



VICTORIAN
ENVIRONMENTAL
WATER HOLDER



Seasonal Watering Plan 2011–12

Published by the Victorian Environmental Water Holder
Melbourne, August 2011

© Victorian Environmental Water Holder 2011

This publication is copyright. No part may be reproduced
by any process except in accordance with the provisions
of the *Copyright Act 1968*.

Authorised by the Victorian Environmental Water Holder,
8 Nicholson St, East Melbourne.

Printed on 100 % recycled paper
ISBN 978-1-74287-145-5 (print)
ISBN 978-1-74287-146-2 (online)

The *Seasonal Watering Plan 2011–12* is available for viewing
or downloading from our website: www.vewh.vic.gov.au

As part of the Victorian Environmental Water Holder's
commitment to environmental sustainability, we only print limited
copies of the *Seasonal Watering Plan 2011–12*. We encourage
those with internet access to view the plan online.

If you require any additional printed copies, please contact
the Victorian Environmental Water Holder using one of the
methods below.

Phone: 03 9637 8951
Email: general.enquiries@vewh.vic.gov.au
By mail: PO Box 500, East Melbourne VIC 3002
In person: 15/8 Nicholson St, East Melbourne

Disclaimer

This publication may be of assistance to you but the Victorian
Environmental Water Holder and its employees do not guarantee
that the publication is without flaw of any kind or is wholly
appropriate for your particular purposes and therefore disclaims
any liability for any error, loss or other consequence which may
arise from you relying on any information in this publication.

Accessibility

If you would like to receive this publication in an accessible format,
such as large print or audio, please telephone 03 9637 8951 or
email general.enquiries@vewh.vic.gov.au

Contents

Foreword	2	13 E Tarago system	31
1 Overview	3	13 F Yarra system	34
2 Environmental water in Victoria	4	13 G Werribee system	38
3 The role of the Victorian Environmental Water Holder	6	13 H Moorabool system	42
4 The Water Holdings	7	13 I Barwon system*	46
5 Environmental watering partners	9	14 Western Victoria	47
6 Environmental water planning	10	14 A Glenelg system	48
7 Water delivery	12	14 B Wimmera system	51
8 Accounting	13	14 C Wimmera-Mallee wetlands*	56
9 Carryover and trade	13	15 Northern Victoria	57
10 Consultation	14	15 A Goulburn system	58
11 Monitoring and reporting	14	15 B Broken system (lower Broken Creek)	63
12 Planned watering actions	15	15 C Campaspe system	67
13 Southern Victoria	16	15 D Loddon system (including Bullarook)	71
13 A Snowy system	17	15 E Northern wetlands and floodplains	76
13 B Latrobe system	20	16 Glossary	82
13 C Thomson system	25	17 List of acronyms	83
13 D Macalister system	28	18 Schedules	83

* Planned watering actions in these systems will be added to the seasonal watering plan at a later date. The development of seasonal watering proposals for these systems has been pending the finalisation of the Barwon environmental flow study, and planning and infrastructure works to connect further Wimmera-Mallee wetlands to the Wimmera-Mallee Pipeline.

Foreword



It is a great honour to be appointed to Victoria's first independent statutory body for holding and managing the State's environmental water entitlements and allocations.

Having only been established since 1 July 2011, developing the first seasonal watering plan of the Victorian Environmental Water Holder (VEWH) has been a challenging, but at the same time satisfying experience.

The development of the detailed and comprehensive seasonal watering proposals by the regional catchment management authorities (CMAs) and Melbourne Water to inform the basis of this plan is acknowledged and much appreciated.

Similarly, the Department of Sustainability and Environment is commended for the significant environmental outcomes achieved by the Victorian environmental watering program during previous years, and particularly through the drought.

The seasonal watering plan has also benefited enormously from the knowledge and experience of the departmental and VEWB staff who have been involved in its development during the transitional period. Thanks go to Beth Ashworth, Mike Jensz, Tori Perrin and Lucy Alderton in this regard.

In a time of unpredictable, and at times, extreme climatic conditions, environmental water management is becoming increasingly complex. The challenges are greater, but the opportunities are also bigger than ever before.

The concept of an integrated statewide plan for environmental water management is a new one for Victoria. While challenging, this new approach presents considerable opportunity for coordinating the management of environmental water across catchments and waterway management boundaries.

The Victorian Water Holdings are a small but very important component of the overall Environmental Water Reserve. It is these entitlements that can be actively managed, in terms of when and how water is released, to get maximum environmental benefit. It is the intention of the VEWB to use its Water Holdings strategically to complement the other components of the Environmental Water Reserve and to work closely with the waterway managers and their partners to maximise environmental benefits.

The opportunity for coordination with other holders of environmental water entitlements, such as the Commonwealth Environmental Water Holder (CEWH) and partners in the Living Murray program, also means larger and more strategic environmental watering events are possible. Increased opportunities to trade environmental water entitlements and allocations, including through expansion of the water grid, provides greater flexibility to put environmental water to its highest value use.

Following an extended period of drought, Victoria's river systems received much needed rainfall and high flow conditions throughout 2010–11. Environmental watering priorities in 2011–12 will build upon the benefits provided by these wet conditions, promoting ecosystem recovery. Preliminary forecasts issued by the Bureau of Meteorology suggest slightly below average rainfall conditions for Victoria. However with most storages near capacity and wet catchments across most of the state, the outlook for the 2011–12 water year is positive.

The experiences of managing environmental water through the drought have not been forgotten however, and the VEWB intends to apply the lessons learned through this period to inform its decision making into the future.

This plan embraces an adaptive management framework, to guide decision-making under a range of seasonal conditions, based on scenarios from extremely dry to very wet. It is this framework that will allow the VEWB to make timely decisions and issue seasonal watering statements which authorise the use of water from its Water Holdings throughout the 2011–12 water year.

I, along with my fellow Commissioners, Geoff Hocking and Ian Penrose, look forward to the implementation of the *Seasonal Watering Plan 2011–12*, along with the challenges and opportunities the first operating year of the VEWB will undoubtedly present.

A handwritten signature in black ink that reads "Denis Flett".

Denis Flett
Chairperson, Victorian Environmental Water Holder

This Seasonal Watering Plan 2011–12 (the plan) is the first produced by the VEWH. It outlines the planned use of water from the Victorian Water Holdings (the Water Holdings), which comprise environmental water entitlements held within 13 source systems. Delivery of water from the Water Holdings to river reaches and wetlands throughout Victoria will help maintain important environmental values.

The plan considers how to coordinate delivery of water from the Victorian Water Holdings with environmental water managed by others, including the partners in the Living Murray program and the CEWH.

The plan has been prepared in collaboration with waterway managers (CMAs and Melbourne Water). It outlines priority environmental watering actions for 2011–12, provided there is sufficient water. The plan considers a range of scenarios, from very dry through to an extremely wet year, and is adaptive to changing water resource conditions and opportunities throughout the water year.

Seasonal watering proposals are developed by waterway managers to identify regional priorities for environmental water use. They provide a clear rationale to directly inform statewide priorities for environmental watering actions. The proposals are informed by relevant regional river health strategies, developed in consultation with the community and other partners. In addition, scientific studies into the timing, duration and frequency of environmental flows required for each river system (known as environmental flow studies), provide the scientific basis for seasonal watering proposals.

Understandably, there is variation in the approaches taken to developing these proposals; for example, in how the planning scenarios are identified, how priority flow components are defined and how risks have been assessed and described. In part, this reflects the varying hydrology of the systems and differences in water management arrangements. It may also be due to historical differences in terminology or the technical approaches used by

waterway managers. In the future, it is intended that there will be more consistent approaches used in developing the seasonal watering plan.

Sections 13–15 outline the scope of planned watering actions during 2011–12 in southern, western and northern Victoria. These sections outline the expected environmental water use under a range of planning scenarios to achieve specific environmental objectives.

Seasonal watering statements will be issued to communicate decisions on environmental watering actions. A statement can be made at any time during the season. Statements will relate to specific systems and waterway managers. Depending on the nature of the system and the entitlement being used, there may be one or multiple statements made for a particular system, as conditions unfold and water becomes available (see section 6 for further information). In addition to communicating decisions on watering actions, the seasonal watering statements authorise waterway managers to order and deliver water from the Water Holdings on behalf of the VEWH.

Schedules 1–14 provide further detail about watering actions outlined in sections 13–15. Schedules 1–14 are available to download from www.vewh.vic.gov.au or hard copies are available from the VEWH office.

2 Environmental water in Victoria

The VEWH manages only the environmental water that is provided through environmental water entitlements or 'the Water Holdings' (see section 4 for more information). The Water Holdings can be actively managed, with discretion as to when, where and in what volumes water is delivered.

The volume of water from the Water Holdings actually available for use in any given year is subject to seasonal conditions, including rainfall and runoff in the catchments.

The Water Holdings form only one part of Victoria's broader Environmental Water Reserve (EWR). The EWR is the legal term used to describe the amount of water set aside to deliver environmental outcomes. In addition to the Water Holdings, the EWR includes water provided through:

- water set aside for the environment as obligations on consumptive water entitlements held by urban and rural water corporations – these are usually called 'passing flows' that must be released from storages or provided at a particular point of a river
- 'above cap' water provided once limits on consumptive water use have been reached or due to unregulated flows and spills from storages, usually created by heavy rainfall.

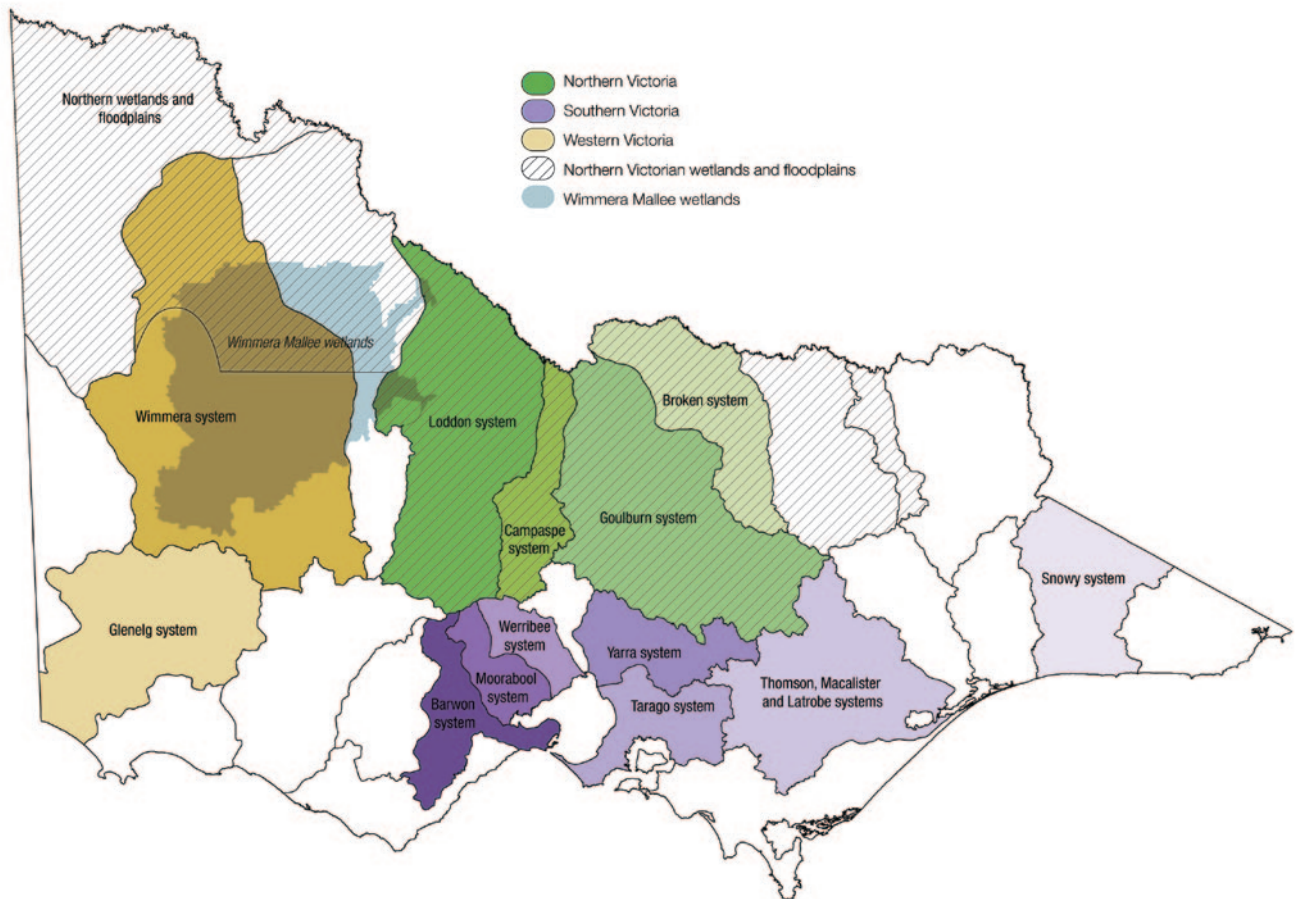
Victorian river systems may also be allocated environmental water from other entitlement-holders, including partners in the Living Murray program, the CEWH and through donations from individuals, community groups and other organisations. It is the role of the VEWH to coordinate with other holders of environmental water entitlements to maximise the benefits to Victorian waterways, and to ensure that the delivery of this water will not have any adverse impacts in Victoria (see section 15 for more information).

River systems contain river reaches, floodplains and wetlands which can receive environmental water. Some of these systems connect naturally, some are connected by man-made structures, and others do not connect at all. Environmental entitlements are sourced from reservoirs in one river system but may be able to be delivered and used in a number of river reaches and wetlands, depending on the specific rules of the entitlement and the physical connectivity between systems. For example, an entitlement held in the Goulburn River may be available for use in River Murray wetlands. Figure 2.1 illustrates the systems where it is possible to deliver water from the Water Holdings.



Lindsay Island – Lake Wallawalla, Mallee Catchment Management Authority

Figure 2.1 Systems that can receive water from the Water Holdings



It is not only environmental water that is beneficial to waterways; other types of water can also provide environmental benefits, for example:

- consumptive water en route (that is, water on its way to being delivered to water users)
- system operating water (that is, water released down regulated rivers in order to deliver consumptive water to users).

Waterway managers consider these other types of water in developing their seasonal watering proposals. They are also considered in the development and implementation of the seasonal watering plan to ensure effective system operations, efficient use of water from the Water Holdings and to optimise environmental benefits.

3 The role of the Victorian Environmental Water Holder

The VEWH is an independent statutory body responsible for making decisions on the most efficient and effective use of Victoria's Water Holdings, thus helping to protect the environmental values of Victoria's rivers, wetlands and floodplains.

The VEWH is comprised of three part-time Commissioners, supported by a small operations team. The Commissioners act as a board of governance and consist of Denis Flett, Chairperson, Geoff Hocking, Deputy Chairperson, and Ian Penrose, Commissioner. The Commissioners are appointed by the Governor in Council on the recommendation of the Minister for Environment.

The VEWH works with CMAs and Melbourne Water. Its main responsibilities are to:

- hold and manage Victorian environmental water entitlements and allocations (the Water Holdings)
- coordinate the delivery of Victorian environmental water allocations with those of other environmental entitlement holders to maximise benefits to the environment
- ensure that environmental water management continues to become more efficient, optimising environmental benefits
- make adaptive, responsive and timely decisions about where and when environmental water is delivered

- examine opportunities to trade water allocations and entitlements, where this optimises environmental benefits
- draw on the environmental watering priorities identified by waterway managers in consultation with their local communities, to identify statewide priorities
- report on when, where, how and why environmental water entitlements have been used.

The objectives and functions of the VEWH are set out in sections 33DA–33DZA of the Water Act 1989. The VEWH is an independent statutory body that acts in accordance with State Government policy including:

- any rules issued by the Minister for Environment under section 33DZA of the Water Act
- sustainable water strategies
- the Victorian River Health Strategy (soon to be replaced by the Victorian Strategy for Healthy Rivers, Estuaries and Wetlands).



Denis Flett
*Chairperson,
Victorian Environmental
Water Holder*



Geoff Hocking
*Deputy Chairperson,
Victorian Environmental
Water Holder*



Ian Penrose
*Commissioner,
Victorian Environmental
Water Holder*

4 The Water Holdings

The Water Holdings are the environmental water entitlements held by the VEWH. Table 4.1 below outlines the environmental entitlements and bulk entitlements held by the VEWH (as of 30 June 2011), including those held in trust for the Living Murray.

Table 4.1 The Water Holdings

System	Entitlement	Volume (ML)	Reliability
Latrobe	Latrobe River Environmental Entitlement 2011	n/a ¹	n/a
Macalister	Macalister River Environmental Entitlement 2010	7,111 3,555	High Low
Thomson	Bulk Entitlement (Thomson River – Environment) Order 2005 ²	10,000 ³	n/a
Tarago	Tarago and Bunyip Rivers Environmental Entitlement 2009 ²	3,000 ⁴	n/a
Yarra	Yarra Environmental Entitlement 2006 ²	17,000 ³ 55 ⁵	n/a
Werribee	Werribee River Environmental Entitlement 2011	n/a ⁶	n/a
Moorabool	Moorabool River Environmental Entitlement 2010 ²	2,500 ⁷	n/a
Barwon	Barwon River Environmental Entitlement 2011	n/a ¹	n/a
Wimmera and Glenelg	Wimmera and Glenelg Rivers Environmental Entitlement 2010 ^{2,8}	41,560	High
Loddon	Bulk Entitlement (Loddon River – Environmental Reserve) Order 2005 ⁸	2,000 7,490 ⁹ 2,024	High n/a Low
	Environmental Entitlement (Birch Creek – Bullarook System) 2009 ²	100 ⁹	n/a
	Water Shares – Snowy River Environmental Reserve	470	High
Campaspe	Environmental Entitlement (Campaspe River – Living Murray Initiative) 2007	126 5,048	High Low
Goulburn	Environmental Entitlement (Goulburn System – Environmental Water Reserve) 2010	0 ¹⁰	n/a
	Goulburn River Environmental Entitlement 2010	1,432	High
	Environmental Entitlement (Goulburn System – Living Murray) 2007	39,625 156,980	High Low
	Bulk Entitlement (Goulburn System – Snowy Environmental Reserve) Order 2004	16,812	High
	Water Shares – Snowy River Environmental Reserve	6,121 17,852	High Low
	Silver and Wallaby Creeks Environmental Entitlement 2006	0 ¹¹	n/a



River Murray, Alison Pouliot

Table 4.1 The Water Holdings (continued)

Source system	Entitlement	Volume (ML)	Reliability
Murray	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999	27,600 40,000 ¹²	High Unregulated entitlement
	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999 – Barmah-Millewa Forest Environmental Water Allocation ¹³	50,000 25,000	High Low
	Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999 – Living Murray	5,710 101,850 34,300 ¹²	High Low Unregulated entitlement
	Environmental Entitlement (River Murray – Environmental Water Reserve) 2010	0 ¹⁰	n/a
	Bulk Entitlement (River Murray – Snowy Environmental Reserve) Conversion Order 2004	29,794	High
	Water Shares – Snowy River Environmental Reserve	10,544 6,415	High Low

1 Use of this entitlement is dependent upon suitable river heights, as specified in both the Latrobe and Barwon environmental entitlements.

2 In addition to the volumetric entitlement, the entitlement also includes passing flow obligations.

3 After making provision for passing flows, on the 1st July every year the first inflows into the Thomson basin (10,000 ML) and Yarra headworks system (17,000 ML) are allocated to the environment.

4 This volume represents the average annual entitlement volume. The entitlement consists of passing flows and a 10.3 per cent share of inflows into storage, with the actual volume available in any year varying depending upon inflow conditions.

5 55 ML of water was recovered through a Stream Flow Tender Pilot program in the catchments of Olinda Creek, Stringybark Creek and Pauls, Steels and Dixons Creeks, which is now available to supplement environmental flows in the Yarra River.

6 The Werribee environmental entitlement consists of a 10 per cent share of inflows into storage, with the actual volume available in any year varying depending upon inflow conditions.

7 This volume represents the average annual entitlement volume. The entitlement consists of a 11.9 per cent share of inflows into storage, with the actual volume available in any year varying depending upon inflow conditions.

8 In addition to volumetric entitlement, the entitlement also consists of above cap water.

9 Allocation of water against these entitlements is dependant upon the seasonal allocation of high-reliability water shares being greater than 1 % on the Goulburn system in April of the previous year (7,940 ML in the Loddon system), and greater than 20 % on the Bullarook system at the start of December in any year (100 ML in the Birch Creek – Bullarook system). Upon reaching these thresholds, the full entitlement volume is made available.

10 The volume available under this entitlement will be amended upon completion of water savings projects associated Stage 1 of the Northern Victoria Irrigation Renewal Program (NVIRP). In the interim period, the environment's 1/3 share of the annual water savings achieved from Stage 1 of NVIRP are provided under a supply agreement.

11 Entitlement consists of passing flows only.

12 Unregulated entitlement volume available only in declared periods of unregulated flow in the River Murray.

13 The Barmah-Millewa Forest Environmental Water Allocation is an obligation set out in Goulburn-Murray Water's entitlement, and this water is specifically for use in the Barmah-Millewa Forest, in accordance with specific rules. New South Wales hold an equivalent volume. Use of this water is approved by the VEWB and New South Wales Government, in consultation with the MDBA.

More detail about the above entitlements can be viewed online at the Victorian Water Register (www.waterregister.vic.gov.au)

5 Environmental watering partners

Environmental watering occurs through the collaboration of a range of agencies and individuals to ensure it is coordinated and effective, bringing about the best outcome for Victorian waterways.

Partners of the VEWH include:

Waterway managers (catchment management authorities and Melbourne Water)

engage communities to identify priority waterways and environmental values; submit seasonal watering proposals for VEWH consideration; and manage the physical delivery of environmental water, monitoring and reporting.

The Department of Sustainability and Environment

develops water resource policy for approval by the Victorian Government; creates and amends environmental entitlements on behalf of the Minister for Water; and manages Crown land (eg. state forests), some of which receives water through the environmental watering program

Storage operators (water corporations)

operate water storages; and work with waterway managers to deliver and measure environmental water.

Parks Victoria

manages state and national parks and other reserves across Victoria, many of which contain sites which receive water through the environmental watering program.

Murray-Darling Basin Authority

coordinates planning for and implementation of the Living Murray program (a multi-jurisdictional commitment to the health of the River Murray) including delivery of water from entitlements held in trust by the VEWH. Partners of the Living Murray program are the Murray-Darling Basin Authority and the Commonwealth, Victorian, New South Wales, South Australian and Australian Capital Territory governments.

Commonwealth Environmental Water Holder

(part of the Department of Sustainability, Environment, Water, Population and Communities) holds and manages the water entitlements purchased through the Restoring the Balance water recovery program.

Other stakeholders with an interest in environmental watering include environmental groups, local government, entitlement-holders, land-holders and communities.

6 Environmental water planning

Seasonal watering proposals put forward by waterway managers identify the regional priorities for environmental water use in each system under a range of planning scenarios. The proposals provide a clear rationale to directly inform the statewide priorities outlined in the seasonal watering plan.

The seasonal watering proposals are informed by relevant regional river health strategies, developed in consultation with the community and other partners. In addition, scientific studies into the timing, duration and frequency of environmental flows required for each system (known as environmental flow studies), provide the scientific basis for seasonal watering proposals. While not responsible for these strategies and studies, the VEWH will likely input to their development in the future.

