watering activities. Use for communications purposes e.g., new social media posts, videos, informative posters and interpretive signage
Work with GLaWAC environmental water officers to find out what they need and provide it e.g., Specialist training on country, new fact sheets/booklets, instructional videos	<ul style="list-style-type: none"> Engage and empower our traditional owners. Identify shared benefits. Two-way knowledge sharing Collaborate and strengthen relationships
Completion of Latrobe River documentary and launch at a community event.	<ul style="list-style-type: none"> Inform and engage the recreational user. Increase advocacy for river conservation and environmental water in the community. Work collaboratively with our partners to strengthen relationships.
Presentations to environmental groups, such as the Latrobe Valley Field Naturalists.	<ul style="list-style-type: none"> Inform and engage the recreational user. Increase advocacy for environmental water in the community. Work collaboratively with our partners to strengthen relationships.

4 Shared Benefits

The shared benefits of potential watering actions across each of the lower Latrobe wetlands are listed in Table 4-1.

Table 4-1 Summary of the shared benefits from wetting and drying in the lower Latrobe wetlands.

Component	Wetland	Who?	Shared Benefit
Fills and partial fills	All	Recreational users	Provide amenity for access tracks, canoeing, fishing and bird watching
	Heart Morass and Dowd Morass	Shooters	Provide open water for duck hunting season
		Campers and other recreational users	Provide amenity for camping
	All	Commercial fishers	May advantage commercial eel and carp fishing.
Acid Sulfate Soil inundation	Heart Morass	Shooters	Maintain open water for duck hunting season, or if water levels have receded and water quality is suitable, the partial fill will be timed to coincide with the duck shooting season opening (mid-March)
		Commercial fishers	May advantage commercial eel and carp fishing
Partial fill	Heart Morass and Dowd Morass	Shooters	If water quality is suitable the partial fill will be timed to coincide with the duck shooting season opening (mid-March)
		Commercial fishers	May advantage commercial eel and carp fishing
Drawdown	All	Recreation users	Provide amenity for access tracks, and bird watching
	Heart Morass and Dowd Morass	Campers and other recreational users	Provide amenity for camping

5 Increasing knowledge and addressing constraints/impacts

5.1 Monitoring

WGCMA will undertake environmental monitoring to inform and evaluate implementation of the seasonal watering plan for the lower Latrobe wetlands. This will include:

- Spring, autumn and event-based water quality monitoring (including pH and salinity) at 2 sites in Sale Common and Dowd Morass and 4 sites in Heart Morass, to inform watering decisions and actions
- River flow rates, water level and water quality in the Latrobe River and lower Latrobe wetlands obtained from VEWH funded telemetered monitoring stations installed at Swing Bridge (on the Latrobe River below the confluence with the Thomson River), Heart Morass, Dowd Morass and Bull Bay (on the southern edge of Lake Wellington)
- Incidental observations and photos of biota to track events and gauge the general condition of the wetlands.

The above will be supplemented with ongoing waterfowl monitoring undertaken by Field and Game Australia and observations from other local community members.

Vegetation monitoring

As part of the state funded Wetland Monitoring and Assessment Program (WETMap) vegetation surveys will be undertaken at the Lower Latrobe wetlands commencing in April 2023. This monitoring will revisit benchmarking sites set up in 2015 (Frood et al., 2015) and be used to detect change in vegetation composition and extent over time including extent changes of Giant Rush at Sale Common.

5.2 Reporting

Reporting will be undertaken in accordance with the Entitlement and the Victorian Environmental Water Holder's Guidelines for reporting on the management of the Water Holdings.

A summary report on environmental watering will be presented to the WGCMA Board. This will include, but not limited to:

- Overview of conditions throughout the water year
- Compliance of flows against the Seasonal Watering Statements
- Results from monitoring program
- Evaluation of delivery success
- Learnings and emerging issues

5.3 Environmental effectiveness

Sound wetland water management requires information about the likely and actual response of water-dependent assets (especially plants as they provide the structural habitat and organic carbon required by other wetland biota) to the water regimes provided (whether through natural or 'active' means). This enables a genuine adaptive management framework to be applied to increase knowledge and improve management over time. Useful information is available for some long-lived plant species that occur in the lower Latrobe wetlands, such as Swamp Paperbark, due to focussed research having been undertaken in the local area (Dowd Morass). There is however a dearth of locally relevant information about the hydro-ecological requirements of most other aquatic plant species. Boon (2011) identified the

following limitations to the currently available information on hydrological requirements of wetland plants in his environmental flows study for Macleod Morass near Bairnsdale:

- What information is available is generally based on studies undertaken in arid or semi-arid parts of the Murray-Darling Basin, and there are likely to be difficulties in extrapolating to coastal eastern Victoria;
- Little recognition is given to the possibility that the hydrological requirements of a given species can vary across its geographical range, especially if its range is large e.g. Common Reed (*Phragmites australis*); and
- Many plant taxa have little or no information available on their hydrological requirements, and there can be a disparity in recommendations for a single species.

Focussed local research and long-term ecological response monitoring are needed to address these limitations and enable refinement of wetland water regime recommendations over time, including the identification of optimum conditions and critical tolerances (as required for Environmental Water Management Plans). Some research/monitoring questions arising from this seasonal watering proposal are:

- Is there an ecological association between Giant Rush and Upright Water Milfoil, and is the aim of controlling the spread of the former and encouraging the persistence of the latter incompatible? These species germinated under the same conditions and based on monitoring to date, are disadvantaged by permanent inundation.
- What are the hydro-ecological requirements for recolonisation and persistence of submerged and emergent aquatic plants (particularly Aquatic Herbland, Aquatic Sedgeland, Brackish Herbland and submerged angiosperms)?
- What are the benefits and risks of summer/autumn versus winter/spring inundation?
- What is the habitat value of widespread introduced species (particularly Parrot's Feather)? Can this habitat be readily replicated or enhanced using indigenous native species, is this achievable, and what role can water regime management play?

A limitation of preparing individual seasonal watering proposals is that the focus is on management of the site, rather than broader but related considerations such as management of highly mobile populations or entire species of waterbirds that occur across or utilise multiple sites. These inter-site issues should be factored into the development of the Victorian seasonal watering plan.

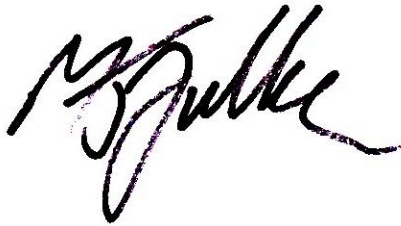
6 Approval and endorsement

I, the authorised representative of the agency shown below, approve the 2023-24 Seasonal Watering Proposal for the Lower Latrobe Wetlands .

SIGNED FOR AND ON BEHALF OF

West Gippsland Catchment Management Authority

Signature of authorised representative



Name: *Martin Fuller*

Title: *Chief Executive Officer*

Date: 21/04/2023

I, the authorised representative of the agency shown below, acknowledge that the priority watering actions being proposed in this proposal can be delivered within existing infrastructure of the Lower Latrobe Wetlands system in 2023-24, recognising that there may be additional information to endorse in relevant operating arrangements.

SIGNED FOR AND ON BEHALF OF

Parks Victoria

Letter of support attached

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Parks Victoria
PO Box 3100
Bendigo Delivery Centre
BENDIGO, Vic, 3554
parks.vic.gov.au
ABN 95 337 637 697

24 April 2023

Adrian Clements
Environmental Water Officer
West Gippsland Catchment Management Authority
PO Box 1374
TRARALGON VIC 3844

Dear Adrian,

Letter of support for the 2023-24 West Gippsland Catchment Management Authority Seasonal Watering Proposals

Parks Victoria has conducted a detailed review of the Seasonal Watering Proposal for the Lower Latrobe Wetlands, and we endorse submission of the final watering proposal to the Victorian Environmental Water Holder, subject to consideration of the matters below.