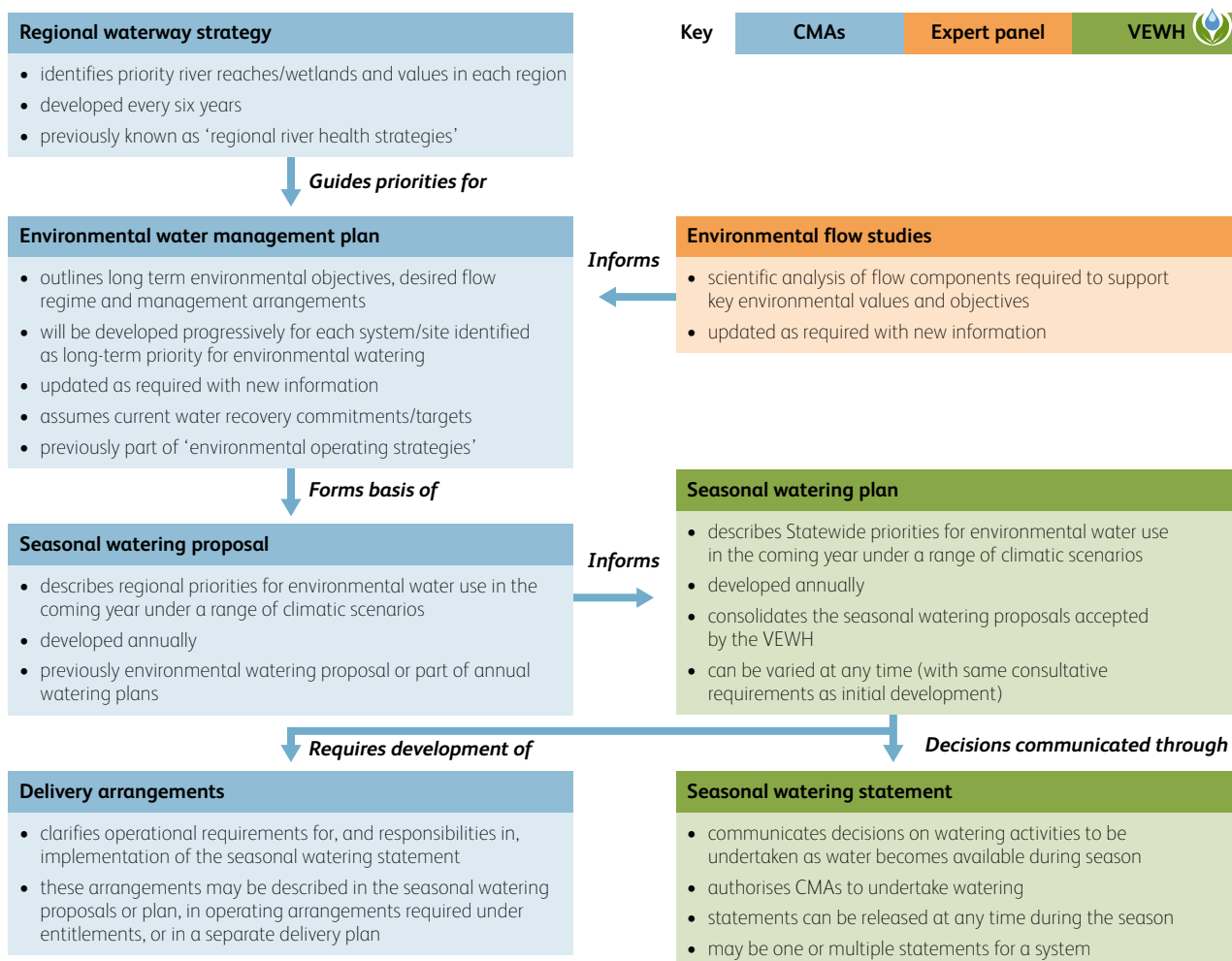
For this first seasonal watering plan, seasonal watering proposals put forward by waterway managers have been considered and accepted by the VEWH and now form part of the *Seasonal Watering Plan 2011–12* (see Schedules 1–14). They incorporate any changes resulting from feedback by the VEWH.

Seasonal watering statements will be issued to communicate decisions on environmental watering actions, including as water becomes available during the season. The statements authorise waterway managers to undertake watering actions; however, before any actions are performed, the VEWH must ensure that appropriate delivery arrangements are in place.

In developing seasonal watering statements, the VEWH will also negotiate with the CEWH and partners of the Living Murray program (see section 15 for more information).

The planning process is outlined in Figure 6.1. The elements of the planning framework, particularly regional waterway strategies and environmental water management plans, will be developed or refined over the next few years.

Figure 6.1 Planning for use of the Water Holdings





River Murray, Department of Sustainability and Environment

A flexible framework, called the *seasonally adaptive approach*, is used to guide decision-making. This approach looks at broad scenarios which range from very dry to very wet conditions. Scenarios incorporate the likely availability of environmental water based on recent climate history and outlook, and determine the priority environmental objectives as a result. In dry scenarios, watering actions are focused on protecting drought refuges and preventing critical or irreversible loss. In wetter scenarios, the aim is to improve resilience and restore floodplain linkages.

As a result of natural connectivity and man-made channels, it is often possible to deliver water from a particular reservoir to a range of river systems; northern Victoria is particularly interconnected. This interconnectivity provides the opportunity to prioritise environmental water use across systems and waterway manager boundaries; it is the role of the VEWH to do this prioritisation.

Determining priorities is most important when resources are constrained; for example, during drought periods or when there are limited funds for delivery charges.

In considering the seasonal watering proposals, developing the seasonal watering plan and prioritising the use of the Water Holdings, the following criteria are used:

- extent and significance of the environmental benefit expected from the watering (for example, the area watered, the size of the breeding event to be triggered, the conservation status of the species that will benefit etc)
- certainty of achieving the environmental benefit and ability to manage other threats (for example, a flow has been provided in the past with demonstrated benefits and relevant complementary works are being undertaken at the site)
- ability to provide ongoing benefits at the site (for example, where the management arrangements provide for watering in the long term)
- implications of not watering the site (for example, potential for critical or irreversible loss)
- risks associated with the watering (such as off-site salinity or water quality impacts)
- feasibility of the watering (including operational requirements and constraints and flexibility in delivery timing)
- cost-effectiveness of the watering (with regards to the amount of benefit for the volume of water and the associated delivery costs; includes the opportunity for return flows to provide downstream benefit)
- opportunity to maximise outcomes by integration with other sources of water and complementary works (for example, to build on a natural event or consumptive water en route)
- watering history (the length of time since a flow has occurred and the ecological implications of this).

The physical delivery of environmental water to sites in Victoria is guided by, and subject to a number of conditions, rules and in some cases fees and charges for the use of water delivery networks.

A seasonal watering statement must be issued by the VEWH before water delivery can commence.

Before issuing a seasonal watering statement to authorise a waterway manager to order and deliver water, the VEWH must be sure that delivery requirements have been met and that any costs to be met by VEWH are acceptable.

It is important that risks to the successful achievement of environmental outcomes and any risks to third parties are assessed and managed. Of particular note is the risk of damage to private property or personal injury. The VEWH and waterway managers will not flood private land. Risk management strategies will be implemented as necessary to address the risk of accidental or exacerbated flooding. These strategies are identified in sections 13A-I, 14A-C and 15A-E and each of the schedules.

Depending on the particular system and the entitlement being used, delivery arrangements might be outlined in any of the following:

- the seasonal watering plan
- operating arrangements required under some entitlements
- a separate delivery plan.

Delivery details include matters such as water source, delivery route, strategies to overcome delivery constraints, local site governance, mechanism, timing and triggers for watering, water ordering process, costs and funding sources and reporting and monitoring requirements.

A delivery plan must also be developed if water from entitlements of the CEWH or the Living Murray is approved for use at Victorian sites.

Once delivery arrangements have been confirmed, environmental watering can begin. This may be via a release from an upstream storage or by diverting directly from a river or channel.



Thomson Dam, Department of Sustainability and Environment

8

Accounting

Environmental water accounting provides information on the volume of water released, delivered and used at each of the environmental watering sites.

Allocation bank accounts (ABAs) are held for most of the entitlements held by the VEWH. As water is allocated to, or delivered from the entitlements, these amounts are recorded in the Victorian Water Register (www.waterregister.vic.gov.au/).

The VEWH will report its annual water use at the end of each water year in its annual report.

9

Carryover and trade

In certain circumstances, the VEWH can carry over allocation into the following water year and trade its water entitlements or allocation, consistent with the VEWH objectives – that is, the trade or carryover needs to benefit the environment. The mix of tools – water use, carryover and trade – will be used to optimise environmental benefits.

Water trading provides opportunities for more efficient use of environmental water in times of water scarcity. For example, revenue raised through trade may be used to purchase allocation at a different time or in a different system, fund small structural works to improve water use efficiency, or fund delivery costs.

Carryover provides opportunities for more flexibility and efficiency in environmental water planning and delivery by allowing entitlement holders to use environmental water when it is of greatest value to them.

All carryover and trade must be in line with any specific conditions in the entitlements or other relevant documents.

The VEWH must report annually on the use of the Water Holdings (including trade and carryover) to ensure transparency and accountability. All trading and carryover activity conducted by the VEWH will be recorded on the Victorian Water Register (www.waterregister.vic.gov.au/) and published in the VEWH annual report.

10

Consultation

This plan has been developed in a transitional phase, where responsibility for management of the Water Holdings has shifted largely from the Department of Sustainability and Environment to the VEWH. As such, the department has undertaken much of the consultation required with waterway managers. The VEWH will continue to consult thoroughly with waterway managers in the development of future plans.

CMAs and Melbourne Water are the waterway managers responsible for engaging with land managers, storage operators, regional communities and other stakeholders to identify environmental watering priorities and delivery arrangements. The consultation arrangements specific to each system are outlined in Schedules 1–14.

11

Monitoring and reporting

It is important to demonstrate that environmental water has been delivered, and that this water is delivering environmental outcomes.

The VEWH is required to report on when, where, how and why environmental water is used. There are also certain reporting obligations that must be undertaken by the VEWH in order to comply with each particular water entitlement.

The CMAs and Melbourne Water focus their monitoring efforts on actual water delivery but also conduct targeted ecological monitoring to improve future management decisions. The ecological objectives for watering and the proposed monitoring programs are outlined in Schedules 1–14.

Scientific environmental flow studies demonstrate the links between particular flow components (such as freshes or overbank flows) and a specific environmental objective (such as breeding of a priority fish species). In addition to these flow studies, the Victorian Government has developed and is undertaking the Victorian Environmental Flow Monitoring and Assessment

Program (VEFMAP). This program will provide a sound scientific basis for the link between particular flow components and the ecological response.

In reporting on the watering actions that are implemented, the VEWH will rely on information provided by waterway managers. This information will be collated and made available in the VEWH annual report. The VEWH will also report on environmental watering outcomes through its website, media releases and other publications as required.

Information about the use of the broader EWR is available through the Monthly Water Report, (produced by the Department of Sustainability and Environment). The Monthly Water Report provides a summary of the status of Victoria's water resources and water supplies at the end of the reporting month (<http://www.water.vic.gov.au/monitoring/monthly>).

The following sections of the seasonal watering plan outline the scope of planned watering during 2011–12. They are described first for southern Victoria, starting in the east and moving across to western Victoria, and then for northern Victoria moving east to west.

These sections refer to the types of flows (flow components) which may be required to meet specific environmental objectives. Like the natural flow of rivers, different combinations of watering actions provide a different range of benefits for each ecosystem.

Flow components describe the different parts of a flow regime relevant to an ecosystem. They are characterised by their size, frequency, timing and duration. Freshes through summer, for instance, help to maintain or improve water quality; spring flooding replenishes a river channel and provides soil and nutrients for floodplains, as well as being vital for the breeding success of water birds and native fish. Figure 12.1 outlines the typical natural flow pattern of a Victorian river.

Wetlands and floodplains typically have wetting and drying phases, each important for ecological communities. For example, wetting phases are important in sustaining the health of river red gum forests and providing breeding habitat for waterbirds. Drying phases help to maintain an appropriate balance of aquatic and terrestrial plants, and ensure the wetting phase does not exceed the requirements of the relevant ecological community.

Further details on the scope of planned environmental watering actions can be found in Schedules 1–14 (these are listed in section 18).

In addition to using water from the Victorian Water Holdings, the VEWL will also negotiate in relation to water from other holders where priorities are similar. For example, the VEWL coordinates the delivery of water held in Victoria by the CEWH and authorises

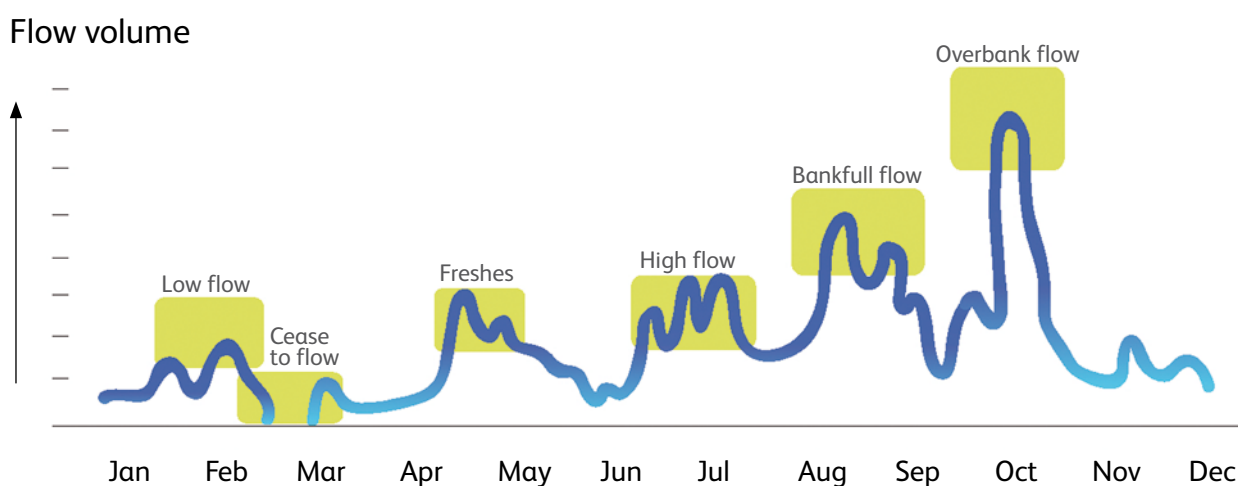
the waterway managers to implement those watering actions. In doing so, the VEWL will seek to maximise the environmental benefits for Victoria's priority river reaches and wetlands. If priorities are not aligned, the VEWL will only authorise watering actions provided there are no adverse impacts on Victorian rivers and wetlands.

All watering actions will be authorised and communicated through seasonal watering statements, which will be issued as required.

In advance of the release of this plan, seasonal watering statements were issued for the Wimmera, Loddon and Campaspe systems. These statements authorised the continuation of watering actions that were approved in 2010–11 by the previous entitlement holder, the Minister for Environment and Climate Change. The continuation of these watering actions is in line with watering priorities in both 2010–11 and 2011–12.

The schedules and statements are available to download from www.vewh.vic.gov.au or hard copies are available by contacting the VEWL. In some instances, it may be appropriate for the VEWL to carry over into 2012–13 or to sell some water allocation, rather than using it in the current water year (see section 9). Likewise, it may be necessary to buy additional water allocation in order to complete a watering action in a particular system. While at this stage trade is not expected to be necessary in 2011–12, it may become so, depending on seasonal conditions. These opportunities will be assessed throughout the season and undertaken only where they optimise environmental outcomes.

Figure 12.1 Typical natural flow pattern of a Victorian river



Within southern Victoria, there are nine systems which can receive water from the Water Holdings (see sub-sections 13A–13I). These include the Snowy system in the far east, the Latrobe, Thomson and Macalister systems in Gippsland, the Tarago, the Yarra and Werribee systems around Greater Melbourne, and the Barwon and Moorabool systems around Greater Geelong and Greater Ballarat.

The Snowy River originates in New South Wales and is connected to the River Murray in northern Victoria via a series of tunnels, pipelines and aqueducts. Water Holdings are held in the Goulburn, Loddon and Murray systems and used to increase environmental flows in the Snowy River via substitution.

Northern Victoria is also connected to southern Victoria by the Goldfields Superpipe (supplying Central Highlands Water's urban customers from the Goulburn system) and the Sugarloaf Interconnector (providing a physical connection between the Goulburn system and Greater Melbourne's supply system). There is also a system of aqueducts and small weirs on the Silver and Wallaby Creeks in the Goulburn system, from which water has been harvested for Greater Melbourne since 1883.

Within southern Victoria, the systems are connected as a result of interconnections completed or being built to ensure urban water supply for Greater Melbourne and Greater Geelong. There is or soon will be the physical ability to move water between the Thomson and the Yarra, between the Yarra and the Barwon, and between the Barwon and Moorabool systems.


While these connections currently or soon will exist, providing the physical ability to move water between systems, the environmental water entitlements place some restrictions on such movement. Such inter-system transfers for environmental watering are not intended as part of this plan.

For the systems in which there are Water Holdings, the main storage operators in southern Victoria are Southern Rural Water, Melbourne Water and Central Highlands Water. In addition to being the storage operator, Melbourne Water is also the waterway manager for the systems around Greater Melbourne.

Planned watering actions for the Barwon system will be included as sub-section 13I of the *Seasonal Watering Plan 2011–12* at a later stage. Once the environmental flow study has been completed, the Corangamite Catchment Management Authority will prepare a seasonal watering proposal. This will then be considered by the VEWH and the agreed priority watering actions included in the plan.



13A Snowy system




Snowy River, Department of Sustainability and Environment

Waterway manager – East Gippsland Catchment Management Authority

The heritage-listed Snowy River originates on the slopes of Mount Kosciuszko, draining the eastern slopes of the Snowy Mountains in New South Wales, before flowing through the Snowy River National Park in Victoria and emptying into Bass Strait. Much of the Snowy valley and its remnant vegetation and wetlands continue to be important resting, feeding and breeding areas for migratory species from tropical rainforests in south-east Asia and wetland birds from Russia, China and Japan. The construction of the Snowy Mountains Hydro-electric Scheme between 1949 and 1974 resulted in the diversion of 99 per cent of the Snowy River's natural flow at Jindabyne Dam. While meeting critical demand for electricity generation and playing a vital irrigation role for farms in the west, flow diversion and other human activities have impacted on the river's health. The Victorian Government is working with the New South Wales and Commonwealth governments to restore health to this iconic river.

Planned environmental water use in 2011–12



The VEWH holds water entitlements in trust for the Snowy program, and manages the administrative requirements of these entitlements to ensure Victoria meets its commitments to provide water to the Snowy River.

Decisions about the preferred environmental water releases for the Snowy are made by the New South Wales Ministerial Corporation, on recommendation of the Snowy Scientific Committee. The VEWH does not have a direct role in planning for or delivering this water.

System overview

The Snowy Mountain Hydro-electric Scheme is a water and hydro-electric power facility located in Kosciuszko National Park in New South Wales. The Snowy Scheme can store up to 5,300,000 ML which is released to generate hydro-electricity. Under its licence, Snowy Hydro Limited has an obligation to release nominal annual volumes of 1,062,000 ML to the River Murray and 1,026,000 ML to the Murrumbidgee system.

Since 2000 the New South Wales, Victorian and Commonwealth governments have committed \$425 million to recover 212,000 ML for the Snowy (21 per cent of average natural flows downstream of the Jindabyne Dam), plus 70,000 ML for the River Murray. In 2003, Water for Rivers was established as a joint government enterprise to undertake the water recovery. The water has been primarily recovered through irrigation modernisation projects, but also included some entitlement purchase.

A substitution arrangement is in place to Water Holdings in the Murray, Loddon and Goulburn systems to increase environmental flows in the Snowy system. Similar arrangements are in place for water recovered in New South Wales.

Water savings in the Murray and Goulburn provide additional water that can be supplied for consumptive use in northern Victoria. Similar arrangements apply on the New South Wales Murray and Murrumbidgee systems. This reduces the volume of water that must be supplied from the Snowy system (i.e. reduces the 1,062,000 ML per year) to the River Murray and Murrumbidgee River, thereby freeing up water for environmental flows in the Snowy.

The majority of the water recovery has now been undertaken and the subsequent environmental water entitlements created. As the water recovery is completed, the remaining Victorian component will be rolled into these entitlements. The entitlements are held by the VEWH in trust for the Snowy program. The VEWH manages the administrative requirements of these entitlements to ensure Victoria meets its commitments to provide water to the Snowy system but currently has no management role in the delivery of water to the Snowy. The VEWH oversees the substitution arrangements in the Victorian rivers, which are then reported to the New South Wales Ministerial Corporation that requests this volume of environmental water to be released by Snowy Hydro down the Snowy River. The Snowy Scientific Committee, which includes two Victorian representatives, makes recommendations on the appropriate release pattern to maximise environmental benefits.

The Snowy system is shown in Figure 13A.1

Current situation

The Snowy River is set to receive 152,000 ML of water in 2011–12, with 84,000 ML planned to be released over 19 days in October to mimic the spring surge that used to occur annually under natural conditions. This will increase the environmental flows from the four per cent of natural flow at Jindabyne that has generally been released since the Snowy Agreement began, to 14 per cent. This is an improvement on the six per cent that was released in 2010–11. The health of the Snowy River will be improved, in particular by the removal of silt and algae from the river bed.

Priority watering actions

Managed environmental water releases in the Snowy River are undertaken on the advice of the Snowy Scientific Committee. More information on this committee and its recommendations can be found at www.snowyssc.org.

Further information

More information about the health of the Victorian part of the Snowy River can be found at www.egcma.com.au.

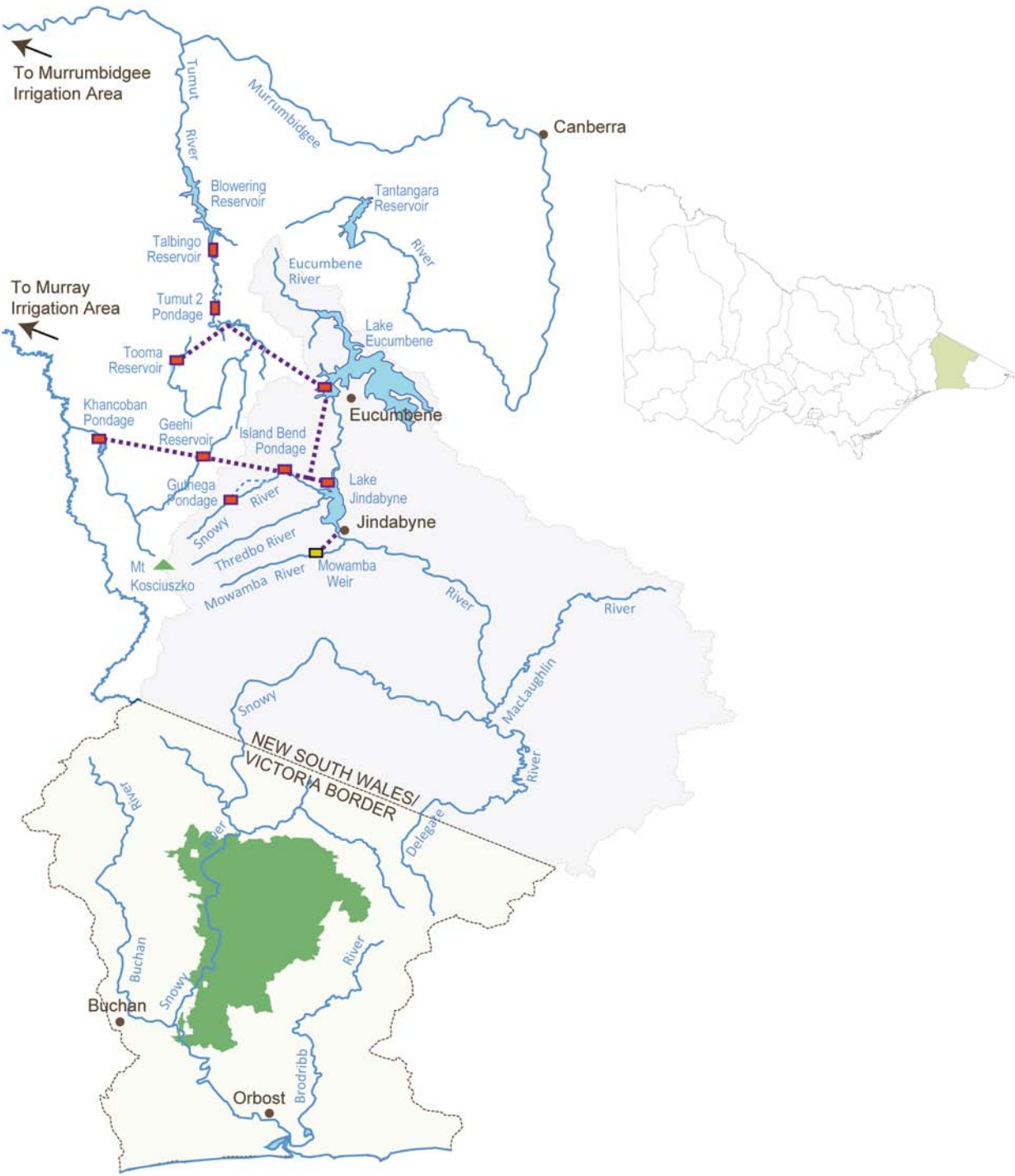
Table 13A.1 Water Holdings available for use in the Snowy system

Entitlement	Description
Bulk Entitlement (Goulburn System – Snowy Environmental Reserve) Order 2004	16,812 high-reliability entitlement
Bulk Entitlement (River Murray – Snowy Environmental Reserve) Order 2004	29,794 high-reliability entitlement
Water shares	6,121 ML Goulburn high-reliability water share 17,852 ML Goulburn low-reliability water share 10,544 ML Murray high-reliability water share 6,415 ML Murray low-reliability water share 470 ML Loddon high-reliability water share



Mouth of the Snowy River at Marlo, Department of Sustainability and Environment

Figure 13A.1 The Snowy system



13B Latrobe system



Heart Morass, Matt Bowler, West Gippsland Catchment Management Authority

Waterway manager – West Gippsland Catchment Management Authority

The lower Latrobe wetlands form part of the Gippsland Lakes wetland system which is listed as a 'wetland of international importance' under the Ramsar Convention. The wetlands include Sale Common, Heart Morass and Dowd Morass. Sale Common is one of only two remaining freshwater wetlands in the Gippsland Lakes system. Dowd Morass is a large, ecologically significant brackish wetland. Both wetlands provide important habitat for a range of waterbird species, and have supported species listed under Victoria's Flora and Fauna Guarantee Act 1988 and the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999. Heart Morass is a large brackish wetland which is comprised of private land and some Crown land. It is estimated to be the largest private wetland restoration project in Australia.

Planned environmental water use in 2011–12

The priority environmental objectives in the lower Latrobe wetland system for 2011–12 are maintaining and enhancing the condition and extent of aquatic plants; limiting the extent of giant rush; maintaining waterbird breeding, recruitment and foraging opportunities; importing organic matter and nutrients; and managing water quality.

Priority watering actions are identified for all wetlands in the lower Latrobe wetland system, including Sale Common, Heart Morass and Dowd Morass.

It is anticipated that all priority watering actions for Sale Common, Heart Morass and Dowd Morass will be delivered in the 2011–12 water year, subject to the development of necessary agreements (refer to implementation section arrangements). River heights are likely to be sufficient to enable the manipulation of water control structures to maintain or increase wetland water levels as appropriate for each wetland.

System overview

The lower Latrobe wetlands are located on the floodplain of the Latrobe River between its confluence with the Thomson River and Lake Wellington, as shown in Figure 13B.1. The system consists of three wetlands: Sale Common; Heart Morass; and Dowd Morass.

Active environmental water management can now formally commence with the establishment of the *Latrobe River Environmental Entitlement 2010*, subject to the development of necessary agreements (refer to implementation arrangements section).

Water available under the Latrobe environmental entitlement does not consist of water held in storage. It allows for access to water from the Latrobe River, downstream of the Thomson River confluence, at any time for diversion into Sale Common, Heart Morass and Dowd Morass, subject to river levels.

Existing wetland water control infrastructure enables delivery of wetting flows, subject to suitable river conditions, and can facilitate drying phases. However, delivery of flushing flows is not possible with existing infrastructure and can only be achieved through natural events.

Figure 13B.1 The Latrobe system

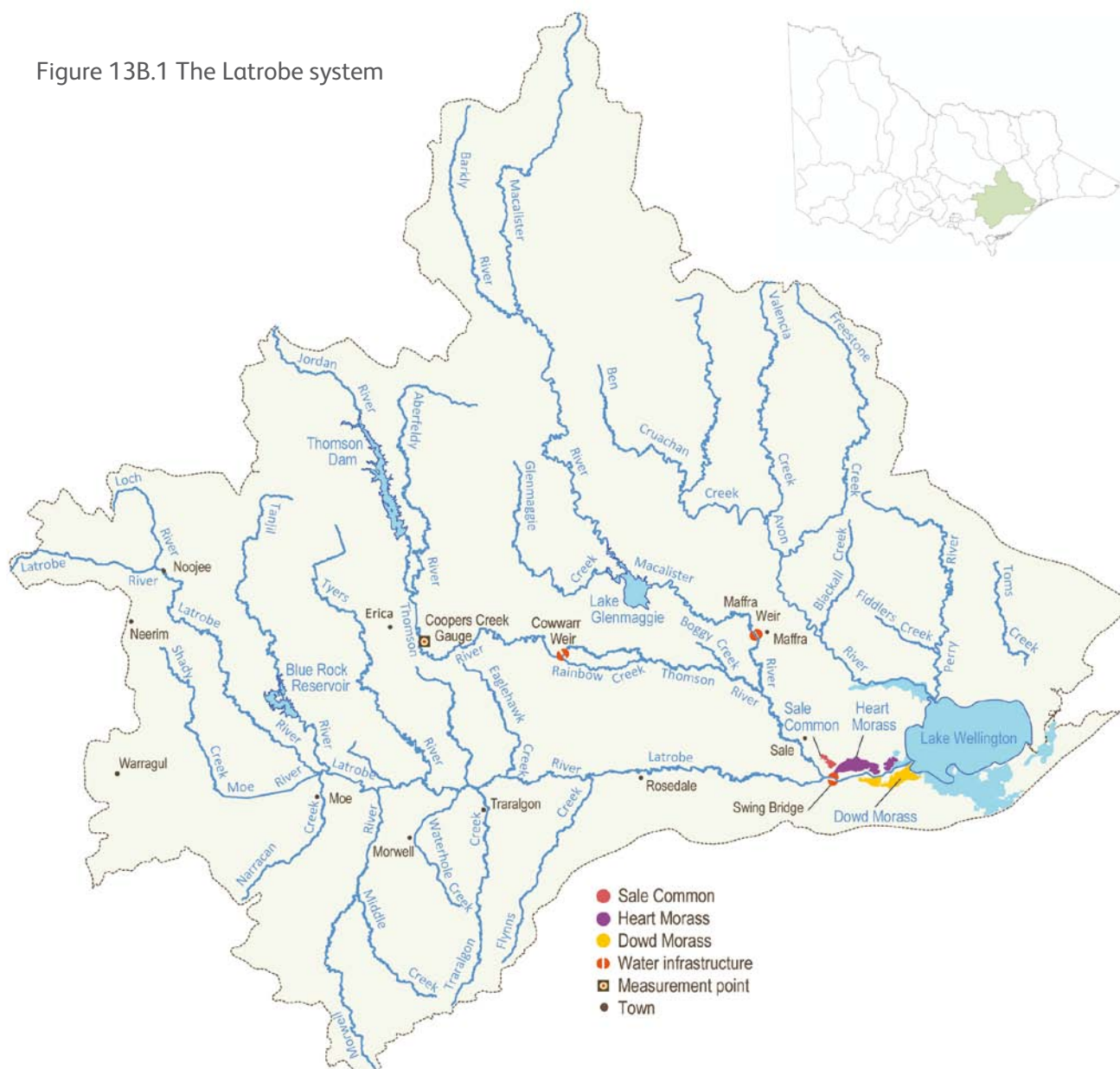


Table 13B.1 Water Holdings available for use in the Latrobe system

Entitlement	Description
Latrobe River Environmental Entitlement 2010	Access to water from the Latrobe River to inundate lower Latrobe wetlands when flows are above -0.7 m AHD at Swing Bridge gauging station

Current situation

The last 15 years in the region have been characterised by extended periods of relatively low rainfall and river flows, punctuated by two major floods in 1998 and 2007. This combination of circumstances has influenced the salinity levels of Dowd Morass and Heart Morass, due to inundation of these wetlands with saline water from Lake Wellington, and reduced frequencies of riverine flushing.

Good rainfall since spring 2007 has resulted in inundation of all lower Latrobe wetlands. This inundation was predominantly riverine flooding from the Latrobe River, resulting in the dilution of salinity levels. Winter flooding in the Thomson, Macalister and Latrobe systems in 2011 has resulted in further inundation of the wetlands, with all wetlands currently anticipated to be full, or close to full.

It is anticipated that all priority watering actions for Sale Common, Heart Morass and Dowd Morass will be delivered in the 2011–12 water year, subject to the development of necessary agreements (refer to implementation arrangements section). Under an average planning scenario, river heights are likely to be sufficient to enable the manipulation of water control structures to maintain or increase water levels in each wetland.

Table 13B.2 Priority watering actions under a range of planning scenarios in the Latrobe system

	DRY	AVERAGE	WET
Sale Common			
Environmental objectives	<p>Provide opportunity for reproduction and growth of vegetation that requires reduced water levels and/or no surface water.</p> <p>Provide waterbird breeding, recruitment and foraging opportunities.</p> <p>Maximise recycling of nutrients.</p> <p>Maintain ecological functioning of refuge areas.</p>	<p>Promote persistence of submerged freshwater aquatic plants.</p> <p>Facilitate expansion of club rushes and tall spike rush.</p> <p>Limit or reduce extent, density and height of giant rush.</p> <p>Maintain waterbird breeding, recruitment and foraging opportunities.</p> <p>Import organic matter and nutrients.</p> <p>Import seed/propagules.</p>	<p>Promote persistence of submerged freshwater aquatic and riparian plants.</p> <p>Facilitate expansion of club rushes and tall spike rush.</p> <p>Limit or reduce extent, density and height of giant rush.</p> <p>Maximise waterbird breeding, recruitment and foraging opportunities.</p> <p>Maximise importation of organic matter and nutrients and export salt.</p> <p>Maximise seed/propagule dispersal.</p> <p>Facilitate movement of dwarf galaxias.</p>
Environmental water priorities	Allow wetland water level to vary according to rainfall and evapotranspiration.	Wetting flow to maintain wetland water level at 0.49 m AHD.	Wetting flow to maintain wetland water level at 0.49 m AHD. Flushing flow (any time).
Possible volume required from the Water Holdings	0 ML*	850 ML	0 ML^
Heart Morass			
Environmental objectives	<p>Provide opportunity for reproduction and growth of plants that require reduced water levels and/or no surface water.</p> <p>Provide waterbird breeding, recruitment and foraging opportunities.</p> <p>Maximise recycling of nutrients.</p> <p>Maintain ecological functioning of refuge areas.</p> <p>Avoid catastrophic events and critical loss resulting from inundation with saline water from Lake Wellington and/or Latrobe River, or activation of acid sulphate soils.</p>	<p>Promote recolonisation and expansion of emergent aquatic plants.</p> <p>Maintain/enhance condition and extent of structurally dominant plants.</p> <p>Maintain waterbird breeding, recruitment and foraging opportunities, particularly colonial nesting species.</p> <p>Import organic matter and nutrients and reduce salinity.</p> <p>Import seed/propagules.</p> <p>Mitigate acid sulphate soil risk.</p>	<p>Promote recolonisation and expansion of submerged freshwater aquatic plants.</p> <p>Maintain/enhance condition and extent of structurally dominant plants.</p> <p>Maximise waterbird breeding, recruitment and foraging opportunities, particularly colonial nesting species.</p> <p>Maximise importation of organic matter and nutrients and export salt.</p> <p>Maximise seed/propagule dispersal.</p> <p>Minimise acid sulphate soil risk.</p>
Environmental watering priorities	<p>Winter/spring wetting flow to fill the wetland to 0.11–0.29 AHD.</p> <p>Allow wetland water level to vary according to river level, rainfall and evapotranspiration.</p> <p>Inundation based on salinity and acid sulphate soil risk.</p>	<p>Winter/spring wetting flow to fill the wetland to 0.11–0.29 AHD.</p> <p>Allow wetland water level to vary according to river level, rainfall and evapotranspiration.</p>	<p>Winter/spring wetting flow to fill the wetland to 0.11–0.29 AHD.</p> <p>Flushing flow (any time).</p> <p>Allow wetland water level to vary according to river level, rainfall and evapotranspiration.</p>
Possible volume required from the Water Holdings	8,520 ML	6,390 ML	0 ML^

Table 13B.2 Priority watering actions under a range of planning scenarios in the Latrobe system (continued)

	DRY	AVERAGE	WET
Dowd Morass			
Environmental objectives	<p>Provide opportunity for reproduction and growth of plants that require reduced water levels and/or no surface water.</p> <p>Provide waterbird breeding, recruitment and foraging opportunities.</p> <p>Maximise recycling of nutrients.</p> <p>Maintain ecological functioning of refuge areas.</p> <p>Avoid catastrophic events and critical losses resulting from inundation with saline water from Lake Wellington and/or Latrobe River, or activation of acid sulphate soils.</p>	<p>Promote recolonisation and expansion of emergent aquatic plants.</p> <p>Maintain/enhance condition and extent of structurally dominant plants.</p> <p>Maintain waterbird breeding, recruitment and foraging opportunities, particularly colonial nesting species.</p> <p>Import organic matter and nutrients and reduce salinity.</p> <p>Import seed/propagules.</p> <p>Mitigate acid sulphate soil risk.</p>	<p>Promote recolonisation and expansion of submerged freshwater aquatic plants.</p> <p>Maintain/enhance condition and extent of structurally dominant plants.</p> <p>Maximise waterbird breeding, recruitment and foraging opportunities, particularly colonial nesting species.</p> <p>Maximise importation of organic matter and nutrients and export salt.</p> <p>Maximise seed/propagule dispersal.</p> <p>Minimise acid sulphate soil risk.</p>
Environmental watering priorities	<p>Winter/spring wetting flow to fill wetland to 0.3 m AHD.</p> <p>Allow wetland water level to vary according to rainfall and evapotranspiration.</p>	<p>Winter/spring wetting flow to fill wetland to 0.3 m AHD.</p> <p>Autumn/winter wetting flow to fill wetland to 0.3 m AHD.</p>	<p>Winter/spring wetting flow to fill wetland to 0.3 m AHD.</p> <p>Autumn/winter wetting flow to fill wetland to 0.3 m AHD.</p> <p>Flushing flow (any time).</p>
Possible volume required from the Water Holdings	5,800 ML	4,060 ML	0 ML [^]
Possible carryover into 2012–13[#]	N/A	N/A	N/A

* No environmental watering will be practically possible due to river levels being lower than the water level in the wetland.

[^] Flow components will be met by natural inflows.

[#] Entitlement consists of access to river flows only and no right to storage capacity, therefore no carryover is available.

Priority watering actions

Table 13B.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions are for:

- Sale Common: maintain high water levels at 0.49 m AHD all year
- Heart Morass: winter/spring wetting flow from August to October to fill the wetland to an average depth of 0.11 – 0.29 m AHD, then water level allowed to fluctuate in accordance with river levels
- Dowd Morass: winter/spring wetting flow from August to October to fill wetland to 0.3 m AHD and autumn/winter wetting flow from May to June to fill wetland to 0.3 m AHD

Adaptive management considerations

As watering actions in the lower Latrobe wetlands are dependent on river heights, the ability to manage environmental watering actions will be largely dependent on seasonal conditions in the 2011–12 water year.

The aim of environmental water management in Sale Common over the next few years is to maintain high levels to manage the growth and composition of aquatic plant communities. However, watering of Sale Common is not possible under dry conditions as river baseflows are approximately the same height as the base of the Common.

Water quality is another important factor influencing environmental watering decisions in the lower Latrobe wetlands, particularly Heart Morass and Dowd Morass, as river water quality can be influenced by saline water from Lake Wellington during extended periods of low flow. Emergency watering to maintain water quality may be necessary, particularly in dry conditions to prevent saline inundation and acid sulphate soils.

Under a wet scenario, no watering action is required for any of the lower Latrobe wetlands as it is expected that all priority flow components, including flushing flows, will be delivered naturally.

West Gippsland Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. A seasonal watering statement will be issued to communicate decisions on the environmental watering actions that are to be undertaken and to authorise West Gippsland Catchment Management Authority to implement those decisions.

In the lower Latrobe wetlands, implementation arrangements are outlined in Schedule 1 of the *Seasonal Watering Plan 2011–12*. Implementation will also be guided by operating arrangements currently under development.

The inundation of Sale Common could impact upon upgrade works on the South Gippsland Highway. Agreement with Vic Roads will be sought by the West Gippsland Catchment Management Authority prior to any managed watering action occurring.

Watering actions identified for Heart Morass will inundate private land. Watering actions for Heart Morass will not be undertaken until agreements with affected landowners are successfully negotiated. The process for negotiating these agreements will be managed by the West Gippsland Catchment Management Authority.

There are no specific implementation issues associated with watering in Dowd Morass.

Reporting on the volume of water used under the Latrobe entitlement will be estimates only; it is not possible to measure the volumes as water is not being released from storage or pumped out of channel.

Risk assessment and management

Apart from those discussed in the implementation section above, there are no additional risks identified for third parties from the implementation of planned watering actions. Risks to successfully achieving the desired environmental outcomes from watering actions have been identified and can be found in Schedule 1.

Further information

More detail about the planned watering actions in the lower Latrobe wetlands can be found by downloading Schedule 1 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

A photograph of the Thomson River at Sale, showing a calm, brownish river reflecting the surrounding green trees and foliage. The river flows from the background towards the foreground, with dense vegetation on both banks.

13C Thomson system

Thomson River at Sale, Department of Sustainability and Environment

Waterway manager – West Gippsland Catchment Management Authority

The Thomson system is vitally important for the Gippsland region, supplying towns and farms with water and providing social and cultural amenities to local communities. The Thomson River and associated dam are integral to Melbourne's water supply, and provide fresh water flows into the lower Latrobe River and to the Gippsland Lakes and surrounding wetlands. The Thomson River is most notably home to a threatened native fish species, the Australian grayling.

Planned environmental water use in 2011–12

The priority environmental objectives in the Thomson system for 2011–12 are improving habitat for aquatic species; maintaining fish passage; assisting spawning and migration of priority fish species, in particular Australian grayling; and avoiding deterioration of water quality.

The priority river reach is reach 3 (Aberfeldy to Cowwarr Weir). Environmental watering will focus, in priority order, on autumn freshes; winter baseflows; and summer freshes.

The outlook for the 2011–12 watering season is positive, with full allocation available and a wet catchment coming into spring. It is expected that there will be sufficient water in the Water Holdings to provide all planned priority flow components under the dry and average planning scenario. It is possible that all flow components could be provided under the wet scenario, except some summer and autumn freshes, depending on the volume and timing of unregulated flows.

A stylized white icon of a plant with three leaves and a central stem, set against a green background.

System overview

The environmental flow reaches for the Thomson system are shown in Figure 13C.1. The priority river reach is reach 3, because it can receive managed environmental water and because it is high value (heritage river status, the presence of the threatened Australian grayling and significant riparian vegetation). The measurement point for target flows at reach 3 is at Coopers Creek gauge. Reach 2 also benefits from flows being passed to the priority reach 3. At Cowwarr Weir the Thomson splits into two, with water able to be passed down the Old Thomson course (reach 4a), or the New Thomson course (reach 4b).

The preference is to pass environmental water down reach 4a to allow for fish migration as Cowwarr Weir is a barrier to fish passage into reach 4b. While reaches 5 and 6 both have important ecological values, it is difficult for managed environmental flow releases to reach them due to the distance and inability to manipulate significant flow volumes at Cowwarr Weir. Water provided through reaches 3 and 4 will still have some benefits to the lower reaches 5 and 6.

Figure 13C.1 The Thomson system

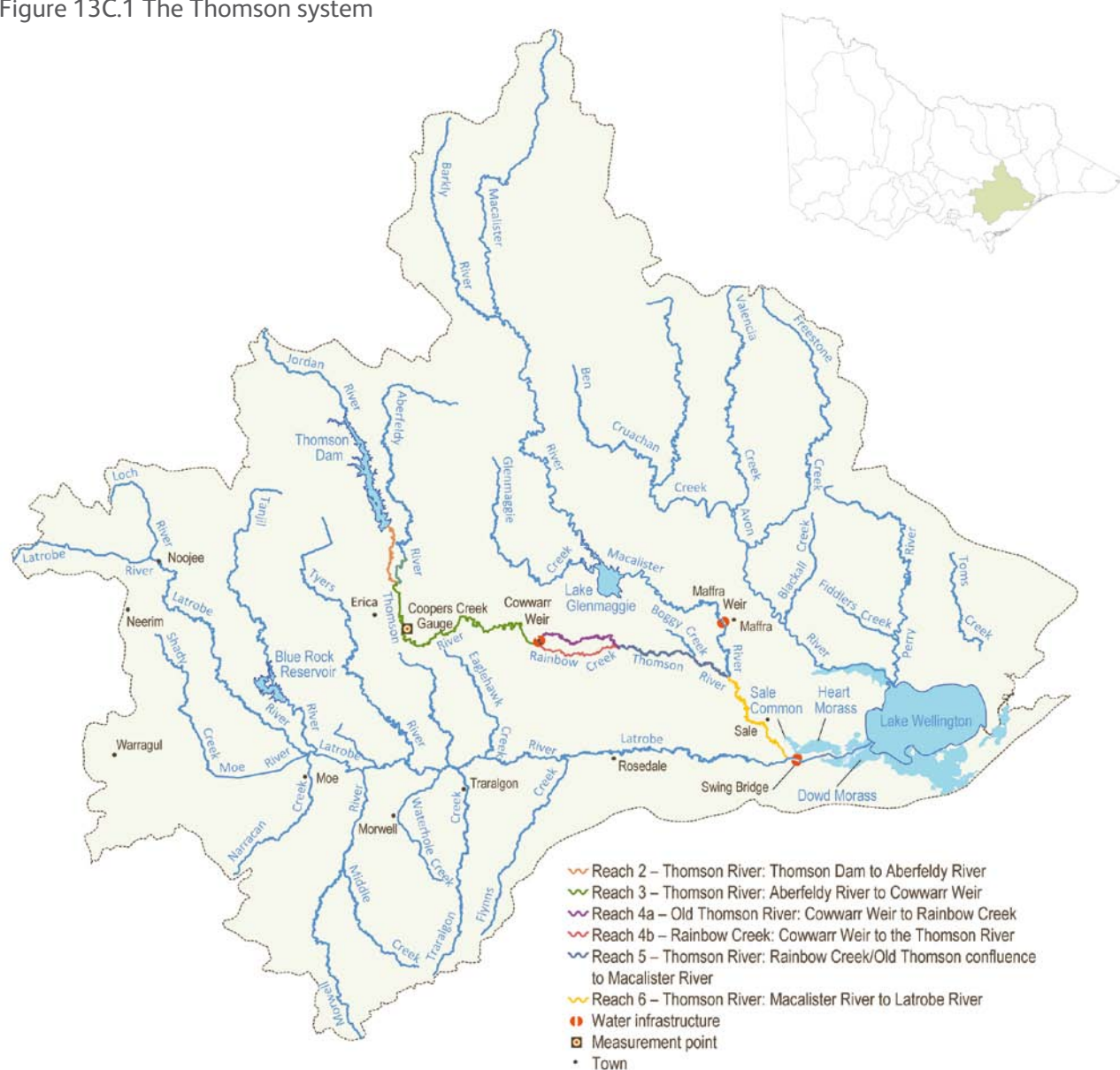


Table 13C.1 Water Holdings available for use in the Thomson system

Entitlement	Description
Bulk Entitlement (Thomson River – Environment) Order 2005	<ul style="list-style-type: none"> 10,000 ML per year and share of reservoir storage space minimum passing flows at various weirs and gauges throughout the Thomson system

Current situation

The prolonged drought from 1997 saw decreased Australian grayling populations in the Thomson system. Spawning flows over the last two years have seen a small increase in the population; however these flows continue to be important to the recovery of grayling populations.

Rainfall at the start of the 2010–11 water year was below average, but improved during the year to above average during summer and autumn. This provided significant flows down the Thomson and increased Thomson Dam levels.

The outlook for the 2011–12 watering season is positive, with full allocation available and a wet catchment coming into spring. It is expected that there will be sufficient water in the Water Holdings to provide all planned priority flow components under the dry and average planning scenario. It is possible that all flow components could be provided under the wet scenario, except some summer and autumn freshes, depending on the volume and timing of unregulated flows.

Priority watering actions

Table 13C.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions, in priority order, are for:

- autumn freshes (one to three freshes of 800 ML per day for four days each between April and May)
- winter baseflows (230 ML per day from May to June and from October to November)
- summer freshes (one to seven freshes of 230 ML per day for three days each between December and April).