When conducting environmental watering actions on the Parks Victoria estate, the following points must be addressed:

- Assess whether on-ground works are required to facilitate the water delivery (i.e. pumping, clearing, installation of levees) and if so, seek advice to determine what approvals are required by Parks Victoria. This advice should be sought early to ensure approvals can be processed prior to the CMA's proposed start-up date.
- Advise relevant Area Chief Ranger (must cc Program Leader – Ecological Water) regarding the proposed opening and closing of the water regulating structures.
- As Parks Victoria assists in the operation of delivery infrastructure at these sites, please continue to ensure we receive reasonable notice so we can schedule these actions, ensure resources are available, and safety requirements can be satisfied.
- Recognition of Parks Victoria in all media relating to delivery of environmental water to the Parks Victoria estate – we must be given the opportunity to contribute to and review draft media releases and general articles, to develop shared and aligned communications messaging.
- We require Delivery Plans for watering actions that utilise pumping infrastructure. These should be submitted to the relevant Area Chief Ranger (must cc Program Leader – Ecological Water), at least 28 days prior to proposed delivery start-up. Where required, this should include completed Cultural Heritage Management Plans.
- We must be included as a member and be invited to participate in all Operational Advisory Groups (or equivalents) for all environmental water sites on or adjoining the Parks Victoria estate.
- As Land Manager, Parks Victoria has co-responsibilities for mitigating risks associated with environmental water deliveries. To assist us in managing these risks they should be highlighted in the site-specific Delivery Plans and discussed with our Area Chief Rangers when planning environmental watering actions.



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Parks Victoria is committed to working with Traditional Owner's to protect cultural values and landscapes. We encourage you to continue to engage with the relevant groups and individuals in the upcoming planning and delivery stages of the proposed watering actions, and to involve us in these interactions.

The key contacts for consultation regarding local matters are:

Bridget Grant
Area Chief Ranger - Valley Plains and Coast
bridget.grant@parks.vic.gov.au
(03) 8427 2639

Chris Holmes
Ranger Team Leader - Valley Plains and Coast
chris.holmes@parks.vic.gov.au
(03) 8427 2635

For broader environmental water based queries or issues across all areas of the Parks Victoria estate please consult with:

Kathryn Stanislowski
Program Leader – Ecological Water
Kathryn.stanislowski@parks.vic.gov.au
(03) 8427 3389

We look forward to working with you in the management of these important wetlands throughout 2023-24.

Yours sincerely



Kerri Villiers
Regional Director – Eastern Victoria



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7 References

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8 Appendices

Appendix 1 Risk assessment for watering proposal (compiled by DG Consulting 2023)