Table 13C.2 Priority watering actions under a range of planning scenarios in the Thomson system

	Planning scenario		
	DRY	AVERAGE	WET
Expected availability of Water Holdings	10,000 ML 2,700 ML carryover	10,000 ML 2,700 ML carryover	10,000 ML 2,700 ML carryover
Environmental objectives	Provide habitat and migration opportunities for native fish.	Provide habitat and migration opportunities for native fish. Provide spawning opportunities for Australian grayling.	Provide habitat and migration opportunities for native fish. Provide spawning opportunities for Australian grayling. Provide opportunities for fish movement and maintain stream substrate condition.
Flow components	Winter baseflow.	Autumn freshes. Winter baseflow.	Autumn freshes. Winter baseflow.
Possible volume required from the Water Holdings*	5,100 ML	9,900 ML	14,900 ML
Possible carryover into 2012–13[#]	7,600 ML	2,800 ML	0 ML

[#] Figures assume no unregulated flows occur, and are therefore an upper limit of the volume required from the Water Holdings.

* The amount of carryover available in 2012–13 will be limited by the available reservoir storage capacity; however this is unlikely to be an issue in 2012–13 as storage are currently only half full.

Adaptive management considerations

The delivery of flow components will change depending on seasonal condition (catchment inflows and the consequent impact on storage levels and unregulated flows in the river). If conditions are dry, storage levels will be low and there will be minimal unregulated flows. In this case, the priority flow component is winter baseflows from October to November 2011 and May to June 2012. If dry conditions persisted, water not used would be carried over into 2012–13 for winter baseflows and an autumn fresh next year. An autumn fresh would not be a priority this year, since this flow component occurred in 2010–11. Since Australian grayling require a minimum of two spawning events every three years, this would not be a priority in 2011–12 if dry conditions occurred.

If conditions are average, storage levels will improve and unregulated flows will increase. In this case, the priority for winter baseflows from October to November 2011 stays the same but not in May and June 2012. The West Gippsland Catchment Management Authority would instead seek to provide autumn freshes to enhance spawning opportunities in April and May 2012. Remaining water would then be used to meet winter baseflows in May and June 2012.

Under wet conditions, storage levels will be high and significant unregulated flows would occur, likely providing some of the winter baseflows in October and November 2011 naturally. In this case, as many of the summer and autumn freshes would be provided as possible, between December 2011 and May 2012. This will depend on the amount and timing of unregulated flows occurring and the volume of water available in the Water Holdings. If unregulated flows do not occur at the right time, it is possible that not all the summer and autumn freshes would be provided.

West Gippsland Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. A seasonal watering statement will be issued to communicate decisions on the environmental watering actions that are to be undertaken and to authorise West Gippsland Catchment Management Authority to implement those decisions.

In the Thomson system, implementation arrangements are outlined in Schedule 1 of the *Seasonal Watering Plan 2011–12* and will also be guided by the draft Thomson River Operating Arrangements.

Risk assessment and management

Risks associated with the implementation of priority watering actions include flooding of private land and personal injury to river users. However, these risks are assessed as low. Management strategies include consideration of historic release limits, ongoing dialogue between West Gippsland Catchment Management Authority and Southern Rural Water; and adequate communication of planned releases to key stakeholders.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 1.

Further information

More detail about the planned watering actions in the Thomson system can be found by downloading Schedule 1 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.



13D Macalister system

Macalister River, West Gippsland Catchment Management Authority

Waterway manager – West Gippsland Catchment Management Authority

The Macalister system is extremely important for the Gippsland region, supplying towns and farms with water and providing social and cultural amenities to local communities. Like its sister river, the Thomson, the Macalister River also provides fresh water flows into the lower Latrobe River and to the Gippsland Lakes and surrounding wetlands. The river is also home to a threatened fish species, the Australian grayling.

Planned environmental water use in 2011–12

The priority environmental objectives in the Macalister system for 2011–12 are improving habitat for aquatic species; maintaining fish passage; assisting spawning and migration of priority fish species, in particular the Australian grayling.

The priority river reach is reach 2 (Maffra Weir to Thomson River confluence). Environmental watering will focus, in priority order, on an autumn fresh and early winter baseflows. It is intended to reduce passing flows where possible to provide optimum flows; this water would then be saved up to provide water to the winter baseflow and autumn fresh priorities.

With full allocation likely to be available for the Macalister in 2011–12, it is expected that the priority autumn freshes will be delivered with the ability to meet the majority of the autumn baseflow requirements. The ability to reduce summer passing flows will depend on system operations.



System overview

The environmental flow reaches for the Macalister system are shown in Figure 13D.1. The priority river reach for environmental watering is reach 2 (Maffra Weir to Thomson River confluence); in particular, flows for fish spawning are targeted at reach 2 because Maffra Weir is a barrier to fish movement. The associated measurement point at Maffra Weir has measurement inaccuracies; therefore, flows are measured in reach 1 (Lake Glenmaggie to Maffra Weir), downstream of Lake Glenmaggie. As the reaches are relatively short and the Macalister River typically gains water from tributary inflow and run-off, releases measured downstream of Lake Glenmaggie will provide the required flows in reach 2.

Current situation

The prolonged drought from 1997 saw decreased Australian grayling populations in the Macalister system. Spawning flows over the last two years have seen a small increase in the population; however, these flows continue to be important to the recovery of grayling populations.

Rainfall at the start of the 2010–11 water year was below average, but improved during the year to above average during summer and autumn. This provided significant flows down the Macalister, including several spills from Lake Glenmaggie.

With full allocation likely to be available for the Macalister in 2011–12, it is expected that the priority autumn freshes will be delivered with the ability to meet the majority of the autumn baseflow requirements. The ability to reduce summer passing flows will depend on system operations.

Figure 13D.1. The Macalister system

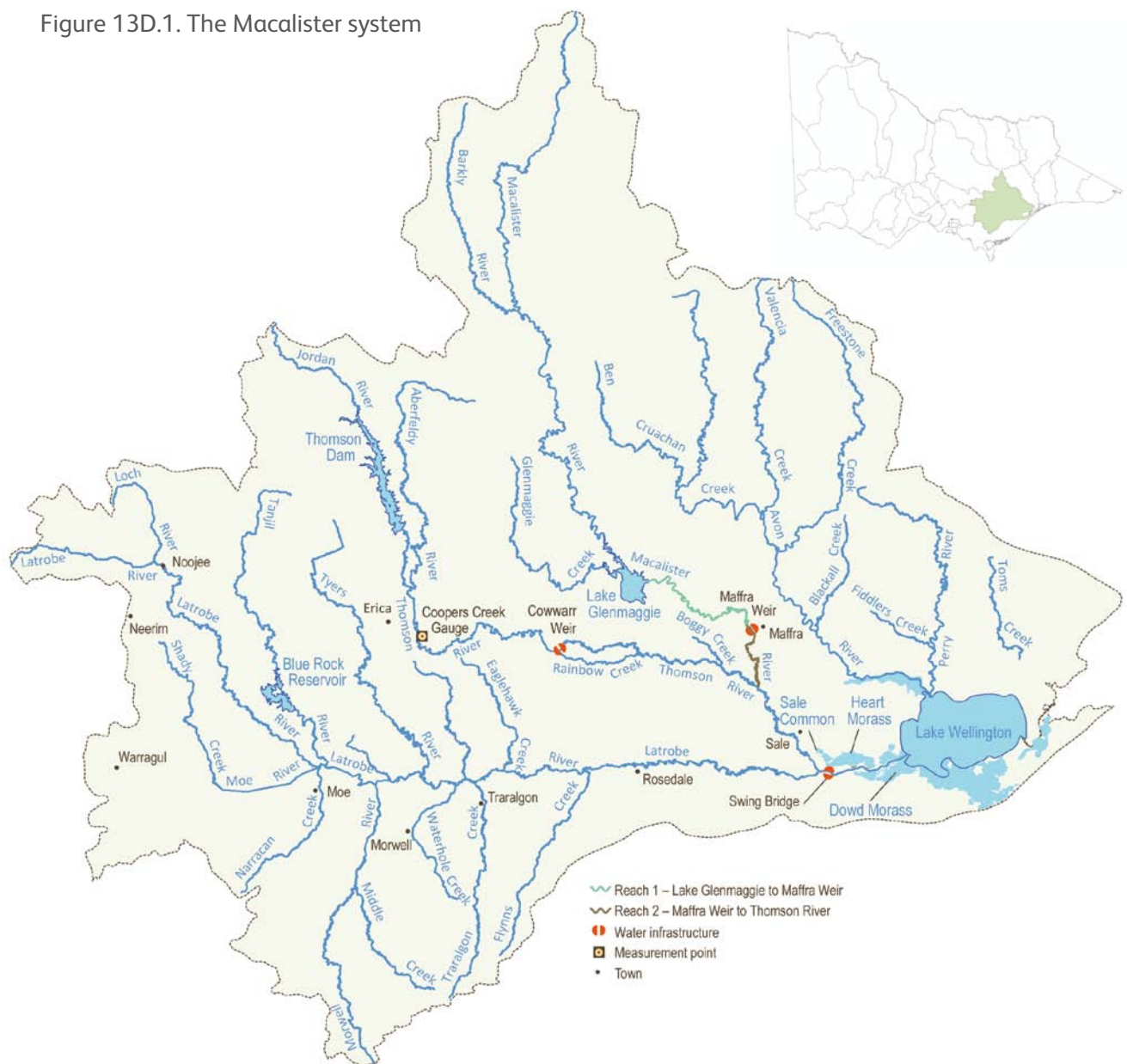


Table 13D.1 Water Holdings available for use in the Macalister system

Entitlement	Description
Macalister River Environmental Entitlement 2009	<ul style="list-style-type: none"> 7,111 ML high-reliability entitlement 3,555 ML low-reliability entitlement Passing flows

Priority watering actions

Table 13D.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions, in priority order, are for:

- autumn freshes (one to two freshes of 350–1,500 ML per day for seven days each between April and May)
- winter baseflows (320 ML per day from May to June)
- summer baseflows (35 ML per day from December to April).

Adaptive management considerations

The Macalister bulk entitlement held by Southern Rural Water allows for the specified passing flows to be reduced on advice from the West Gippsland Catchment Management Authority. These flows can be retained in storage if there is spare capacity in Lake Glenmaggie; however, it is the first water to be lost if the storage physically spills. The summer passing flows set out in the entitlement are higher than those required, therefore it is desirable

to retain these in storage to ensure sufficient water for other priority flow components. This will be dependent on inflows and the available capacity in Lake Glenmaggie (for example, if it is close to full, it is likely that any stored volume would be spilt before autumn). As Lake Glenmaggie spills in the spring of most years, the ability to store water for the priority autumn fresh component by reducing passing flows is limited. The West Gippsland Catchment Management Authority will assess the benefits of reducing passing flows during the year to provide high priority components.

The key objective for the autumn fresh is for spawning of Australian grayling. While the scientific flow study recommends 1,500 ML per day, without unregulated flows there would be insufficient water in the Water Holdings to provide this. A flow of 350 ML per day would meet other ecological objectives, such as fish connectivity, and potentially provide spawning opportunities. Environmental water will be released to build on natural events

where possible, to meet the higher flow target. The West Gippsland Catchment Management Authority will be seeking to provide one or two freshes between April and May 2012.

It is possible that there will be less water available in the Water Holdings than is required to provide the priority flow components. If this occurs, all available water would be used to provide as many flow components as possible, as there is little ability to carry water over in storage for use in 2012–13 as storages are likely to spill.

West Gippsland Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering activities that are a priority in the coming year, provided there is sufficient water. A seasonal watering statement will be issued to communicate decisions on the environmental watering actions that are to be undertaken and to authorise West Gippsland Catchment Management Authority to implement those decisions.

In the Macalister system, implementation arrangements are outlined in Schedule 1 of the *Seasonal Watering Plan 2011–12* and will also be guided by the draft Macalister River Operating Arrangements.

Risk assessment and management

Risks associated with the implementation of priority watering actions include flooding of private land and personal injury to river users. However, these risks are assessed as low. Management strategies include consideration of historic release limits, ongoing dialogue between West Gippsland Catchment Management Authority and Southern Rural Water; and adequate communication of planned releases to key stakeholders.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 1.

Further information

More detail about the planned watering activities in the Macalister system can be found by downloading Schedule 1 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

Table 13D.2 Priority watering actions under a range of planning scenarios in the Macalister system

	Planning scenario		
	DRY	AVERAGE	WET
Expected availability of Water Holdings	7,111 ML	8,149 ML	10,666 ML
Environmental objectives	Provide habitat and migration opportunities for native fish. Provide spawning opportunities for Australian grayling.	Provide habitat and migration opportunities for native fish. Provide spawning opportunities for Australian grayling.	Provide habitat and migration opportunities for native fish. Provide spawning opportunities for Australian grayling.
Flow components	Autumn fresh. Winter baseflow. Summer baseflow.^	Autumn fresh. Winter baseflow. Summer baseflow.^	Two autumn freshes. Winter baseflow. Summer baseflow.^
Possible volume required from the Water Holdings*	12,900 ML	12,900 ML	14,800 ML
Possible carryover into 2012–13	0 ML	0 ML	0 ML

^ Provision of this flow component does not require water from the Water Holdings; rather it requires water that would have been released as passing flows to be retained in storage.

* Figures assume no unregulated flows occur, and are therefore an upper limit of the volume required from the Water Holdings.



13E Tarago system

Tarago River, Melbourne Water

Waterway manager – Melbourne Water

The Tarago River is a major tributary of the Bunyip River. Its headwaters are within the Tarago State Forest and flow into the Tarago Reservoir at Neerim. Downstream of the reservoir, the Tarago flows through the towns of Rokeby and Robin Hood before meeting the Bunyip River at Longwarry North, supplying many irrigators in the catchment. The Tarago system is home to many native fish species such as the Australian grayling and river blackfish, along with one of Australia's most iconic marsupials, the platypus. Threatened vegetation species such as long pink-bells, tree geebung, and swamp bush-pea can be found along some river reaches.

Planned environmental water use in 2011–12

The priority environmental objectives in the Tarago system for 2011–12 are improving habitat for aquatic species; maintaining habitat connectivity; assisting spawning and migration of priority fish species; increasing the spread of flood-tolerant vegetation; maintaining channel form; and avoiding deterioration of water quality.

The priority river reaches are reach 2 (around Drouin West – downstream of Tarago reservoir) and reach 6 (around Iona – downstream of the Bunyip and Tarago rivers confluence). Environmental watering will focus, in priority order, on summer freshes; summer and winter high flows; and a winter fresh.

Based on existing knowledge, the outlook for the 2011–12 watering season is positive with a wet scenario likely. It is expected that there will be sufficient water, through both regulated and unregulated flows, to provide all priority flow components.

System overview

Water available under the Tarago and Bunyip environmental entitlement is stored in and released from Tarago Reservoir.

The environmental flow reaches are shown in Figure 13E.1. The priority river reaches are reach 2, the Tarago River from Tarago Reservoir to the Bunyip River confluence, and reach 6, the Bunyip Main Drain. These reaches have the priority ecological values and can also practically have water delivered from Tarago Reservoir at low cost. Some benefit is also provided to reach 7, as the final reach of the system. The measurement points for target flows are at Drouin West in reach 2 and Iona in reach 6.

Current situation

Flows in the Tarago River have been well below average over the last couple of years. However, in 2010–11, stream flows were above average in winter, spring and summer. Unregulated flows and passing flows resulted in some planned priority flow components being met, including winter high flows and winter freshes. No environmental water was released in the Tarago system during 2010–11 due to operational works on Tarago Reservoir and clarification of operational arrangements.

Based on existing knowledge, the outlook for the 2011–12 watering season is positive with a wet scenario likely. It is expected that there will be sufficient water, through both regulated and unregulated flows, to provide all priority flow components.

Figure 13E.1 The Tarago system

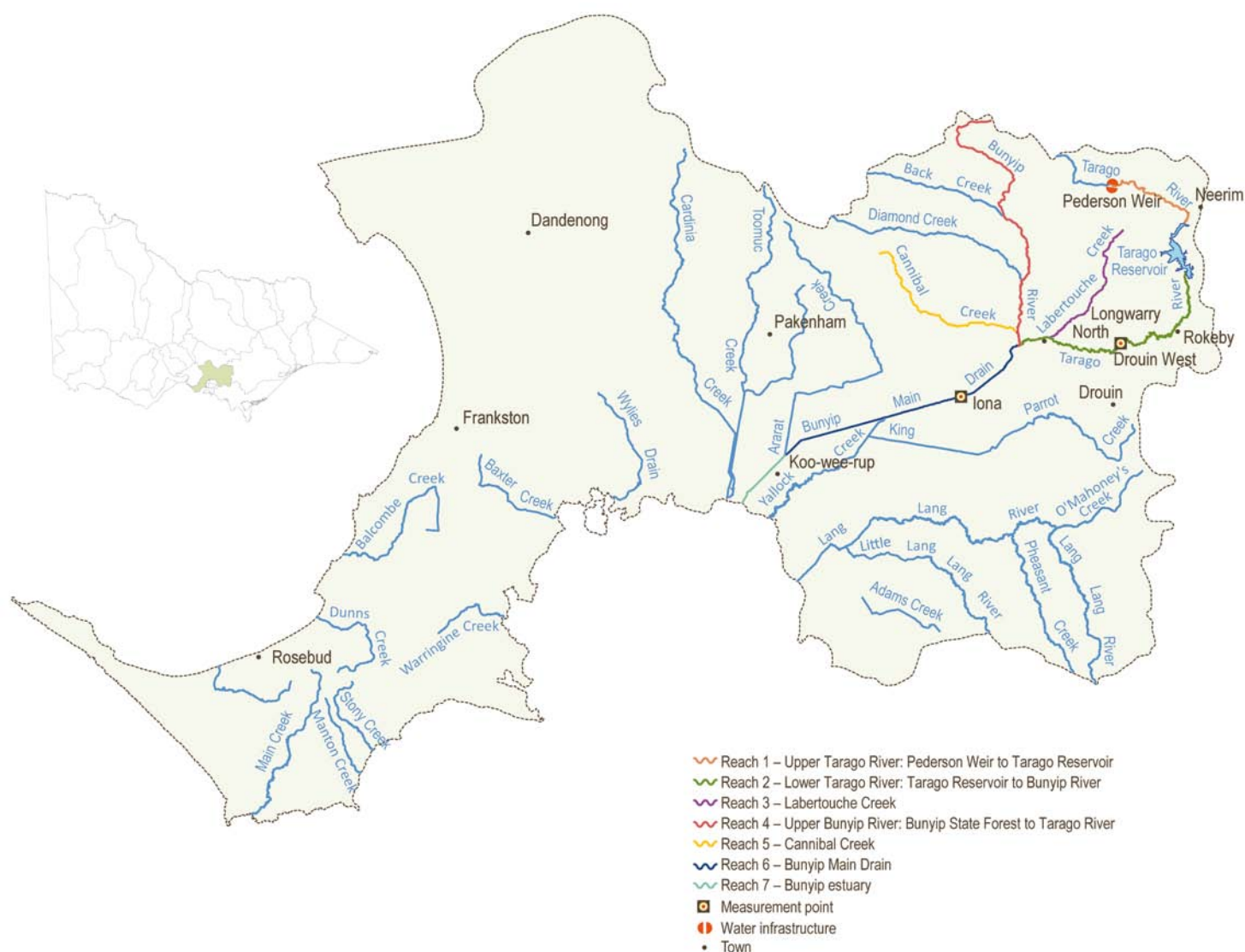


Table 13E.1 Water Holdings available for use in the Tarago system

Entitlement	Description
Tarago and Bunyip Rivers Environmental Entitlement 2009	<ul style="list-style-type: none"> 10.3 % of inflows, after passing flows have been provided 3,000 ML of storage space Passing flows of 12 ML per day or natural flow at Drouin West gauging station

Priority watering actions

Table 13E.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions are for:

- summer freshes in reach 2 (five freshes of 100 ML per day for four days each between December and May)
- summer freshes in reach 6 (three freshes of 120 ML per day for seven days each between December and May)
- summer high flows in reach 2 (one event of 200 ML per day for one day between December and May)
- winter high flows in reach 2 (280 ML per day for one day between October and November)
- winter high flows in reach 6 (70 ML per day between October and November)

- winter freshes in reach 2 (three freshes of 120 ML per day for two days each between June and November)
- winter freshes in reach 6 (three freshes of 170 ML per day for two days each between June and November, with one in November).

Summer low flows are also a priority flow component; however these are provided year round by passing flows. Melbourne Water, as the storage operator, is required to maintain the passing flows specified in the *Tarago and Bunyip Rivers Environmental Entitlement 2009*. Due to potential flooding risks and infrastructure limitations, bankfull and overbank flows will not be actively managed, but may occur naturally.

Adaptive management considerations

Decisions to release water from the Tarago and Bunyip environmental entitlement will mainly be influenced by the amount of unregulated flows experienced in the system throughout the year. With passing flows providing low flow requirements, summer freshes are the highest priority in the Tarago system. As inflows and unregulated flows increase, the focus will move to the delivery of summer and winter high flows, and a winter fresh. Delivery of winter flow components may occur early in the season (August 2011) if Melbourne Water determines that there is sufficient water available in the system to achieve priority summer flow components later in the year.

After providing all of these components, any water still available under the entitlement would be carried over into 2012–13.

Melbourne Water will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit. Close working relationships with Southern Rural Water will help in timing environmental releases to build on irrigation releases.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. A seasonal watering statement will be issued to communicate decisions

on the environmental watering actions that are actually to be undertaken. The seasonal watering statement will authorise Melbourne Water to implement those decisions.

In the Tarago system, implementation arrangements are outlined in Schedule 2 of the *Seasonal Watering Plan 2011–12*. Implementation will also be guided by the draft Tarago and Bunyip Operating Arrangements 2011.

Risk assessment and management

Risks associated with the implementation of priority watering actions include flooding of private land and personal injury to river users; however this risk is assessed as low. Management strategies include consideration of historic release limits, ongoing dialogue between environmental water reserve officers and storage operation officers within Melbourne Water, and adequate communication of planned releases to key stakeholders.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 2.

Further information

More detail about the planned watering actions in the Tarago system can be found by downloading Schedule 2 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au

Table 13E.2 Priority watering actions under a range of planning scenarios in the Tarago system

	Planning scenario			
	DROUGHT (protect)	DRY (maintain)	AVERAGE (recover)	WET (enhance)
Expected availability of Water Holdings[^]	3,000 ML	3,000 ML	3,000 ML	3,000 ML
Environmental objectives	Protect priority species and critical refuge habitat. Avoid catastrophic events (eg. fish deaths or algal blooms). Protect water quality for priority species and habitats.	Protect priority species and critical refuge habitat. Avoid catastrophic events (eg. fish deaths or algal blooms). Protect water quality for priority species and habitats.	Improve habitat access for aquatic species. Avoid deterioration of water quality. Maintain habitat connectivity. Increase the spread of flood-tolerant vegetation. Assist spawning and migration of priority fish species.	Improve habitat access for aquatic species. Maintain habitat connectivity. Increase the spread of flood-tolerant vegetation. Assist spawning and migration of priority fish species. Maintain channel form.
Flow components[#]	Summer fresh if water quality deteriorates.	Summer freshes. Summer and winter high flows.	Summer freshes. Summer and winter high flows. Winter fresh.	Summer freshes. Summer and winter high flows. Winter fresh.
Possible volume required from the Water Holdings[*]	1,000 ML	1,000–2,000 ML	2,000–3,000 ML	500 ML
Possible carryover into 2012–13	2,000 ML	1,000–2,000 ML	0–1,000 ML	2,500 ML

[^] The *Tarago and Bunyip Rivers Environmental Entitlement 2009* entitles the environment to 3,000 ML of storage space in Tarago Reservoir. Where total inflows exceed 3,000 ML, access to storage airspace is currently being discussed.

[#] Bankfull and overbank flows may occur naturally but will not be provided through the Water Holdings due to the risk of flooding private land.

^{*} Estimated volumes depend on the amount of unregulated flows experienced throughout the year.



13F Yarra system

Yarra River, David Hannah

Waterway manager – Melbourne Water

The Yarra River is one of Victoria's most significant waterways. The pristine upper reaches of the river are important water supply catchments, while the lower reaches provide social and recreational opportunities for more than four million people who live in Greater Melbourne and surrounds. The waterways of the Yarra River are generally of high ecological value, supporting platypus and a number of nationally significant species of fish (such as the Australian grayling and the Macquarie perch).

Planned environmental water use in 2011–12

The priority environmental objectives in the Yarra system for 2011–12 are improving habitat for aquatic species; maintaining fish passage; assisting spawning and migration of priority fish species, including Australian grayling and Macquarie perch; increasing the spread of flood-tolerant vegetation; maintaining channel form; and avoiding deterioration of water quality.

The priority river reaches are reach 2 (around Warburton) and reach 5 (around Warrandyte). Environmental watering will focus, in priority order, on summer freshes; winter freshes; summer high flows; and winter high flows.

Based on existing knowledge, the seasonal outlook for 2011–12 is positive with a wet scenario likely. There is a good chance that summer freshes will be provided naturally and there will be sufficient water in the Water Holdings to provide all planned priority flow components, with water left to carry over into 2012–13.



System overview

The 17,000 ML of water available under the Yarra environmental entitlement can be released from the Upper Yarra, Maroondah and O'Shannassy reservoirs. It can be provided to reaches 1–8.

The environmental flow reaches for the Yarra system are shown in Figure 13F.1. The priority river reaches are reach 2, from Armstrong Creek to Millgrove, and reach 5, from the top of Yering Gorge to Mullum Mullum Creek, due to their high environmental values. The measurement points for target flows are at Millgrove in reach 2 and Warrandyte in reach 5.

The environmental entitlement held in storage adds to the significant benefits already provided by unregulated flows in the Yarra system.

Current situation

Flows in the Yarra River have been well below average over the last 13 years. However, in 2010–11, increased rainfall resulted in above-average stream flows during the summer and winter months. As a result, the majority of planned priority flow components were met naturally, including summer and winter low flows, high flows, and freshes. In addition, bankfull flows were met naturally. Therefore no delivery of environmental water was required during 2010–11. As such, there will be about 18,000 ML of carryover available for use, in addition to the 17,000 ML expected to be allocated in 2011–12.

Based on existing knowledge, the seasonal outlook for 2011–12 is positive with a wet scenario likely. Under a wet scenario, summer freshes will be provided naturally and there will be sufficient water in the Water Holdings to provide all planned priority flow components, with water left to carry over into 2012–13.

Figure 13F.1 The Yarra system

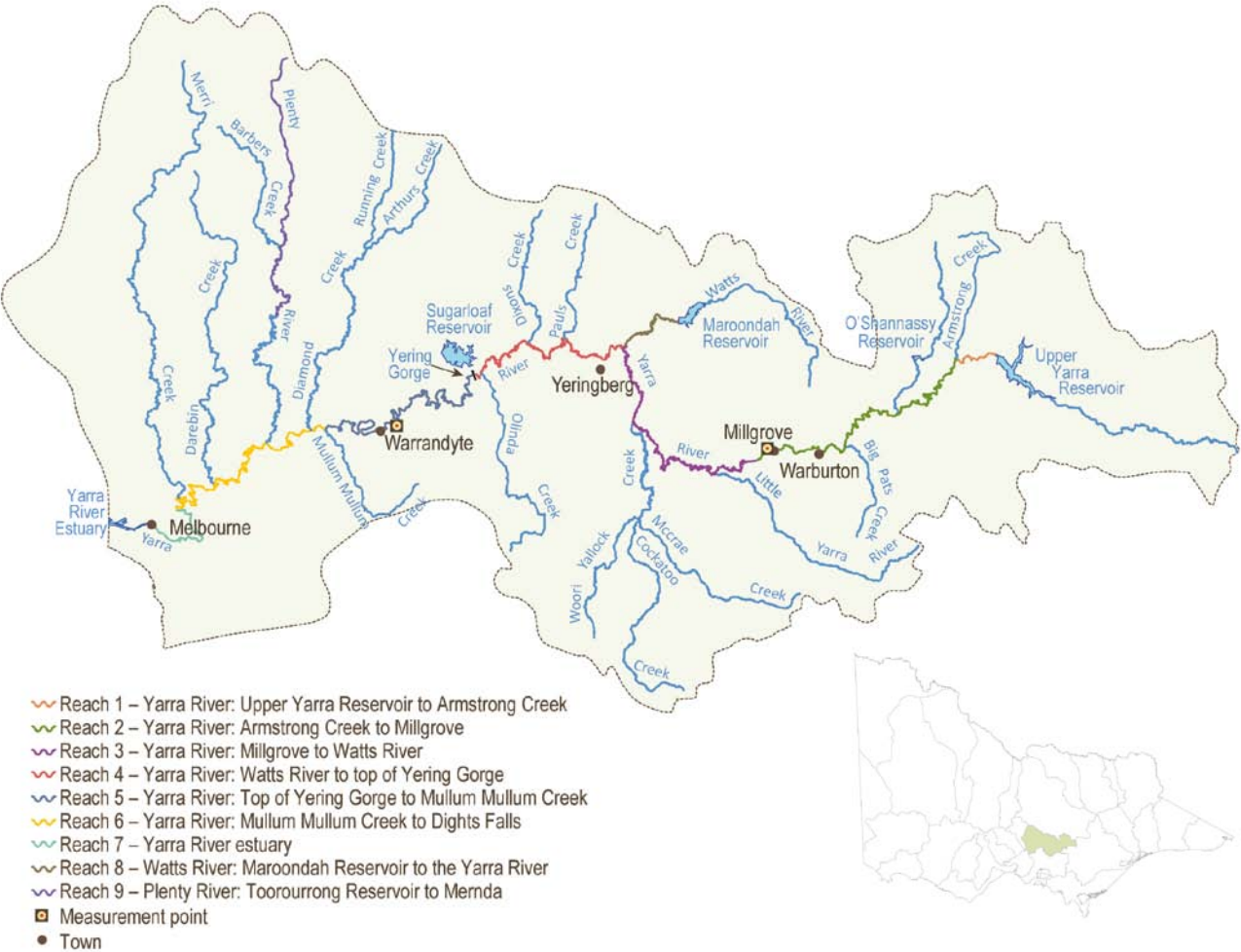


Table 13F.1 Water Holdings available for use in the Yarra system

Entitlement	Description
Yarra Environmental Entitlement 2006	<ul style="list-style-type: none">17,000 ML per year and share of reservoir storage spaceminimum passing flows at various weirs and gauges throughout the Yarra system55 ML per year in the Yarra River downstream of the confluence with Olinda Creek

Priority watering actions

Table 13F.2 outlines the priority objectives and watering actions under a range of planning or climatic scenarios. The priority watering actions are for:

- summer freshes in reach 2 (three freshes of 350 ML per day for two days each between December and May)
- summer freshes in reach 5 (three freshes of 750 ML per day for two days between December and May)
- winter freshes in reach 2 (two freshes of 700 ML per day for seven days each between June and November)
- winter freshes in reach 5 (two freshes of 2,000 ML per day for seven days between June and November)
- summer high flows in reach 2 (560 ML per day for seven days between April and May)
- summer high flows in reach 5 (1,500 ML per day for seven days between April and May)

- winter high flows in reach 2 (700 ML per day for 14 days between October and November)
- winter high flows in reach 5 (2,000 ML per day for 14 days between October and November).

Winter and summer low flows are also a priority flow component. These are provided year round by passing flows required under the *Yarra River Environmental Entitlement 2006*. Melbourne Water, as the storage operator, is required to maintain flows as specified in Schedule 1 of the entitlement.

Bankfull and overbank flows are important to the health of the Yarra River, as identified in the scientific flow study. However, the environmental entitlement specifies that these cannot be met through managed flows.

Table 13F.2 Priority watering actions under a range of planning scenarios in the Yarra system

	Planning scenario			
	DROUGHT (protect)	DRY (maintain)	AVERAGE (recover)	WET (enhance)
Expected availability of Water Holdings	8,000 ML carryover 17,000 ML allocation	18,000 ML carryover 17,000 ML allocation	18,000 ML carryover 17,000 ML allocation	18,000 ML carryover 17,000 ML allocation
Environmental objectives	Avoid localised extinction of, and provide refuge habitat for, aquatic species. Avoid catastrophic events (eg. fish deaths or algal blooms). Avoid deterioration of water quality.	Avoid localised extinction of and provide refuge habitat for aquatic species. Avoid catastrophic events (eg. fish deaths or algal blooms). Avoid deterioration of water quality.	Improve habitat access for aquatic species. Maintain fish passage. Assist spawning and migration of priority fish species. Increase the spread of flood-tolerant vegetation. Avoid deterioration of water quality.	Improve habitat access for aquatic species. Maintain fish passage. Assist spawning and migration of priority fish species. Increase the spread of flood-tolerant vegetation. Maintain channel form.
Flow components	Summer fresh if water quality deteriorates.	Three summer freshes. Winter fresh. Summer high flows.	Three summer freshes. One winter fresh. Summer high flows.	Three summer freshes. Two winter freshes. Summer high flows. Winter high flows. [^]
Possible volume required from the Water Holdings*	10,000 ML	10,000–33,000 ML	10,000–34,000 ML	10,000 ML
Possible carryover into 2012/13[#]	25,000 ML	2,000–25,000 ML	1,000–25,000 ML	25,000 ML

[^] Subject to high unregulated stream flows, the winter high flow component will be delivered through reach 1 to mobilise sediment, as per the Upper Yarra Dam flow release strategy.

* Estimated volumes depend on the amount of unregulated flows experienced throughout the year.

[#] The amount of carryover available in 2012–13 will be limited by the available reservoir storage capacity.



Yarra River, Alison Pouliot

Adaptive management considerations

Decisions to release water from the Yarra entitlement will be mainly influenced by the amount of unregulated flows experienced in the system throughout the year.

Summer freshes are the highest priority in the Yarra system. As the season progresses, and if the catchment remains wet, it is expected that summer freshes will be met naturally and the priority will move to the provision of winter freshes, and summer high flows. The delivery of winter high flows may occur in 2011, depending upon the occurrence of a natural high flow event to assist in mobilising sediment in reach 1.

After providing all of these components, water still available under the entitlement is to be carried over into 2012–13 to meet similar objectives as those for this year.

The 55 ML available downstream of the confluence with Olinda Creek will likely be left instream to supplement unregulated flows, as it is unlikely to be required for billabong watering. Most priority billabongs were inundated in 2010–11.

Melbourne Water, as the waterway manager, will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Environmental flow requirements may also be met through cease to harvest at Yering Pumping Station or through operational transfers within the Melbourne Water headworks system. This is subject to agreement with Melbourne Water storage operators. Where these arrangements occur, any additional losses will be deducted from the Water Holdings.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. A seasonal watering statement will be issued to communicate decisions on the environmental watering actions that are to be undertaken and to authorise Melbourne Water to implement those decisions.

In the Yarra system, implementation arrangements are outlined in Schedule 3 of the *Seasonal Watering Plan 2011–12*. In the future, implementation will also be guided by operating arrangements due for development by June 2012.

Risk assessment and management

Risks associated with the implementation of these watering actions include flooding of private land and personal injury to river users. However, these risks are assessed as low. Management strategies include consideration of historic release limits, ongoing dialogue between environmental water reserve officers and storage operation staff within Melbourne Water, and adequate communication of planned releases to key stakeholders.

Additional risks associated with the delivery of high flows through reach 1, including mobilisation of sediment and organic matter, are addressed in the Upper Yarra Dam flow release strategy. These risks will be managed by timing the release to coincide with high unregulated flows in the Yarra system, minimising downstream impacts.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 3.

Further information

More detail about the planned watering actions in the Yarra system can be found by downloading Schedule 3 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.



13G Werribee system

Werribee River, Melbourne Water

Waterway manager – Melbourne Water

The Werribee system, located 40 kilometres south-west of Melbourne, flows from the Wombat State Forest south east to the undulating plains of basalt soils north of Ballan before flowing into Port Phillip Bay. The upper Werribee River contains areas of relatively intact streamside vegetation and is an important habitat for native fish, platypus and invertebrates. The middle reaches of the Werribee River provide good habitat for fish, including short-finned eel, pygmy perch, and tupong, and a significant platypus population. The lower reaches of the river are home to migratory wading birds and numerous fish species, and are lined with highly valued river red gums.

Planned environmental water use in 2011–12

The priority environmental objectives in the Werribee system for 2011–12 are maintaining pool habitat and connectivity for platypus and priority fish species, including pygmy perch; maintaining instream and riparian vegetation growth; mobilising sediment; and maintaining riffle sites and channel form.

The priority river reaches are reach 6 (below Lake Merrimu) and reach 8 (below Melton Reservoir). Environmental watering will focus, in priority order, on cease to flow events; low flows; low flow freshes; baseflows; small high flow freshes; and large high flow freshes.

Based on existing knowledge, the outlook for the Werribee system is positive with a wet scenario likely. It is expected that there will be sufficient water available to provide all priority flow components.



System overview

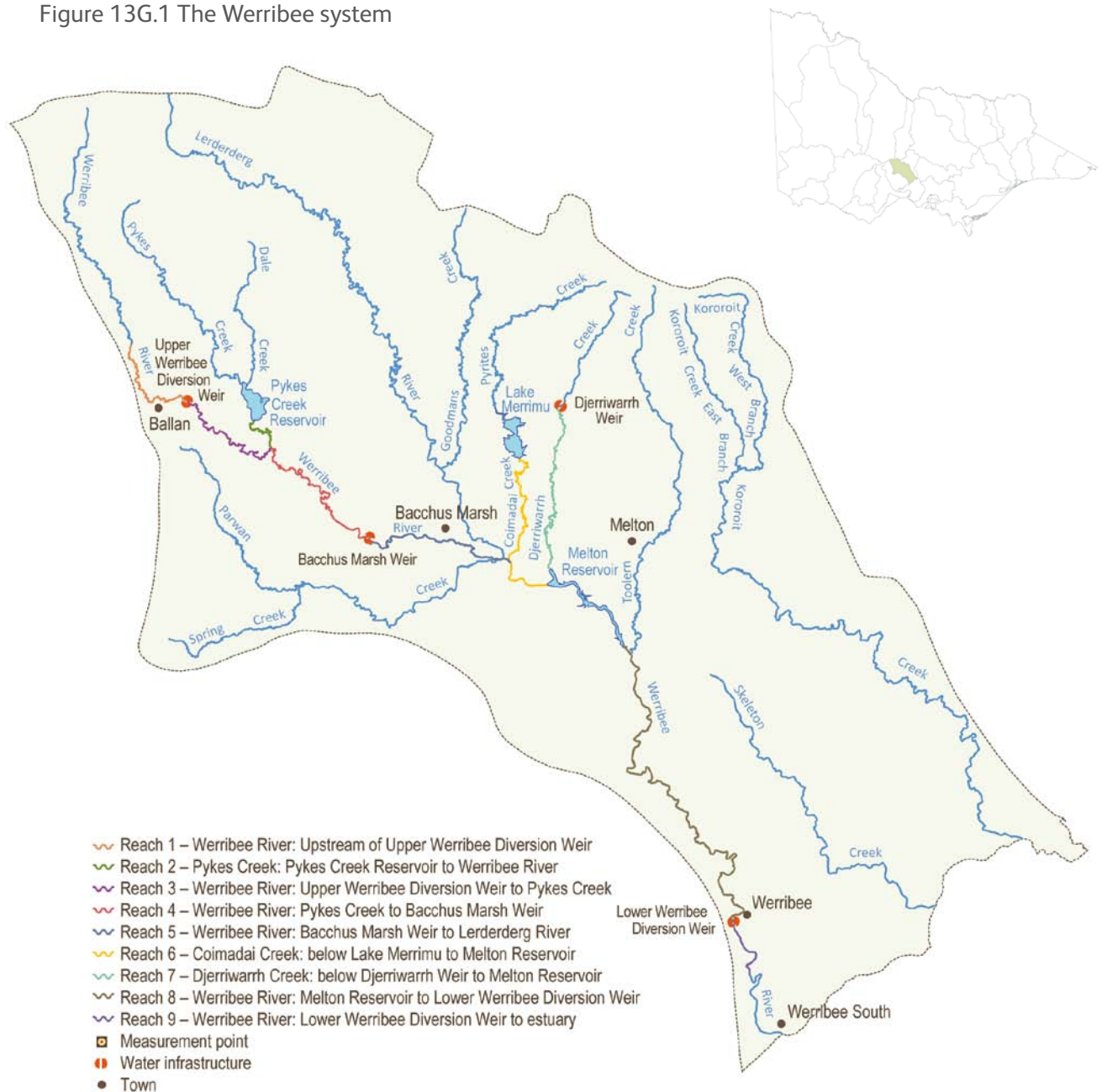
Environmental water available under the *Werribee River Environmental Entitlement 2011* can be released to the Werribee system from Lake Merrimu and Melton Reservoir.

The environmental flow reaches in the Werribee system are shown in Figure 13G.1. Environmental water can only be managed in the reaches below the reservoirs. Therefore, the priority reaches for environmental watering are reach 6, downstream of Lake Merrimu, and reach 8, downstream of Melton Reservoir. The measurement points for target flows are below Lake Merrimu in reach 6 and below Melton Reservoir in reach 8. It is anticipated that some benefit will be provided to reach 9, the lowest reach, below the Werribee Diversion Weir to the estuary.

The Werribee system is highly regulated, providing water to support urban and industrial customers, private diverters and irrigation districts at Bacchus Marsh and Werribee. As a result, the natural flow regime of the river has been significantly altered.

Environmental water in the Werribee system will assist in restoring some degree of natural seasonality to the flow regime of the river.

Figure 13G.1 The Werribee system



Current situation

The flow regime of the Werribee River has been highly modified, resulting in reversal of the natural flow seasonality of the system. While passing flows are provided at numerous locations in the Werribee system, no active management of environmental water has occurred to date as the environmental entitlement was only created in May 2011. Whilst passing flows have provided some environmental benefit, environmental water now available under the Werribee entitlement will greatly improve the ability to achieve desired environmental objectives in the system.

The Werribee system has experienced prolonged low flow conditions up until 2010–11 when good spring and winter rainfall filled both Lake Merrimu and Melton Reservoir, causing Melton Reservoir to spill for the first time since 2005. Bankfull flows occurred naturally in reach 8, with some achievement of baseflows, low flows and high flow freshes during 2010–11. Low flow freshes did not occur.

Operational leakage from Lake Merrimu is believed to be the cause of a persistent trickle flow in reach 6. This is thought to be reducing the occurrence of cease to flow events, but requires further investigation. Additionally, the capture of flow in Lake Merrimu has significantly reduced the occurrence of freshes, with no achievement of bankfull and overbank flows in recent years.

Based on existing knowledge, the outlook for the Werribee system is positive with a wet scenario likely. It is expected that there will be sufficient water available to provide all priority flow components.

Table 13G.1 Water Holdings available for use in the Werribee system

Entitlement	Description
Werribee River Environmental Entitlement 2011	<ul style="list-style-type: none"> • 10 per cent of share of inflows, after passing flows have been provided • some ability to bank passing flows in Lake Merrimu (subject to a number of conditions) • air space storage in Lake Merrimu and Melton Reservoir (first to spill)

Priority watering actions

Table 13G.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions for the Werribee system are:

- cease to flow in reach 6 (0 ML per day for 30 days, or natural, between December and January and March and June)
- low flows in reach 8 (10 ML per day, or natural flow, between December and May, in all years but extreme drought)
- low flow fresh in reach 8 (5–167 ML per day, or natural, for one to three days between December and June)
- baseflow in reach 6 (0.5 ML per day, or natural, between July and December)
- baseflow in reach 8 (36 ML per day, or natural, between June and December)
- small high flow freshes in reach 6 (10 freshes of 10 ML per day for five days each between July and November)
- large high flow freshes in reach 6 (two freshes of 93 ML per day, or natural, for two days each between July and November)
- large high flow freshes in reach 8 (seven freshes of 350 ML per day or natural, for seven days each between June and December).

Adaptive management considerations

As inflows improve, more flow components will be delivered in the water year. Under wetter conditions the delivery of baseflows becomes a higher priority than low flows and low flow freshes, as there is increased water available under the environmental entitlement to maintain baseflows.

To maximise the benefits of the environmental water available in the Werribee system, Melbourne Water will work closely with Southern Rural Water to time releases, where possible, to build on irrigation releases. This is a key method for efficiently achieving flow components, particularly summer freshes.

After providing these flow components, either managed or natural, any water still available under the entitlement will be carried over to meet similar objectives in 2012–13.

Melbourne Water, as the waterway manager, will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. As conditions unfold and water becomes available throughout the year, seasonal watering statements will be issued to communicate decisions on the environmental watering actions that are to be undertaken. The seasonal watering statements authorise Melbourne Water to implement those decisions.

In the Werribee system, implementation arrangements are outlined in Schedule 4 of the *Seasonal Watering Plan 2011–12*, with operating arrangements for the system currently under development. These arrangements outline the water source, delivery constraints, timing and triggers for watering, water ordering process, costs, reporting and monitoring requirements.

Risk assessment and management

Risks associated with the implementation of priority watering actions include flooding of private land and risk of personal injury. However, these risks are assessed as low. Management strategies include ongoing dialogue between environmental water reserve officers and storage operators, and adequate communication of planned releases to key stakeholders.

Additional risks associated with water quality, particularly during the summer periods, have also been identified. This risk will be managed through ongoing water quality monitoring and use of triggers to inform the timing of environmental releases.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 4.

Further information

More detail about the planned watering actions in the Werribee system can be found by downloading Schedule 4 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

Table 13G.2 Priority watering actions under a range of planning scenarios in the Werribee system

	Planning scenario			
	DROUGHT (protect)	DRY (maintain)	AVERAGE (recover)	WET (enhance)
Expected availability of Water Holdings¹	3,000 ML carryover < 1,000 ML allocation	3,000 ML carryover 1,000 ML allocation	3,000 ML carryover 1,000–2,000 ML allocation	3,000 ML carryover 3,000 ML allocation
Environmental objectives	Maintain habitat for platypus populations. Maintain refuge for fish. Allow passage of river blackfish. Inundate instream macroinvertebrate riffle habitat. Maintain pool water quality. Curtail growing season of in-channel emergent macrophytes	Maintain habitat for platypus populations. Maintain refuge for fish. Allow passage of river blackfish. Inundate instream macroinvertebrate riffle habitat. Maintain pool water quality. Curtail growing season of in-channel emergent macrophytes.	Manage instream vegetation growth. Manage pygmy perch access stream bed vegetation. Mobilise sand and silt from riffle sites and pools. Maintain channel form. Mobilise gravels and disturb macrophytes. Disturb shrubby vegetations.	Manage instream vegetation growth. Manage pygmy perch access stream bed vegetation. Mobilise sand and silt from riffle sites and pools. Maintain channel form. Mobilise gravels and disturb macrophytes. Disturb shrubby vegetations.
Flow components	Cease to flow (reach 6). ² Low flows (reach 8). Low flow freshes (one per reach).	Cease to flow (reach 6). ² Low flows (reach 8). Low flow freshes (two per reach). Baseflow (reach 8).	Baseflow. ^{3,4} Low flows ³ (reach 8). Low flow freshes (three per reach). Small high flow freshes (10 events in reach 6). Large high flow fresh (reach 6).	Baseflow. ^{3,4} Low flows ³ (reach 8). Low flow freshes (four events in reach 6; three events in reach 8). Small high flow freshes. Large high flow fresh (reach 6). Large high flow fresh (one event in reach 8). Bankfull. ⁵ Overbank. ⁵
Possible volume required from the Water Holdings⁶	1,000 ML	1,600 ML	3,300 ML	8,300 ML
Possible carryover into 2012/13¹	Up to 3,000 ML	Up to 3,400 ML	Up to 3,300 ML	0 ML

1 The *Werribee River Environmental Entitlement 2011* allows environmental water to be stored in storage space not being used by other entitlement holders in Lake Merrimu and Melton Reservoir. When either of the storages spill, environmental water is the first to spill.

2 Cease to flow components are provided by ensuring water from the Water Holdings is not released.

3 Baseflow requirements are provided through passing flows requirements in reach 6.

4 Baseflows cannot currently be provided in reach 8 due to outlet constraints.

5 Bankfull and overbank flows will not be provided through managed environmental water releases due to the potential flooding of private land and infrastructure, however these flows are expected to occur naturally under an 'enhance' scenario.

6 Figures assume no unregulated flows occur, and are therefore an upper limit of the volume required from the Water Holdings.



13H Moorabool system

Moorabool River in flood, 2011, Corangamite Catchment Management Authority

Waterway manager – Corangamite Catchment Management Authority

The Moorabool system is an important catchment for the major urban areas of Geelong and Ballarat. The river also sustains economic values through its contribution to extensive agriculture in the region. Despite years of drought and water extraction, the river still retains some significant environmental values, particularly the mid to lower reaches around She Oaks Weir. These values include native fish of high conservation value and areas of significant remnant vegetation. The river maintains populations of native aquatic species such as tupong, river blackfish, southern pygmy perch, Australian smelt and the short-finned eel.