System	Risk category	Risk description	Pre-Mitigation Likelihood	Pre-Mitigation Consequence	Risk Rating	Mitigation actions	Lead organism. for action	Residual Risk Likelihood	Residual Risk Consequence	Risk Rating
All	Environment	Target flows may not be achieved if tributary inflow contributions are lower than forecast.	Possible	Minor	Low	<ul style="list-style-type: none"> • Experience from recent events to be reviewed to inform planning. • Rainfall and catchment responses to be closely monitored during events and adjustments made to planned releases as necessary (using data inputs from storage operators). 	WGCMA	Unlikely	Minor	Low
All	Environment	Timing of environmental flow releases adversely impacts on Australian grayling breeding	Unlikely	Moderate	Low	<ul style="list-style-type: none"> • Base timing for events on monitoring data collected to date and improved knowledge from FLOWS study (note that learnings have been extrapolated to Latrobe, as specific Latrobe monitoring data is not available) • Share updated information on Australian grayling behaviour with other relevant waterway managers. 	WGCMA	Unlikely	Minor	Low
All	Reputational	Inability to demonstrate outcomes achieved through environmental watering activities lead to a loss of public/political support for activities	Possible	Moderate	Medium	<ul style="list-style-type: none"> • Communicate benefits of environmental watering to the broader community and government and clarify various roles in environmental watering activities. • Implement community engagement strategy to communicate local successes and benefits from environmental watering and engage the community & EWAGS in environmental water management. 	VEWH WGCMA	Unlikely	Moderate	Low
All	Environment	Current adopted environmental flow recommendations fail to achieve the intended environmental objectives	Unlikely	Major	Low	<ul style="list-style-type: none"> • Undertake monitoring and research to improve understanding of ecological responses and review flow recommendations if required. • Implement results of recent flow study reviews, including using findings from other systems, and undertake review of flow studies in the Latrobe and Thomson. 	WGCMA	Unlikely	Moderate	Low
All	Legal	Environmental releases cause unauthorised inundation of private land, resulting in impacts on landowner activities and assets.	Possible	Moderate	Medium	<ul style="list-style-type: none"> • Update and ensure currency of any applicable agreements covering inundation of private land. • Development of cautious release plans designed to avoid overbank flows. • Monitoring of events and providing feedback to the storage operator for adjustment of releases to avoid overbank flows. • Communications to alert community of environmental watering actions. • Ensure pre-order communications process in Operating Arrangements document are implemented - Use local intelligence gathering processes (works crews) to identify impacts to banks/levees following major unregulated flow events 	WGCMA	Unlikely	Minor	Low
All	Environment	Constraints to environmental releases such as limited river channel capacity (and risk of flooding private land) and limited discharge capacity at low storage levels constrain environmental releases, leading to a failure to achieve environmental objectives across the system <i>- Note: Risk assessment based on environmental conditions in 2022-23. Need to review if drier conditions emerge and persist</i>	Possible	Minor	Low	<ul style="list-style-type: none"> • Update and ensure currency of any applicable agreements covering inundation of private land. • Development of cautious release plans designed to avoid overbank flows. • Monitoring of events and providing feedback to the storage operator for adjustment of releases to avoid overbank flows, particularly where landholder agreements are not in place. • Development of a strategy to address environmental flow limits. <p><i>Note: developing alternate release options to address constraints in the Latrobe, possibly using Moondarra & Narracan reservoirs</i></p>	WGCMA	Unlikely	Minor	Low
All	Safety	Environmental flow releases cause a rapid change in river conditions that mean lead to safety risks as to river users can quickly find themselves in conditions that are significantly different from those that they assessed before entering the water and therefore exceed their level of capability leading to potential safety risk	Possible	Extreme	High	<ul style="list-style-type: none"> • Include ramp-ups and ramp-down phases in release plans to reduce rapid water level changes. • Appropriate communications actions to alert users, especially for high use sites and high use periods. • Encourage river users to subscribe to website notification services of flow plans. • Implement communications plan about environmental water releases <p><i>(Note: This risk is still rated as medium after mitigation actions.) Note: By gradually ramping flows up and down and providing advance notifications of planned watering actions to potential river users, these mitigation actions mean that rapid and unexpected changes to river conditions will not be a result of environmental flows and therefore the risk is diminished because conditions will not significantly change as a direct result of e-flows, and therefore river users' assessment of conditions at the time they started their activity remain (i.e. the residual consequence is minor).</i></p>	WGCMA	Unlikely	Minor	Low
All	Environment	Environmental releases do not achieve planned/specified flow targets due to competing demand, outlet capacity constraints or maintenance at reservoirs	Possible	Minor	Low	<ul style="list-style-type: none"> • Scheduling of maintenance outside high demand periods (i.e. current practice). • Testing seasonal watering proposals with storage operators. • Communications on planned asset outages through BE holders' forums 	Storage operator WGCMA Storage Operator	Unlikely	Minor	Low
All	Environment	Environmental releases do not achieve planned/specified flow targets due to releases being diverted by other users before reaching delivery site.	Unlikely	Minor	Low	<ul style="list-style-type: none"> • Ensure diversions field staff are aware of planned events and are managing compliance with orders by all users. • CMA and SRW to collaborate to assess the scope of risks associated with diversion of environmental flows 	SRW CMA	Unlikely	Minor	Low