Planned environmental water use in 2011–12

The priority environmental objectives in the Moorabool system for 2011–12 are maintaining water quality; maintaining diversity of macroinvertebrate and instream aquatic plant communities; limiting encroachment of instream vegetation; maintaining snag habitat; restoring or maintaining self-sustaining population of priority fish species; and maintaining riparian vegetation communities.

The priority river reach is reach 3 between Lal Lal Reservoir and She Oaks Weir. Environmental watering will focus, in priority order, on summer freshes; summer low flow; cease to flow (if natural conditions are appropriate); winter freshes; and winter low flow.

Based on existing knowledge, the outlook for the 2011–12 watering season is positive, with an average scenario most likely. It is expected that there will be sufficient water, through both regulated and unregulated flows, to meet all priority summer flow requirements and some achievement of winter freshes.



System overview

Water available under the Moorabool environmental entitlement is stored and released from Lal Lal Reservoir, the main storage on the Moorabool system.

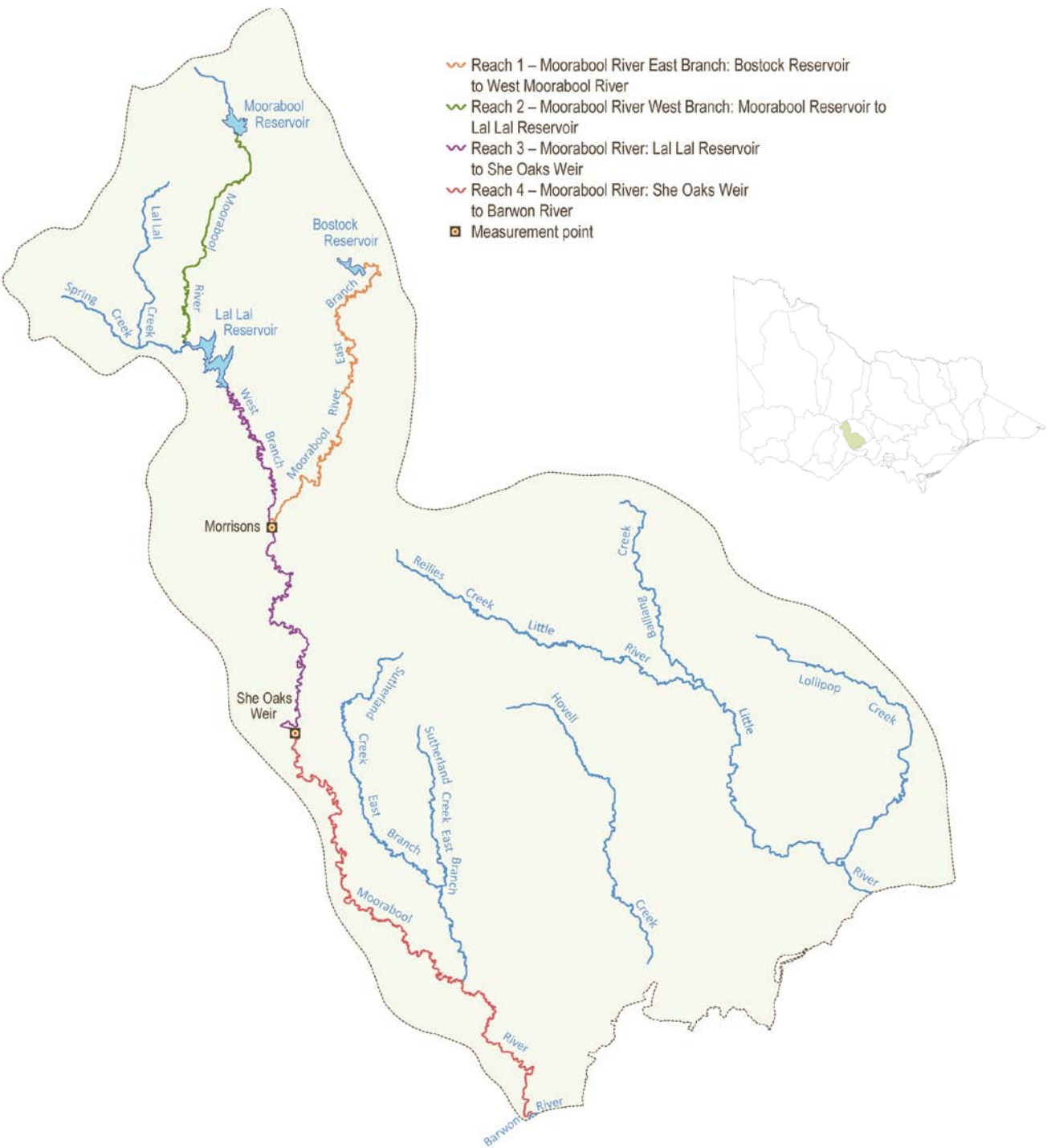
The environmental flow reaches are shown in Figure 13H.1. The priority reach in the Moorabool system is reach 3, between Lal Lal Reservoir and She Oaks Weir. This reach has the priority ecological values and is most influenced by water released from Lal Lal Reservoir. Some benefit may be provided to reach 4, as the final reach of the Moorabool system which flows into the Barwon River, although this reach is not an environmental watering priority. The measurement points for target flows in the Moorabool system are at Morrisons and She Oaks Weir.

Current situation

Seasonal flow patterns have been reversed in the Moorabool system in the majority of the past 10 years, with high summer flows and little or no winter flows occurring. This is a result of the transfer of consumptive water from Lal Lal Reservoir, and environmental releases to protect refuge habitat.

Since 2005, the Moorabool River has experienced prolonged drought conditions and 'cease to flow' events. During this time, the Corangamite Catchment Management Authority operated under emergency management conditions, using small volumes of water to maintain key drought refuges and avoid critical loss of species. Significant and sustained flows were then experienced in 2010–11 with most priority flow components partially or fully achieved through a combination of natural unregulated flows, consumptive water releases and managed environmental releases.

Figure 13H.1 The Moorabool system



The extent to which priority flow components will be met in the 2011–12 water year will largely depend on the amount of unregulated flows in the system and opportunities to build upon other releases, such as consumptive water deliveries. Based on

existing knowledge, the outlook for the 2011–12 watering season is positive with an average scenario most likely. It is expected that there will be sufficient water, through both regulated and unregulated flows, to meet all priority summer flow requirements and potentially winter freshes.

Table 13G.1 Water Holdings available for use in the Moorabool system

Entitlement	Description
Moorabool River Environmental Entitlement 2010	<ul style="list-style-type: none">11.9 per cent (7,086 ML) of storage capacity11.9 per cent of inflows, after passing flows have been set asidea maximum use of 7,500 ML of VEWB water in any consecutive three year period

Priority watering actions

Table 13H.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions, in priority order, for reach 3 are for:

- summer fresh (three freshes of 31 ML per day for 10 days between December and May)
- summer low flow (20 ML per day from December to May)
- cease to flow (one event of 0 ML per day for 10 days between December and May)
- winter fresh (one fresh of at least 146 ML per day for five days between June and November)
- winter low flow (83 ML per day from June to November).

Depending on inflows into Lal Lal Reservoir, a portion of summer low flows will be provided to the system through passing flows specified under the *Moorabool River Environmental Entitlement 2010* and managed by Central Highlands Water. However, these flows often require top-up with environmental water to reach desired flow rates.

Winter high flows are also an important flow component in the Moorabool system, aiding in deepening pools, removing organic matter, fish breeding and movement, and wetting riparian communities such as tea tree; however, it is not possible to actively manage these flows due to capacity constraints at Lal Lal Reservoir. In addition, there is insufficient water available under the existing entitlement to provide these flows without jeopardising other critical flow components or watering actions in future years. As such, winter high flows will not be sought using the environmental entitlement, but may occur naturally.

Adaptive management considerations

Decisions to release water from the Moorabool environmental entitlement will be mainly influenced by the amount of unregulated flows and water corporation transfers occurring in the system throughout the year. Given the small volume available for use under the environmental entitlement and the need to protect refuge pools and water quality from December 2011 to May 2012, the delivery of summer flow components is the highest priority.

The second priority will be to provide winter flows in 2012, to restore some balance to the reversal of seasonal flow pattern typically seen in the system.

Water available under the Moorabool environmental entitlement is restricted by a maximum use of 7,500 ML over any three-year consecutive period. Corangamite Catchment Management Authority plans to use 2,500 ML in 2011–12, retaining flexibility for future years through carryover.

Corangamite Catchment Management Authority will monitor the inflows and water quality, assessing the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit. Close working relationships with Barwon Water and Central Highlands Water will be important in timing environmental releases to coincide with deliveries of consumptive volumes, thereby sharing any losses and maximising flow rates.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year. A seasonal watering statement will be issued to communicate decisions on the environmental watering actions that are to be undertaken and authorise Corangamite Catchment Management Authority to implement these decisions.

In the Moorabool system, implementation arrangements are outlined in Schedule 5 of the *Seasonal Watering Plan 2011–12*.

Risk assessment and management

Risks associated with the implementation of these watering actions include flooding of private land and personal injury to river users; however, these risks are assessed as low. Management strategies include monitoring of release levels, ongoing dialogue between Corangamite Catchment Management Authority and storage operators at Central Highlands Water and adequate communication of planned releases to key stakeholders.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 5.

Further information

More detail about the planned watering actions in the Moorabool system can be found by downloading Schedule 5 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

Table 13H.2 Priority watering actions under a range of planning scenarios in the Moorabool system

	Planning scenario			
	DROUGHT	DRY	AVERAGE	WET
Expected availability of Water Holdings	0–1,475 ML allocation 6,300 ML carryover	1,500–2,350 ML allocation 6,300 ML carryover	2,375–2,625 ML allocation 6,300 ML carryover	>2,650 ML allocation 6,300 ML carryover
Environmental objectives	Manage salinity and dissolved oxygen levels. Maintain diverse macroinvertebrate communities. Maintain instream aquatic plant species diversity. Limit encroachment of instream vegetation. Restore riffles.	Manage salinity, dissolved oxygen and total nitrogen concentrations. Maintain diverse macroinvertebrate communities. Maintain instream aquatic plant species diversity. Limit encroachment of instream vegetation. Provide adequate fish habitat. Maintain snag habitat. Restore riffles.	Manage salinity, dissolved oxygen and total nitrogen concentrations. Maintain diverse macroinvertebrate communities. Maintain instream aquatic plant species diversity. Limit encroachment of instream vegetation. Maintain snag habitat. Restore or maintain self-sustaining populations of tupong, river blackfish, southern pygmy perch, Australian smelt, and short-finned eel. Maintain physical processes through organic matter transport. Maintain riparian vegetation communities. Maintain channel form.	Manage salinity, dissolved oxygen and total nitrogen concentrations. Maintain diverse macroinvertebrate communities. Maintain instream aquatic plant species diversity. Limit encroachment of instream vegetation. Maintain snag habitat. Restore or maintain self-sustaining populations of tupong, river blackfish, southern pygmy perch, Australian smelt, and short-finned eel. Maintain physical processes through organic matter transport. Maintain riparian vegetation communities. Maintain channel form.
Flow components	Trigger-based freshes. Summer freshes. Summer low flow.	Cease to flow. Summer freshes. Summer low flow. Late winter fresh.	Cease to flow. Summer freshes. Summer low flow. Winter freshes. Winter low flow.	Summer freshes. Summer low flow. Winter freshes. Winter low flow. Winter high flow (natural event).
Possible volume required from the Water Holdings	2,500 ML	2,500 ML	2,500 ML	2,500 ML
Possible carryover into 2012–13	3,800–5,275 ML	5,300–6,150 ML	6,175–6,425 ML	>6,450 ML



13I Barwon system



Hospital Swamp, Donna Smithyman, Corangamite Catchment Management Authority

Planned watering actions for the Barwon system will be included as sub-section 13I in the Seasonal Watering Plan 2011–12 at a later stage. Once the environmental flow study has been completed, the Corangamite Catchment Management Authority will prepare a seasonal watering proposal. This will then be considered by the VEWH and the agreed priority watering actions included in the plan.

The Wimmera-Glenelg is a single, highly connected, regulated source system and the only system within western Victoria in which there are Water Holdings. This source system supplies both the Glenelg and the Wimmera regulated river systems (see sub-sections 14A and 14B), as well as wetlands connected to the Wimmera-Mallee pipeline (see sub-section 14C).

The Wimmera-Glenelg environmental water entitlement was originally created in 2004 as part of the process of converting loosely defined rights to water into secure entitlements, including the water savings from the Northern Mallee pipeline project. It has been progressively updated as further water savings have been realised. In 2010, the entitlement was reissued to reflect the water recovery undertaken as part of the Wimmera-Mallee pipeline project.

The Wimmera-Glenelg supply system is complex, with many rivers, streams and pipelines, multiple storages, channels connecting storages, and numerous passing flow requirements. The system is operated by Grampians Wimmera Mallee Water, which is currently developing storage management rules in consultation with entitlement holders (including the VEWH) and other key stakeholders.

Due to this complexity, planning for use of the Water Holdings in western Victoria is undertaken conjunctively for the Wimmera and Glenelg systems. Sub-sections 14A and 14B, which address the two systems separately, are complementary to each other.

The priority watering actions for the Glenelg and Wimmera systems have been proposed by the Glenelg Hopkins and Wimmera catchment management authorities on advice from the Inter-Catchment Advisory Group, which includes community representatives of both CMAs. The priority actions have since been agreed to by the VEWH and included in the seasonal watering plan.

Planned watering actions for the Wimmera-Mallee wetlands will be included in the *Seasonal Watering Plan 2011–12* at a later stage. Once planning and infrastructure works to connect further wetlands to the pipeline are completed, the Mallee Catchment Management Authority will prepare a seasonal watering proposal, in consultation with Wimmera and North Central CMAs. This will then be considered by the VEWH and the agreed priority watering actions included in the plan.



14A Glenelg system

Frazer Swamp on the Glenelg River, Glenelg-Hopkins Catchment Management Authority

Waterway manager – Glenelg Hopkins Catchment Management Authority

The Glenelg River, in south-western Victoria, starts in the Grampian Ranges and runs for over 350 kilometres, making it the longest river in south-west Victoria. A short stretch of the lower end winds through South Australia before returning to Victoria to enter the sea at Nelson. The Glenelg River is a central feature of the Lower Glenelg National Park and is valued for its high social, economic and environmental attributes. In recent history the Glenelg River has been seriously affected by prolonged drought and is now experiencing improved flows for the first time in many years. The Glenelg River is listed as a heritage river due to the high-value aquatic life it supports, including the Glenelg freshwater mussel and Glenelg spiny crayfish.

Planned environmental water use in 2011–12

The priority environmental objectives in the Glenelg system for 2011–12 include maintaining and improving instream habitat and water quality, and providing connectivity between reaches to support native fish movement.

The priority river reach in the Glenelg system is reach 1, from Rocklands Reservoir to upstream of Burkes Bridge. Environmental watering will focus, in priority order, on summer baseflows; a summer fresh; and a spring fresh. If there is sufficient environmental water to provide all flow components in reach 1, the focus will shift to providing additional flows to meet baseflow targets in reach 2.

Based on existing knowledge, the seasonal outlook for 2011–12 is positive, with an average scenario likely. It is likely that allocations in 2011–12 and water carried over from last year will provide sufficient water for all priority flow components in the Glenelg system.

System overview

The Glenelg system has two main storages which can capture water from the Glenelg River: the Moora Moora and Rocklands reservoirs. Moora Moora Reservoir is a relatively small dam in the headwaters of the Glenelg. Rocklands Reservoir is the largest storage in the Wimmera-Glenelg headwork system and captures all inflows from seven creeks and rivers including the Glenelg River. Environmental water in the Glenelg system is released from Rocklands Reservoir through carp screens and enters reach 1 via the dam outlet, and 5 mile and 12 mile outlets which provide water to reach 1 progressively downstream.

In the Glenelg River the priority reaches for environmental watering are reaches 1 and 2. Reach 3 will benefit from environmental watering releases; however reach 1 and 2 are the only reaches in which environmental water can be adequately released to meet desired flow targets. The measurement points for target flows are at Harrow for reach 1 and Dergholm for reach 2.

Figure 14A.1 The Glenelg system

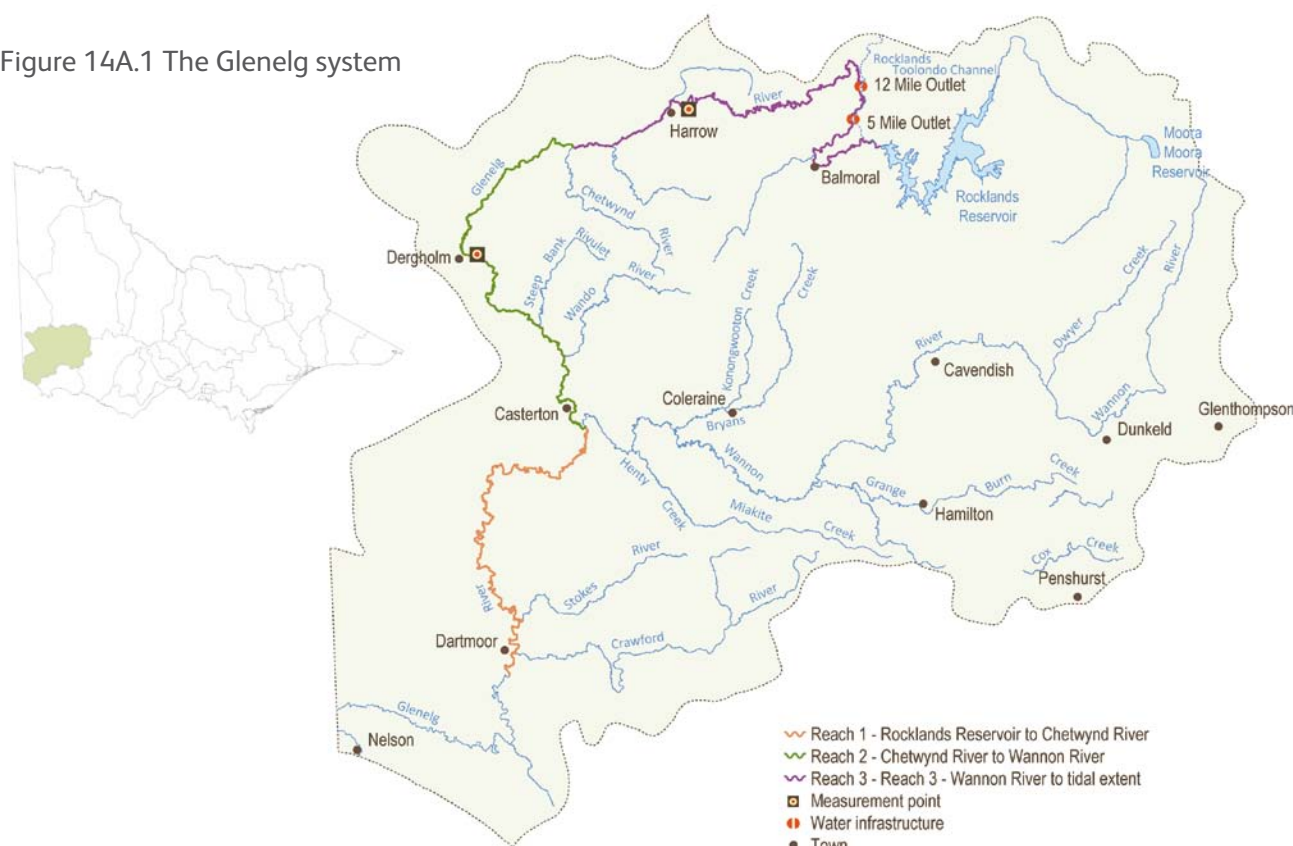


Table 14A.1 Water Holdings available for use in the Glenelg system

Entitlement	Description
Wimmera and Glenelg Rivers Environmental Entitlement 2010	<ul style="list-style-type: none"> 40,560 ML of regulated entitlement with the allocations based on inflow into storage (to be shared between the Wimmera system and Glenelg system) fixed passing flows in Wannon River passing flows with some ability to vary rates in the Glenelg River

Current situation

The 2010–11 water year marked a drastic shift in water resource condition in the Glenelg system, moving from drought conditions which have dominated the region since 1997, to large-scale flooding. These flows provided significant benefit to riparian vegetation and have improved water quality and macroinvertebrate diversity. Fish response has been mixed, with the diversity of native species increasing. All planned priority flow components occurred naturally or were provided, including summer baseflows and freshes, winter baseflows and winter spring freshes.

Based on existing knowledge, the seasonal outlook for 2011–12 is positive, with an average scenario likely. It is likely that allocations in 2011–12 and water carried over from last year will provide sufficient water for all priority flow components in the Glenelg system.

Passing flows occur during winter to meet the winter baseflow requirements.

Priority watering actions

Table 14A.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions are based on what can be feasibly released within operational constraints. The primary focus is on:

- summer base flows in reaches 1 and 2 (minimum of 75 ML per day between November and May)
- summer freshes in reach 1 (five freshes of 65 ML per day for six days each between December and May)

- winter/spring freshes in reach 1 (two freshes of 350 ML per day for four days each between July and October).

Adaptive management considerations

Environmental water will first be reserved to provide summer baseflows and freshes from November 2011. If there is sufficient water available, winter/spring freshes will be provided up to October 2011.

The Wimmera-Glenelg headwork system is highly regulated with numerous storages. A number of factors influence the management of environmental releases in the Glenelg system, including reservoir capacity constraints, storage levels, and other water resource management activities. Glenelg Hopkins Catchment Management Authority will work closely with Grampians-Wimmera-Mallee Water to ensure there is maximum benefit from the use of environmental water in the system.

Water available after providing priority flow components in both the Glenelg and Wimmera systems is to be carried over into 2012–13.

Glenelg Hopkins Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

The Glenelg-Hopkins Catchment Management Authority and Wimmera Catchment Management Authority will work together to provide the priority watering actions in both the Glenelg and Wimmera systems, considering water availability and system constraints. They will communicate regularly to ensure sufficient water in the Water Holdings before ordering. In the unlikely event

there is insufficient water to meet priority watering actions in both the Glenelg and Wimmera systems, prioritisation will be agreed by both CMAs and based on the effectiveness of flows in minimising risks to key ecological assets. If shortfalls are identified, the CMAs will work together to allocate the remaining water to the priority flow components across systems, involving the VEWH in final decision making as necessary.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. A seasonal watering statement will be issued to communicate decisions on the environmental watering actions that are actually to be undertaken and to authorise Glenelg Hopkins Catchment Management Authority to implement those decisions.

In the Glenelg system, implementation arrangements are outlined in Schedule 7 of the *Seasonal Watering Plan 2011–12*. In the future, implementation will also be guided by storage management rules due for development by October 2011 and operating arrangements also to be developed.

Risk assessment and management

While unlikely, there is a risk that in an extremely wet year, flooding impacts could be exacerbated. In order to manage this risk, the Glenelg Hopkins Catchment Management Authority will monitor releases and upstream flows and if there is a risk, immediately order releases to cease.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 7. Of note is an emerging risk related to water quality issues in Taylors Lake in the Wimmera system. In response, Grampians Wimmera Mallee Water has modified its normal operational practice as a mitigation measure. This has the potential to impact on water available from the Water Holdings. The VEWH, together with Wimmera and Glenelg-Hopkins catchment management authorities, will work closely with Grampians Wimmera Mallee Water to manage the water quality issues while minimising the risk to the Water Holdings.

Further information

More detail about the planned watering activities in the Glenelg system can be found by downloading Schedule 7 of the *Seasonal Watering Plan 2011–12* at www.vevh.vic.gov.au.