System	Risk category	Risk description	Pre-Mitigation Likelihood	Pre-Mitigation Consequence	Risk Rating	Mitigation actions	Lead organisn. for action	Residual Risk Likelihood	Residual Risk Consequence	Risk Rating
All	Reputational	Environmental deliveries affect water quality for urban purposes, leading to shortfalls in urban supply. <i>Note: Warragul and Moe urban supplies in the Latrobe system have been interconnected, providing greater resilience for towns in the region. Maffra on the Macalister still remains vulnerable as there is limited urban storage.</i>	Unlikely	Moderate	Low	<ul style="list-style-type: none"> Communication and consultation with urban water authority to understand issues and concerns, and to provide 2 weeks advance notice of flow changes where possible Modify delivery plans to reduce potential water quality impacts where possible, particularly in peak urban demand periods. Include consideration of options for meeting demands from Lake Narracan where possible. 	WGCMA WGCMA SRW	Unlikely	Minor	Low
All	Environment	Works on waterway structures may prevent optimal timing of environmental deliveries, resulting in environmental impacts	Possible	Minor	Low	<ul style="list-style-type: none"> Consultation on any proposed works and inclusion of appropriate conditions on works approvals/licences to ensure that there are no unacceptable impacts on timing and flow rates for environmental releases. - Consider separate risk assessment for Maffra Weir works proposals as they are developed, not impacting 23-24 deliveries (basis for residual risk rating) 	WGCMA	Unlikely	Minor	Low
All	Reputational	Any public safety risks posed by consumptive water releases are misconstrued as environmental water releases and are detrimental to the environmental water brand.	Possible	Moderate	Medium	<ul style="list-style-type: none"> Broadcast a year-round public safety message raising awareness that river levels may rise and fall quickly due to irrigation releases and environmental watering. - Notification processes for environmental water delivery clarify the role of environmental water in river operations - Environmental water engagement plan also improves understanding of environmental water actions - Undertake state-wide programs to increase environmental water understanding - Rates of rise and fall of releases managed to avoid rapid changes, except in flood emergencies when significant notification processes led by SES are undertaken. 	Storage operator (&WGCMA) WGCMA (& Storage operator) WGCMA VEWH Storage operator	Unlikely	Minor	Low
All	Environment	Insufficient water available to undertake planned environmental release actions.	Unlikely	Moderate	Low	<ul style="list-style-type: none"> Undertake planning that considers the range of seasonal conditions or water availability scenarios that may unfold. Manage carryover and consider trade as options to lessen the risks posed by supply shortfalls. Consider options that combine environmental water with other sources (e.g. consumptive water en-route or withheld passing flows) to achieve hydrological objectives For Thomson optimise passing flows in July/August to create water savings for use later in the season, including consideration of risk allocation for environmental and consumptive entitlement holders. (May require revision to OA document). - Not for 22-23, further analysis planned for 22-23 - residual risk based on 22-23 environmental conditions after widespread overbank flows 	WGCMA VEWH/ WGCMA WGCMA	Unlikely	Minor	Low
All	Environment	Debris from bushfires, including ash, or erosion from drought affected areas may enter reservoirs or waterways, leading to adverse environmental impacts	Unlikely	Moderate	Low	<ul style="list-style-type: none"> Monitor ash related water quality issues and adjust environmental water releases as required to mitigate impacts 	WGCMA	Unlikely	Minor	Low
All	Reputational	Insufficient resources available (including staff, funding for maintenance of roads, regulators etc), across partner organisations to deliver some planned environmental watering actions, leading to cancellation or interruptions of deliveries. <i>Note: Cumulative impacts of repeated cancellation may increase risk</i>	Unlikely	Moderate	Low	<ul style="list-style-type: none"> Partners notify the CMA and VEWH of resourcing constraints in advance of deliveries and VEWH convenes meetings to consider implications and potential solutions, including seeking access to additional funding. Continue to actively prioritise actions to match available resources and ensure key actions are delivered. Reallocation of tasks and available funding. - residual risk based on 22-23 environmental conditions after widespread overbank flows 	VEWH WGCMA WGCMA	Unlikely	Minor	Low
All	Safety	Environmental watering generates or spreads a BGA bloom resulting in human health risks	Unlikely	Minor	Low	<ul style="list-style-type: none"> - Warning signage and notifications - Consider amending delivery plans to reduce risks - Activate and participate in regional BGA coordination process 	Land manager WG CMA DELWP Gippsland	Unlikely	Minor	Low
Lower Latrobe Wetlands	Environment	High tides coinciding with low water levels in wetlands could result in saline water intrusions into the wetlands, which may cause negative environmental impacts on long term vegetation conditions. <i>- Based on Sale Common risk, which is the highest risk. Others are Heart - Possible & Moderate Dowds - Likely + Moderate</i>	Possible	Moderate	Medium	<ul style="list-style-type: none"> Implement findings from saline inflow risk assessment study. Apply findings from the Latrobe River environmental watering recommendations. - Consider the medium to longer term objectives and values to be protected <p><i>(Note: This risk is rated as low after mitigation actions in the context of current env. conditions of vegetation. New infrastructure needed to effectively mitigate risks)</i></p>	WGCMA	Possible	Minor	Low
Lower Latrobe Wetlands	Environment	Poor condition of wetland side of the Dowd Morass regulator results in PV being unable to operate the structure due to OH&S risks, leading to failure to deliver environmental flows and to achieve environmental objectives.	Unlikely	Minor	Low	<ul style="list-style-type: none"> PV (Asset owner) to undertake regular maintenance and pre-event asset inspections on delivery infrastructure. <i>*Note that insufficient resources are likely to limit the asset owner's ability to regularly inspect and maintain infrastructure. Increased resources for these activities may further reduce the likelihood and risk ratings.</i> Communicate failures to the CMA Develop design for upgrading regulating structure and seek funding to implement 	PV PV WGCMA	Unlikely	Minor	Low