Table 14A.2 Priority watering actions under a range of planning scenarios in the Glenelg system

	Planning scenario			
	DROUGHT	DRY	AVERAGE	WET
Expected availability of Water Holdings[^]	27,651 ML carryover 29,500 ML allocation	27,651 ML carryover 40,500 ML allocation	27,651 ML carryover 40,500 ML allocation	27,651 ML carryover 40,500 ML allocation
Environmental objectives	Maintain pool habitat for fish. Increase flow disturbance for macroinvertebrates. Improve fish movement potential.	Maintain pool habitat for fish. Minimise low dissolved oxygen risks (especially hot summer months) for fish. Increase flow disturbance for macroinvertebrates. Improve fish movement potential. Carbon/nutrient cycling and vegetation.	Maintain pool habitat for fish. Minimise low dissolved oxygen risks (especially hot summer months) for fish. Increase flow disturbance for macroinvertebrates. Improve fish movement potential. Spring flood for macroinvertebrates, fish and wetlands.	Maintain pool habitat for fish. Minimise low dissolved oxygen risks (especially hot summer months) for fish. Increase flow disturbance for macroinvertebrates. Improve fish movement potential Spring flood for macroinvertebrates, fish and wetlands.
Flow components	Summer baseflow.	Summer baseflow.	Summer baseflow. Summer freshes. Winter/spring freshes.	Summer baseflow. Summer freshes. Winter/spring freshes.
Possible volume required from the Water Holdings[*]	5,300 ML	7,475 ML	20,125 ML	20,125 ML
Possible carryover into 2012–13[#]	33,251 ML	30,076 ML	2,526 ML	2,526 ML

[^] Water Holdings are shared across the Glenelg and Wimmera systems and indicate the total amount for both systems.

^{*} Figures are estimates of the volume required in the Glenelg system only and not the Wimmera system. Figures assume no unregulated flows occur, and are therefore an upper limit of the volume required from the Water Holdings.

[#] Figures take account of the possible volume required in both the Glenelg and Wimmera systems. The amount of carryover into 2012–13 will be determined not only by the volume of unused water but the possibility that the storage spills and carryover is forfeited. Figures assume full usage from the required volumes and that the storage does not spill.



14B Wimmera system

Wimmera River, Melissa Powell

Waterway manager – Wimmera Catchment Management Authority

The Wimmera River lies in western Victoria, beginning in the Pyrenees, and flowing into Lake Hindmarsh and Lake Albacutya. In recent years, the Wimmera River has been seriously affected by drought, but is now experiencing improved flows for the first time in many years. The Wimmera River is known for its high social, economic and environmental values and is listed as a heritage river. The Wimmera system is home to many threatened species such as the Wimmera bottlebrush, located along the MacKenzie River and to Victoria's only self-sustaining population of freshwater catfish.

Planned environmental water use in 2011–12

The priority environmental objectives in the Wimmera system for 2011–12 are maintaining pool habitat and water quality for fish populations; improving potential for fish movement; increasing macroinvertebrate populations; carbon/nutrient cycling and bench vegetation; and limiting saline groundwater impacts on banks and deep pools.

The priority river reaches for environmental watering are the regulated sections of the Wimmera River where releases can be made: reach 4 and then reaches 2 and 3. Priorities in the MacKenzie River are reaches 2 and 3, with reach 1 benefiting from flows passed to the lower reaches. Environmental watering in both rivers will focus, in priority order, on summer base flows; summer freshes; winter/spring baseflows; and spring freshes.

Based on existing knowledge, the seasonal outlook for 2011–12 is positive, with an average scenario most likely. It is likely that allocations in 2011–12 and water carried over from last year will provide sufficient water for priority flow components in the MacKenzie and Wimmera rivers.

System overview

Water in the Wimmera system is stored in three on-stream reservoirs: Lake Wartook on the MacKenzie River; Lake Lonsdale on Mount William Creek; and Lake Bellfield on Fyans Creek. Off-stream storages can harvest water via channels from the Wimmera River and Mount William Creek (Taylor's Lake) and Fyan Creek (Lake Fyans). The channel system enables water to be shifted between some of the storages and between the Wimmera and Glenelg systems. Environmental water can be called out of any storage, dependent on constraints and system losses. This complexity provides significant opportunities and flexibility in environmental water management.

The environmental flow reaches are shown in Figure 14B.1. In the Wimmera system, the priority reaches for environmental watering are the heritage-listed reach 4 and then the lower section of reach 2 and all of reach 3 of the Wimmera River. These are the only reaches for which stored environmental water can be released, with the upper reaches being mostly unregulated. Flows are targeted at Lochiel downstream of Dimboola, however day to day management will use the metering point at Wail as flow data can be accessed daily. The priority reaches in the MacKenzie River are reaches 2 and 3, with reach 1 receiving consumptive water year-round to supply Horsham's water supply. The measurement points for target flows are at Dad and Dave Weir for reach 2 and Mackenzie Creek Reserve gauging station for reach 3. Water flowing through reach 3 of the MacKenzie will provide benefit to the Wimmera River below Horsham.

Figure 14B.1 The Wimmera system

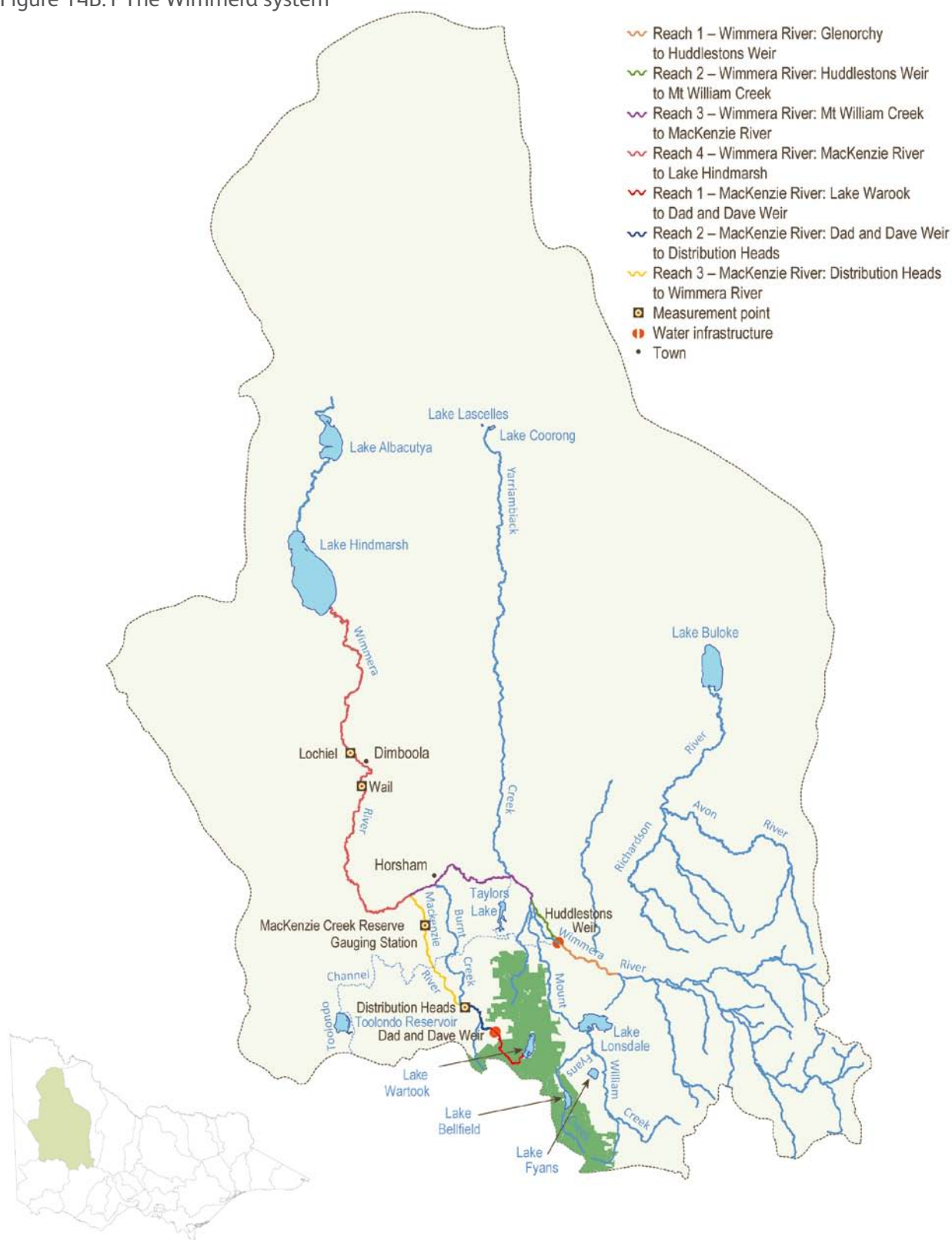


Table 14B.1 Water Holdings available for use in the Wimmera system

Entitlement	Description
Wimmera and Glenelg Rivers Environmental Entitlement 2010	<ul style="list-style-type: none"> • 40,560 ML of regulated entitlement with the allocations based on inflow into storage • Fixed passing flows in Fyans Creek • Passing flows with some ability to vary rates in the Wimmera River and Mount William Creek

Current situation

In the 2010–11 water year, there was a drastic shift from the drought conditions that dominated the region since 1997 to large-scale flooding across the whole system. Three flood events, of varying magnitude, in September and December 2010 and January 2011 met the environmental flow objectives not able to be met by regulated releases due to capacity constraints. The most recent flood resulted in significant overbank flooding and large inflows into Lake Hindmarsh, which was completely empty six months earlier.

While the start of the 2010–11 water year was focused on providing drought refuge, after the floods the focus shifted to maintaining baseflows in the Wimmera and MacKenzie rivers. The majority of planned priority flow components were provided or occurred naturally, including winter/spring (baseflows occurred after August), spring freshes (freshes occurred in late spring early summer), summer baseflows and summer freshes. In addition, bankfull flows occurred through spring and summer.

Based on existing knowledge, the seasonal outlook for 2011–12 is positive, with an average scenario likely. It is likely that allocations in 2011–12 and water carried over from last year will provide sufficient water for all priority planned flow components in the MacKenzie and Wimmera rivers.

Priority watering actions

Table 14B.2 outlines the priority objectives and watering actions under a range of planning scenarios, with estimated volumes required to meet ecological objectives. The priority watering actions are:

- MacKenzie River summer baseflows (2 ML per day from December to February, with a maximum of five cease to flow events of seven days each)
- MacKenzie River summer freshes (five freshes of 5 ML per day for seven days each between December and February)
- Wimmera River summer baseflows (5 ML per day from December to February, with a cease to flow event of 5–25 days)
- Wimmera River summer freshes (four freshes of 20 ML per day for 7–15 days each between December and February)
- MacKenzie River winter baseflows (37 ML per day from June to August)
- MacKenzie River spring baseflows (37 ML per day from September to November)
- Wimmera River winter baseflows (37 ML per day from June to August)
- Wimmera River spring baseflows (37 ML per day from September to December)
- MacKenzie River spring freshes (three freshes of 100 ML per day for seven days each between September and November)
- Wimmera River spring freshes (up to five freshes of 334 ML per day for at least 16 days each between September and November).

The priority environmental watering actions in the MacKenzie and Wimmera rivers are based on the baseflows and freshes that can be feasibly released, with the magnitude of freshes constrained by storage and outlet capacity.

Adaptive management considerations

The Wimmera-Glenelg is a highly regulated system, with the ability to move water to various locations. The ability of the waterway manager to access water from its preferred storages and at desired rates will be dependent on inflows into the six river/creek sources, storage levels and other water deliveries. This will be continuously assessed during the year by the Wimmera Catchment Management Authority and Grampians-Wimmera-Mallee Water. Opportunities will be sought where possible to provide volumes to other regulated waterways such as Mount William Creek and Burnt Creek in the delivery of water to priority reaches of the Wimmera River.

Summer flow components have been identified as the highest priority in the MacKenzie and Wimmera rivers, with the MacKenzie the highest priority to receive environmental water. Volumes for the summer flow components in both systems will be reserved before winter/spring flows are released from August 2011 and again in June 2012, with the MacKenzie the highest priority to receive these components, followed by the Wimmera if there is sufficient water. The carryover volume and predicted allocations means that there will likely be sufficient water to meet the priority planned flow components.

In general, considerations in adaptive management include balancing the immediate need for environmental water versus future, potentially drier, years. In making this decision, it is necessary to think about the 15 per cent deduction that is associated with carryover in the Wimmera system and the risk of losing carryover altogether if storages spill.

Wimmera Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

The Wimmera Catchment Management Authority and Glenelg-Hopkins Catchment Management Authority will work together to provide the priority watering actions in both the Wimmera and Glenelg systems, considering water availability and system constraints. They will communicate regularly to ensure sufficient water in the Water Holdings before ordering. In the unlikely event there is insufficient water to meet priority watering actions in both the Wimmera and Glenelg systems, prioritisation will be agreed by both CMAs and based on the effectiveness of flows in minimising risks to key ecological assets. If shortfalls are identified, the CMAs will work together to allocate the remaining water to the priority flow components across systems, involving the VEWH in final decision making as necessary.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. A seasonal watering statement will be issued to communicate decisions on the environmental watering actions that are to be undertaken and to authorise Wimmera Catchment Management Authority to implement those decisions. A transitional watering statement was released on 1 July 2011 to authorise the continuation of watering actions that were approved in 2010–11 by the previous entitlement holder, the Minister for Environment and Climate Change. This will be superseded when a new seasonal watering statement is issued.

In the Wimmera system, implementation arrangements are outlined in Schedule 7 of the *Seasonal Watering Plan 2011–12*. In the future, implementation will also be guided by storage management rules due for development by October 2011 and operating arrangements also to be developed.

Risk assessment and management

While unlikely, there is a risk that in an extremely wet year, flooding impacts could be marginally exacerbated. In order to manage this risk, the Wimmera Catchment Management Authority will monitor releases and upstream flows and if there is a risk, immediately order releases to cease. An additional risk is that the delivery of environmental water will turn over saline pools and mix salt-stratified water, with the resulting high salinity and low dissolved oxygen levels causing death of instream biota. All releases will be monitored to assess stratification, with the highest risk in summer when the stratification is most strongly defined. In the event of mixing, flows will be reduced to prevent further mixing of saline water.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 7. Of note is an emerging risk related to water quality issues in Taylors Lake in the Wimmera system. In response, Grampians Wimmera Mallee Water has modified its normal operational practice as a mitigation measure. This in turn has the potential to impact on water available from the Water Holdings. The VEWH, together with Wimmera and Glenelg-Hopkins catchment management authorities, will work closely with Grampians Wimmera Mallee Water to manage the water quality issues while minimising the risk to the Water Holdings.

Further information

More detail about the planned watering actions in the Wimmera system can be found by downloading Schedule 7 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.



Wimmera River, Melissa Powell

Table 14B.2 Priority watering actions under a range of planning scenarios in the Wimmera system

	Planning scenario			
	DROUGHT	DRY	AVERAGE	WET
Expected availability of Water Holdings[^]	27,651 ML carryover 29,500 ML allocation	27,651 ML carryover 40,500 ML allocation	27,651 ML carryover 40,500 ML allocation	27,651 ML carryover 40,500 ML allocation
Wimmera River (reaches 2–4)				
Environmental objectives	Maintain pool habitat and water quality for fish populations. Improve fish movement potential. Increase macroinvertebrate populations.	Maintain pool habitat and water quality for fish populations. Improve fish movement potential. Increase macroinvertebrate populations. Carbon/nutrient cycling & bench vegetation.	Maintain pool habitat and water quality for fish populations. Improve fish movement potential. Increase macroinvertebrate populations. Limit saline groundwater impacts on banks.	Maintain pool habitat and water quality for fish populations. Improve fish movement potential. Increase macroinvertebrate populations. Provide cues for native fish for migration and spawning.
Flow components	Year round baseflows. Summer freshes.	Year round baseflows. Summer freshes.	Year round baseflows. Summer freshes. Spring fresh.	Year round baseflows. Summer freshes. Spring fresh.
Possible volume required from the Water Holdings	17,000 ML	17,000 ML	30,000 ML	30,000 ML
Mackenzie River (reaches 2–3)				
Environmental objectives	Habitat for fish (reach 2). Maintain health of Wimmera bottlebrush.	Habitat for fish (reach 2). Maintain health of Wimmera bottlebrush. Promote chances of Wimmera bottlebrush recruitment.	Habitat for fish (all reaches). Maintain health of Wimmera bottlebrush. Promote chances of Wimmera bottlebrush recruitment. Improve potential for fish/platypus movement.	Habitat for fish (all reaches). Maintain health of Wimmera bottlebrush. Promote chances of Wimmera bottlebrush recruitment. Improve fish/platypus movement potential. Inundate emergent aquatic vegetation.
Flow components	Summer baseflows (reach 2). Summer freshes (reach 2). Spring baseflow and freshes (reach 3).	Summer baseflows (reach 2). Summer freshes (reach 2). Spring baseflow and freshes (reach 3).	Summer baseflows (reach 2). Summer freshes (reach 2). Spring baseflow and freshes (reach 3). Winter baseflow.	Summer baseflows (reach 2). Summer freshes (reach 2). Spring baseflow and freshes (reach 3). Winter baseflow.
Possible volume required from the Water Holdings	1,600 ML	2,600 ML	4,500 ML	4,500 ML
Total possible volume required from the Water Holdings[*]	18,600 ML	19,600 ML	34,500 ML	34,500 ML
Possible carryover into 2012/13[#]	33,251 ML	30,076 ML	2,526 ML	2,526 ML

[^] Water Holdings are shared across the Glenelg and Wimmera systems and indicate the total amount for both systems.

^{*} Use figures do not assume unregulated flows are meeting any of the flow demands and are therefore are an upper limit of flow requirement.

[#] The amount of carryover into 2012–13 will be determined not only by water use but the possibility that the storage spills and the use of water from this shared entitlement in the Glenelg system. The carryover volumes account for expected water use in the Glenelg system, and assume the full amount is required from the required Water Holdings and that the storage does not spill.



14C Wimmera-Mallee wetlands

Barbers environmental dam, Mallee Catchment Management Authority

Planned watering actions for the Wimmera-Mallee wetlands will be included in the Seasonal Watering Plan 2011–12 at a later stage. Once planning and infrastructure works to connect further wetlands to the pipeline are completed, the Mallee Catchment Management Authority will prepare a seasonal watering proposal, in consultation with Wimmera and North Central catchment management authorities. This will then be considered by the VEWB and the agreed priority watering actions included in the plan.

Northern Victoria includes the tributaries that flow north into the River Murray. In addition to the Kiewa and Ovens, in which there are no Water Holdings, these systems include the Broken, Goulburn, Campaspe and Loddon (see sub-sections 15A–15D). There are also significant wetlands and floodplains which are supplied by these systems (see sub-section 15E).

Northern Victoria is part of the Murray-Darling Basin, in which water sharing is governed by the *Murray-Darling Basin Agreement*. This agreement guides how much water is allocated to each state (Victoria, New South Wales and South Australia). Each state then has its own entitlement framework for allocating its share of water to water users.

Northern Victoria is renowned for its irrigated agricultural production and has been significantly developed over the past 100 years. The water systems in northern Victoria are highly connected, allowing water to move between systems.

The storage operator in northern Victoria is Goulburn-Murray Water, and for the storages subject to interstate sharing arrangements, the Murray-Darling Basin Authority.

Over the last 10 years, there has been significant investment to return water to the environment. In addition to Victorian projects, water recovery has been undertaken by partners of the Living Murray program and separately by the Commonwealth Government. The VEWL will liaise with these other water holders to coordinate delivery of their water with the Victorian Water Holdings and optimise the benefits for Victorian systems.

The Living Murray program

The Living Murray program began in 2002 as a partnership between the Commonwealth, New South Wales, Victorian, South Australian and Australian Capital Territory governments. The long-term goal of this program is to achieve a healthy working River Murray system for the benefit of all Australians.

In 2004, under the Living Murray 'First Step' decision, ministers from the partner governments committed to recover a long-term average of 500,000 ML of water to improve environmental outcomes at six 'icon sites': the River Murray channel; Barmah-Millewa Forest; Gunbower-Koondrook-Perricoota Forest; Hattah Lakes; Chowilla Floodplain and Lindsay-Wallpolla Islands; and the Lower Lakes, Coorong and Murray Mouth. The Murray-Darling Basin Authority also participated in water recovery in its own right.

The allocation of Living Murray water is overseen by the Murray-Darling Basin Authority. The Authority takes advice from the Environmental Watering Group which includes representatives from each of the partner jurisdictions. Decisions are made in line with the *Living Murray Annual Watering Plan* (http://www.mdba.gov.au/programs/tlm/programs_to_deliver/environmental_delivery). The VEWL is now a member of the Environmental Watering Group, and is responsible for submitting proposals for the use of Living Murray water in Victoria.

Commonwealth Environmental Water Holder

The *Commonwealth Water Act 2007* established the CEWH to manage the Commonwealth's environmental water holdings. The purpose of the Commonwealth Water Holdings is to protect or restore the environmental assets of the Murray-Darling Basin, and of other areas outside the Basin where the Commonwealth holds water, so as to give effect to relevant international agreements.

Water held by the CEWH is required to be managed in accordance with the environmental watering plan in the Basin Plan, currently being developed by the Murray-Darling Basin Authority.

Decisions on watering actions are made by the CEWH in consultation with its scientific advisory committee. The VEWL will submit proposals to the CEWH for the use of CEWH water for Victoria's priority river reaches and wetlands. In some cases, the CEWH may want water delivered via Victorian rivers for priority sites elsewhere in the Murray Darling Basin (for example, in South Australia). The VEWL will coordinate the delivery of this water and authorise waterway managers to undertake it, provided there are no adverse impacts on Victorian rivers and wetlands.

The Snowy River water recovery package

Water recovery has been undertaken in the Goulburn, Loddon and Murray systems to return water, via substitution, to the Snowy system, including in southern Victoria (see sub-section 13A for a full explanation).



15A Goulburn system

Goulburn River at Shepparton, Keith Ward, Goulburn Broken Catchment Management Authority

Waterway manager – Goulburn Broken Catchment Management Authority

The Goulburn river basin is Victoria's largest, covering over 1.6 million hectares or 7.1 per cent of the state's total area. The Goulburn River is an iconic heritage river due to its high environmental values. It supports areas of intact river red gum forest, and provides habitat for threatened and endangered species such as the barking marsh frog, Murray cod and Macquarie perch. It also contains many important cultural heritage sites, as well as providing water for agriculture and supporting recreational activities such as fishing and canoeing.

Planned environmental water use in 2011–12

The priority environmental objectives in the Goulburn system in 2011–12 are maximising fish habitat; improving and expanding macroinvertebrate habitat; carbon/nutrient cycling and bench vegetation; and stimulating golden perch breeding.

The priority reaches for environmental watering are reaches 4 and 5, from Goulburn Weir to the River Murray, as they have the largest water demands. Reaches 1 to 3, between Lake Eildon and Goulburn Weir, benefit from the flows being passed to the lower reaches or are not adversely impacted by them.

Environmental watering will focus, in priority order, on winter/spring baseflows; a spring fresh; and autumn/winter baseflows. If additional water is available or catchment runoff conditions are average to wet, environmental watering will also focus on increased winter/spring baseflows; a winter fresh; summer baseflows; and summer freshes.

With full use of all available Water Holdings, it is likely that the first-tier priority components can be provided under drier climatic conditions and second-tier priority flow components could be provided under average to wet climatic conditions.



System overview

The environmental flow reaches are shown in Figure 15A.1. Water Holdings in the Goulburn system are released from Lake Eildon into reach 1 or Goulburn Weir into reach 4.

The priority river reaches are reaches 4 and 5, from Goulburn Weir to the River Murray, with reaches 1, 2 and 3, between Lake Eildon and Goulburn Weir, benefiting from the flows being passed to the lower reaches or being unaffected by them. The measurement points for target flows are at Murchison for reach 4 and McCoys Bridge for reach 5.

In addition to the Water Holdings, passing flows are provided under Goulburn-Murray Water's bulk entitlements and consumptive water is delivered down the Goulburn en route to the River Murray. These can provide significant environmental benefits if delivered during the right time of year. High flows in summer can have a detrimental effect on the system and need to be managed where possible; the larger and longer the flow, the more potential for ecological damage. Goulburn Broken Catchment Management Authority will work with Goulburn-Murray Water to maximise the environmental outcomes of consumptive water delivery while preventing ecological damage where possible.