System	Risk category	Risk description	Pre-Mitigation Likelihood	Pre-Mitigation Consequence	Risk Rating	Mitigation actions	Lead organism. for action	Residual Risk Likelihood	Residual Risk Consequence	Risk Rating
						necessary upgrades in conjunction with land manager (in progress). Consider opportunities to design to minimise risks of interference				
Lower Latrobe Wetlands	Environment	Unauthorised access/operation of wetland regulating structures causes environment harm (e.g. saltwater event)	Unlikely	Moderate	Low	<ul style="list-style-type: none"> Ensure structures are locked and monitor structure regularly to minimise likelihood of interference. Educate the community on environmental water needs and benefits. Erect signage to identify the importance of the assets for environmental water delivery. (Priority for Sale Common) <p>(Note: This risk is rated as low after mitigation actions in the context of current env. conditions of vegetation.)</p>	PV WGCMA WGCMA	Unlikely	Moderate	Low
Lower Latrobe Wetlands	Environment	Infrastructure capacity is insufficient to enable Sale Common to be watered at low river levels, leading to failure to achieve environmental objectives	Possible	Minor	Low	<ul style="list-style-type: none"> Upgrade or replace existing inlet structure to enable access to low river flows for watering the site. <p>Note: An upgrade strategy has been developed and is expected to be implemented in next few years</p> <ul style="list-style-type: none"> Investigate other water delivery options 	WGCMA	Possible	Minor	Low
Lower Latrobe Wetlands	Environment	Infrastructure capacity is insufficient to enable Dowd Morass to be watered at low river levels, leading to salt water intrusion from Lake Wellington which results in environmental damage	Possible	Minor	Low	<ul style="list-style-type: none"> Provide additional upstream inlet structure to enable access to low river flows for watering the site. Consider temporary pumping alternatives <p>- Note: Construction of infrastructure at Dowd Morass likely to commence in summer 2023 - review residual risk following completion</p>	WGCMA WGCMA	Possible	Minor	Low
Lower Latrobe Wetlands	Environment	Infrastructure capacity is insufficient to enable Heart Morass to be watered at low river levels, leading exposure of acid sulphate soils. which results in environmental damage	Unlikely	Moderate	Low	<ul style="list-style-type: none"> Provide additional upstream inlet structure to enable access to low river flows for watering the site. Consider temporary pumping alternatives 	WGCMA WGCMA	Unlikely	Major	Low
All systems	Safety	Negative community sentiment in relation to government decisions/actions creates a safety risk for staff involved in environmental watering actions <i>*This is state wide risk, but may not apply in all systems - the risk rating will reflect local risk levels</i>	Possible	Moderate	Medium	<ul style="list-style-type: none"> ensure staff are alerted to warnings about violent members of public Strategic Communication of benefits of e-water and concern over safety to wider public (with co-ordination between partners) ensure safe operational procedures for staff are followed, including staff training 	All	Possible	Minor	Low