Figure 15A.1 The Goulburn system

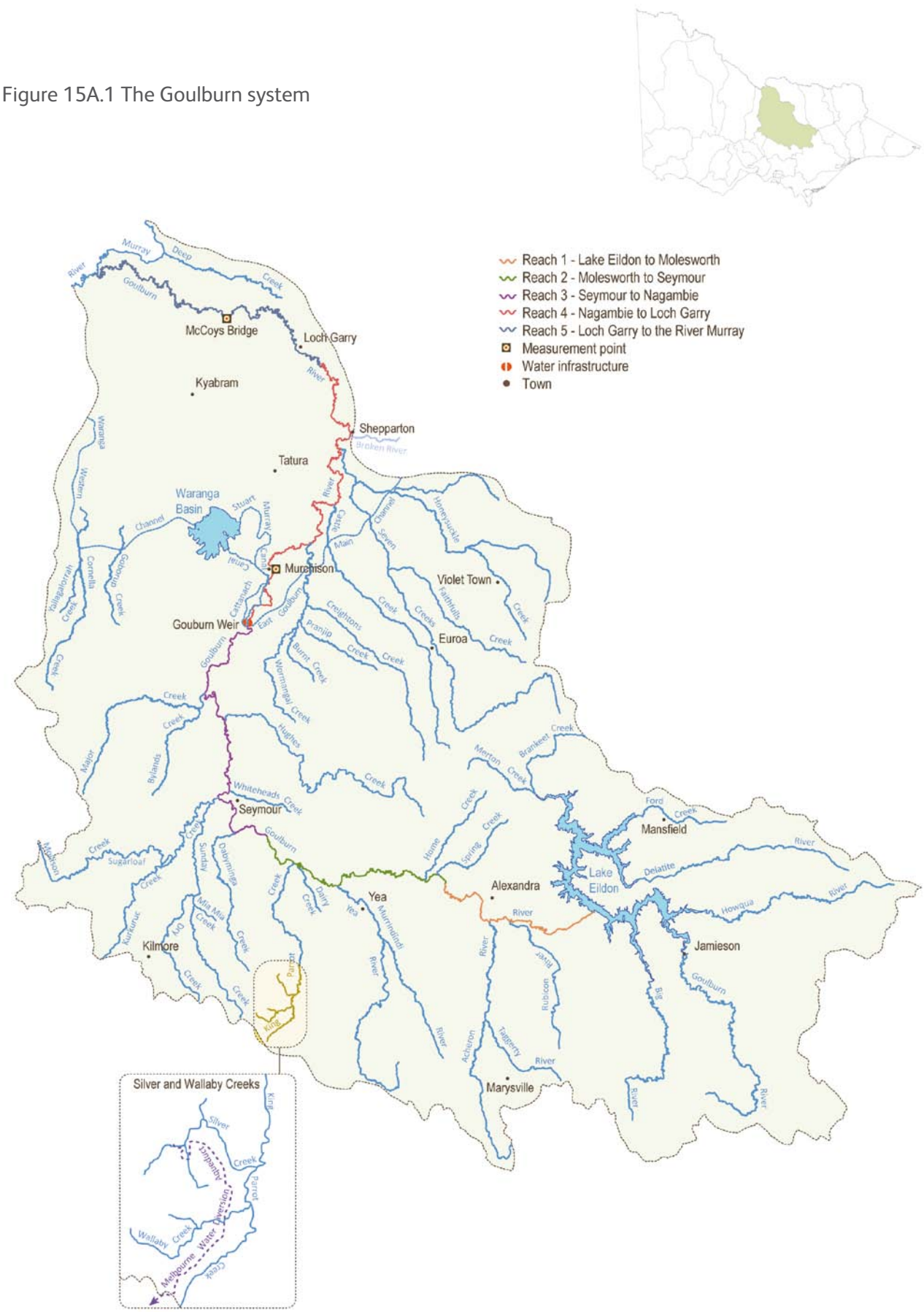


Table 15A.1 Water Holdings available for use in the Goulburn system

Entitlement	Description
Victorian Water Holdings	
Victorian River Murray Flora and Fauna Entitlement	27,600 ML high reliability entitlement
Goulburn Environmental Water Savings Supply Deed	One-third of water savings created in the Goulburn system as a result of modernisation works completed as part of Stage 1 of the Northern Victoria Irrigation Renewal Project Mitigation water reserve (water which was deemed required to mitigate against impacts of reduced outfalls into environmental sites resulting from modernisation)
Shepparton Modernisation Project ¹	1,500 high-reliability entitlement 7,600 ML low-reliability entitlement
Environmental Entitlement (Goulburn System – Living Murray) 2007 ²	49,625 ML high reliability entitlement 156,980 ML low reliability entitlement
Silver and Wallaby Creeks Environmental Entitlement 2006 ³	Passing flows
Other Water Holdings	
Commonwealth Environmental Water Holdings ⁴	100,455 ML Goulburn high-reliability water share 10,527 ML Goulburn low-reliability water share

¹ Entitlement does not yet exist, but is expected to be finalised in 2011–12.

² Water allocated to this entitlement must be used for the Living Murray 'icon sites'. However, this water is released down and can provide environmental benefits in the Goulburn River en route to the River Murray.

³ Entitlement provides passing flows only and not a volume in storage, therefore no management action is necessary.

⁴ Decisions about the use of Commonwealth Water Holdings are the responsibility of the CEWH. The VEWH will submit proposals for the use of CEWH water for Victoria's priority rivers and wetlands.

Current situation

Leading into 2011–12, there were several years of drought with low river flows, particularly in the Goulburn River between Goulburn Weir and the River Murray. This was followed by extremely wet conditions in 2010–11 where all environmental flow objectives were met naturally. With the prolonged drought causing river health degradation, the wet 2010–11 has started the ecological recovery of the Goulburn River. It is important to continue this recovery in the 2011–12 water year. With significant volumes of environmental and operational water available, good environmental improvement should be possible.

Priority watering actions

Table 15A.2 outlines the priority objectives and watering actions and how these vary for different planning scenarios. The priority watering actions are for the following flows at Murchison or McCoys Bridge:

- winter/spring baseflows (540 ML per day at Murchison between July and November)
- a spring fresh (5,600 ML per day at Murchison for 14 days between October and November)
- autumn/winter baseflows (540 ML per day at Murchison between April and June).

If additional water is available, environmental watering will also focus on these second tier priorities:

- higher winter/spring baseflows (830 ML per day at Murchison between July and December)
- a winter fresh (5,600 ML per day at Murchison for 14 days between June and August).
- summer baseflows (940 ML per day at McCoys Bridge between December and May)
- summer freshes (5,600 ML per day at McCoys Bridge for two days between December and April)

While bankfull and overbank flows are recommended in the scientific flow study, they are not priority flow components at this stage, due to the risk of flooding private land.

The VEWH will also coordinate the delivery of CEWH water and authorise waterway managers to implement CEWH priority watering actions, provided there are no adverse impacts on Victorian rivers and wetlands.

Table 15A.2 Priority watering actions under a range of planning scenarios in the Goulburn system

	Planning scenario					
	WORST DROUGHT	VERY DRY	DRY	AVERAGE	WET	VERY WET
Expected availability of Water Holdings[#]	1,000 ML Victorian Water Holdings 88,500 Living Murray Water Holdings 88,000 ML Commonwealth Environmental Water Holdings	1,500 ML Victorian Water Holdings 97,500 ML Living Murray 117,000 ML Commonwealth Environmental Water Holdings	1,500 ML Victorian Water Holdings 112,500 ML Living Murray 160,000 ML Commonwealth Environmental Water Holdings	3,000 ML Victorian Water Holdings 112,500 ML Living Murray Water Holdings 150,000 ML Commonwealth Environmental Water Holdings	9,100 ML Victorian Water Holdings 112,500 ML Living Murray Water Holdings 130,000 ML Commonwealth Environmental Water Holdings	9,100 ML Victorian Water Holdings 197,000 ML Living Murray Water Holdings 130,000 ML Commonwealth Environmental Water Holdings
Environmental objectives	Maintain pool depth and maximise fish habitat. Improve and expand macroinvertebrate habitat. Bench inundation for carbon/nutrient cycling and vegetation. Stimulate golden perch breeding.	Maintain pool depth and maximise fish habitat. Improve and expand macroinvertebrate habitat. Bench inundation for carbon/nutrient cycling and vegetation. Stimulate golden perch breeding.	Maintain pool depth and maximise fish habitat. Improve and expand macroinvertebrate habitat. Bench inundation for carbon/nutrient cycling and vegetation. Stimulate golden perch breeding.	Maintain pool depth and maximise fish habitat. Improve and expand macroinvertebrate habitat. Bench inundation for carbon/nutrient cycling and vegetation.	Maintain pool depth and maximise fish habitat. Improve and expand macroinvertebrate habitat. Bench inundation for carbon/nutrient cycling and vegetation.	Maintain pool depth and maximise fish habitat. Improve and expand macroinvertebrate habitat. Bench inundation for carbon/nutrient cycling and vegetation.
Flow components	Winter/spring baseflows. Spring fresh. Autumn/winter baseflows.	Winter/spring baseflows. Spring fresh. Extend duration of natural freshes. Autumn/winter baseflows.	Winter/spring baseflows. Spring fresh. Extend duration of natural freshes. Autumn/winter baseflows.	Winter/spring baseflows. Summer fresh. Autumn/winter baseflows.	Winter/spring baseflows. Summer baseflows. Summer fresh. Autumn/winter baseflows.	Winter/spring baseflows. Summer baseflows. Summer fresh. Autumn/winter baseflows.
Possible volume required from the Water Holdings[*]	113,000 ML (plus additional 97,000 ML if available)	151,000 ML (plus additional 63,000 ML if available)	210,000 ML (plus additional 34,000 ML if available)	137,000 ML (no additional water required)	155,000 ML (no additional water required)	172,000 ML (no additional water required)
Possible carryover into 2012–13	0 ML	9,500 ML	38,500 ML	135,500 ML	97,500 ML	172,000 ML

[#] This is an estimate of the water which is available from the Goulburn system and does not include water which can be traded into the Goulburn from other systems. In addition, these volumes can be traded out of the Goulburn for use in other systems. Estimates assume some spills from spillable water accounts. Figures available from the Commonwealth Environmental Water Holdings assume an estimate of carryover only and depend upon decisions by the CEWH.

^{*} Outlines the range of water required from the Water Holdings, dependent on the amount of natural flows that occur. The additional volumes indicated in brackets are those that would enable delivery of flow components that are lower priority but which would still provide significant environmental benefit.

Adaptive management considerations

Decisions about the watering actions that will take place in the Goulburn system are largely dependent on the amount of water assigned by the CEWH, and the ability to release Living Murray water at times beneficial to the Goulburn River. Table 15A.2 outlines the plan for full use of the entitlements in Table 15A.1, including all allocations made in 2011–12 and an estimate of carryover from 2010–11.

Under the drier scenarios, environmental watering focuses on winter/spring flow objectives, while the delivery of consumptive water meets summer/autumn flow objectives. Even if there were less consumptive water available than assumed here, the priority for environmental watering would still be on winter/spring flows. Under the wetter scenarios, environmental watering focuses on summer/autumn objectives because less consumptive water is likely to be delivered and natural flows would be meeting winter/spring objectives.

Climatic conditions are not certain at this stage. Depending on water availability and decisions of the CEWH, the following prioritisation would apply in the Goulburn system.

Winter baseflows of 540 ML per day would be provided from July to November 2011. Additional water would first be saved to provide the spring fresh of 4,600–5,600 ML per day between October and November 2011, then the winter baseflows beginning April 2012 to June 2012. Continuation of these flows into July/August 2012 would require water to be carried over into next water year.

Following this, winter baseflows in 2011 would be increased to 830 ML per day. In October 2011, the decision to release water for the spring fresh would depend on water temperatures and whether it was being provided naturally or whether there was sufficient water in the Water Holdings to provide it. If so, a decision must be made on whether to release it in October or November (or even December). Goulburn Broken Catchment Management Authority would seek to provide the flow with maximum environmental benefit while using the Water Holdings as efficiently as possible.

Depending on the climatic conditions, Goulburn Broken Catchment Management Authority would start working with Goulburn-Murray Water between October and December 2011 to plan for the delivery of consumptive water. If there was limited consumptive water being delivered and available water from the Water Holdings, summer baseflows of 940 ML per day would be provided from December 2011 to March 2012, with a fresh of 5,600 ML per day at some stage in that period. Releases for autumn/winter baseflows of 540–830 ML per day would begin in March or April 2012.

Goulburn Broken Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. As conditions unfold and water becomes available throughout the year, seasonal watering statements will be issued to communicate decisions on the environmental watering actions that are to be undertaken. The seasonal watering statements authorise Goulburn Broken Catchment Management Authority to implement those decisions.

Implementation arrangements for the Goulburn system are outlined in Schedule 9. In the future, implementation will also be guided by operating arrangements due for development by June 2012.

Risk assessment and management

Risks associated with the implementation of these watering actions include flooding of private land and personal injury to river users. However, these risks are assessed as low, given the planned flows are well below bankfull level. Public advice of watering events will be undertaken by the Goulburn Broken Catchment Management Authority where required. An increased abundance of carp resulting from the improved habitat availability provided for native fish is possible. There is currently no strategy available to manage this risk. If natural overbank flows occur, there is a risk of a blackwater event; water may be released to mitigate the effect of the blackwater.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 9.

Further information

More detail about the planned watering activities in the Goulburn system can be found by downloading Schedule 9 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.



15B Broken system (lower Broken Creek)

Broken Creek downstream of outfall at Katamatite, Keith Ward, Goulburn-Broken Catchment Management Authority

Waterway manager – Goulburn Broken Catchment Management Authority

The Broken Creek, in northern Victoria, flows from the Broken River north into the River Murray, just downstream of Barmah Forest. It supports threatened plant and animal species, including up to six native fish species of state and national conservation significance, and icon species such as the Murray cod. The Broken Creek also supports riparian vegetation, especially in the lower reaches, which provides important habitat for threatened waterbirds, such as the brolga and bush-stone curlew.

Planned environmental water use in 2011–12

The priority environmental objectives in the lower Broken Creek for 2011–12 are providing native fish passage; providing suitable water quality conditions for native fish; and providing fish habitat during migration and breeding seasons.

While all reaches are important, environmental watering is targeted to reach 3 (from Nathalia Weir Pool to the River Murray), with flows providing benefits to reaches 1 and 2 on the way. Environmental watering will focus, in priority order, on year-round low flows; winter/spring medium flows; summer/autumn medium flows; summer/autumn high flows; winter/spring flushes; and winter/spring high flows.

The outlook for 2011–12 does not greatly influence the flow requirements for the creek as it is such a highly regulated system. Of greater importance is the ability to get the required flows through the irrigation channel system to the creek. The ability to use consumptive water en route will determine the amount of environmental water required to provide priority flow components.



System overview

The Broken Creek flows from the Broken River at Casey's Weir north-west to the River Murray. Water can be released from the Goulburn system through the East Goulburn Main Channel and from the Murray system through the Yarrawonga Main Channel. Water from the Goulburn and Murray can only be delivered to the lower Broken Creek and not the upper reaches.

The environmental flow reaches in the lower Broken Creek are shown in Figure 15B.1. While all reaches are important, environmental watering is targeted to reach 3 (from Nathalia Weir Pool to the River Murray), with flows providing benefits to reaches 1 and 2 on the way. The measurement point for target flows for reach 3 is at Rices Weir. The upper Broken Creek from

Waggarandall Weir to Katamatite is now largely unregulated and ephemeral in nature.

In addition to the Water Holdings, consumptive water can be diverted through the channel system en route to irrigators to provide flows in the lower Broken Creek in spring, summer and autumn. Goulburn-Murray Water's bulk entitlement also includes 30,000 ML that can be released if required to mitigate water quality issues. Goulburn Broken Catchment Management Authority will work with Goulburn-Murray Water and the Murray-Darling Basin Authority to maximise the environmental outcomes of consumptive water delivery, and the water quality reserve if required.

Figure 15B.1 The Broken Creek system



Table 15B.1 Water Holdings available for use in the Broken system (lower Broken Creek)

Entitlement	Description
Victorian Water Holdings	
Bulk Entitlements (River Murray Flora & Fauna) Conversion Order 1999	27,600 ML high reliability entitlement
Goulburn Environmental Water Savings Supply Deed	One third of water savings created as a result of modernisation works completed as part of stage 1 of the Northern Victoria Irrigation Renewal Project Mitigation water reserve (water which was deemed required to mitigate against impacts of reduced outfalls into environmental sites resulting from modernisation)
Other Water Holdings	
Commonwealth Environmental Water Holdings [#]	100,455 ML Goulburn high-reliability water share
	10,527 ML Goulburn low-reliability water share
	140,076 ML Murray high-reliability water share
	11,125 ML Murray low-reliability water share
	47 ML Broken high-reliability water share* 4 ML Broken low-reliability water share*
<p>* Water is held in Lake Nillahcootie on the Broken River. As part of the upper Broken Creek is unregulated, the losses to provide this water would be too great to effectively use these Water Holdings in the lower Broken Creek. The Goulburn Broken Catchment Management Authority and the VEWH will work with the CEWH on delivery of these water shares in the Broken River.</p> <p>[#] Decisions about the use of Commonwealth Water Holdings are the responsibility of the CEWH. The VEWH will submit proposals for the use of CEWH water for Victoria's priority rivers and wetlands.</p>	

Current situation

The 2010–11 water year resulted in extensive flood flows after several years of drought. Most of the lower Broken Creek's environmental water needs were met naturally; however, these natural flows resulted in an extensive blackwater event during November to February, with very low dissolved oxygen levels and some fish deaths. Environmental water was released to manage these impacts.

The focus in 2011–12 is to continue to provide flow components that maximise the native fish populations in the lower Broken Creek. The outlook for 2011–12 does not greatly influence the flow requirements for the creek as it is such a highly regulated system. Of greater importance is the ability to get the required flows through the irrigation channel system to the creek. This limitation creates a high risk of fish deaths in the lower Broken Creek. The ability to use consumptive water en route will determine the amount of environmental water required to provide priority flow components.

Priority watering actions

Table 15B.2 outlines the priority objectives and watering actions and how these vary for different planning scenarios. The priority watering actions are for the following flows at Rice's Weir:

- year-round low flow (40 ML per day from August to May)
- winter/spring medium flow (120 ML per day from August to November)
- summer/autumn medium flow (150 ML per day from December to May)

- summer/autumn high flow (250 ML per day for 30–60 days between December and mid March)
- winter/spring flush (two flushes of 250 ML per day for 14 days between August and November)
- winter/spring high flow (250 ML per day from September to December).

The VEWH will also coordinate the delivery of CEWH water and authorise waterway managers to implement CEWH priority watering actions, provided there are no adverse impacts on Victorian rivers and wetlands.

Adaptive management considerations

Decisions about the watering actions that will take place in the lower Broken Creek largely depend on the ability to use consumptive water en route. The key issue for water delivery is the likely difficulty in gaining access to enough channel capacity to provide the required flow rates at different times of the year. This means that Water Holdings in both the both Goulburn and Murray, which are delivered via different channels, may be required.

When irrigation demand increases significantly in spring, it is more difficult to access the channel system to deliver water to the creek. Before this occurs, a flush should be provided to reduce azolla build up in the creek.

Goulburn Broken Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. As conditions unfold and water becomes available throughout the year, seasonal watering statements will be issued to communicate decisions on the environmental watering activities that are to be undertaken. The seasonal watering statements will authorise Goulburn Broken Catchment Management Authority to implement those decisions.

Implementation arrangements for the lower Broken Creek are outlined in Schedule 10 of the *Seasonal Watering Plan 2011–12*. In the future, implementation will also be guided by operating arrangements due for development by June 2012.

Risk assessment and management

Risks associated with implementation of these watering actions include flooding of private land and personal injury to river users. However, these risks are assessed as low, given the planned flows are well below bankfull level. An increased abundance of carp is possible, due to the improved habitat availability provided for native fish. There is currently no strategy available to manage this risk. A blackwater event is not likely to occur from these watering actions but releases are a good tool to mitigate their effect if they occur from upstream catchment runoff.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. In particular, there is a high risk associated with the inability to manage water quality in the creek due to restrictions on delivery of water through the channel systems, which has the potential to result in fish deaths. Details on these risks can be found in Schedule 10.

Further information

More detail about the planned watering actions in the lower Broken Creek can be found by downloading Schedule 10 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

Table 15B.2 Priority watering actions under a range of planning scenarios in the Broken system

	Planning scenario		
	VERY DRY	AVERAGE	WET
Expected availability of Water Holdings	34,000 ML Victorian Water Holdings 207,000 ML Commonwealth Environmental Water Holdings (in Goulburn and Murray)	34,000 ML Victorian Water Holdings 207,000 ML Commonwealth Environmental Water Holdings (in Goulburn and Murray)	34,000 ML Victorian Water Holdings 207,000 ML Commonwealth Environmental Water Holdings (in Goulburn and Murray)
Environmental objectives	Provide native fish passage. Provide suitable water quality conditions for native fish. Provide fish habitat during migration and breeding seasons.	Provide native fish passage. Provide suitable water quality conditions for native fish. Provide fish habitat during migration and breeding seasons.	Provide native fish passage. Provide suitable water quality conditions for native fish. Provide fish habitat during migration and breeding seasons.
Flow components	Year-round low flow. [^] Winter/spring medium flow. Summer/autumn medium flow. Summer/autumn high flow. Winter/spring flush. Winter/spring high flow.	Year-round low flow. [^] Winter/spring medium flow. Summer/autumn medium flow. Summer/autumn high flow. Winter/spring flush. Winter/spring high flow.	Year-round low flow. [^] Winter/spring medium flow. Summer/autumn medium flow. Summer/autumn high flow. Winter/spring flush. Winter/spring high flow.
Possible volume required from the Water Holdings*	0–12,000 ML	0–17,000 ML	0–21,000 ML
Possible carryover into 2012–13	N/A	N/A	N/A

* Assumes reasonable access to consumptive water en route from the Goulburn and Murray systems, with more consumptive water being delivered in the drier scenarios.

[#] Decisions to carry over will be driven by the environmental water demands of other VEW and CEWH priorities, rather than the needs of the Broken system in 2012–13. It is likely that water requirements for the lower Broken Creek in 2012–13 will be similar to 2011–12 requirements.

[^] While the preference is to provide this flow component all year round, the channel system closes for repairs and limits the ability to provide these flows in winter.



15C Campaspe system

Campaspe River, North Central Catchment Management Authority

Waterway manager – North Central Catchment Management Authority

The Campaspe system, which flows to its confluence with the River Murray at Echuca, lies in north-central Victoria. The Campaspe River provides irrigation water to an agriculturally diverse catchment, including dryland, dairy and intensive horticultural farming. The Campaspe River has high environmental values because of its connection to the River Murray, its banks of river red gums and its relatively healthy native fish populations, including Murray cod, golden and silver perch. It also supports a range of significant bird species, such as the near-threatened brown treecreeper.

Planned environmental water use in 2011–12

The priority environmental objectives in the Campaspe system for 2011–12 are maintaining pool habitat and water quality for fish populations; improving the potential for fish movement; maintaining macroinvertebrate populations; reducing encroachment of terrestrial vegetation instream; and enhancing river red gum recruitment.

While all river reaches are a priority, environmental watering is targeted at reaches 2 and 4. Reach 3 will also benefit from environmental water releases if these are made from Lake Eppalock rather than the Campaspe Siphon.

Environmental watering will focus, in priority order, on winter low flows and winter high flows in reach 2; summer low flows and summer freshes in reach 4; and then winter low flows and winter high flows in reach 4.

Based on existing knowledge, the seasonal outlook for 2011–12 is positive; allocations on 1 July 2011 in the Campaspe system were 100 per cent for high reliability entitlements and 47 per cent for low reliability entitlements. It is possible to provide all the priority flow components; however, this is dependent on access to water from the Commonwealth Environmental Water Holder and the Living Murray.



System overview

Water Holdings in the Campaspe system can be delivered from two locations: Lake Eppalock and the Campaspe Siphon. Releases from Lake Eppalock flow through reaches 2 to 4 en route to the River Murray. Releases can be made from the Goulburn system through the Western Waranga Channel to the Campaspe Siphon and into reach 4.

The environmental flow reaches are shown in Figure 15C.1. While all river reaches are important, environmental watering is targeted at reach 2 (Lake Eppalock to the Campaspe Weir) and reach 4 (Campaspe Siphon to the River Murray confluence). It is at the top of these reaches that there is an ability to provide releases to meet downstream needs. The measurement points for target flows are

at Barnadown in reach 2 and Echuca in reach 4. Reach 3 will also benefit from environmental water releases if these are made from Lake Eppalock rather than the Campaspe Siphon.

In addition to the Water Holdings, passing flows are provided under Goulburn-Murray Water's bulk entitlement and consumptive water is delivered down the Campaspe to meet consumptive users' needs (reaches 1 to 3). There are also opportunities to provide environmental benefit from consumptive water from the Goulburn through the lower Campaspe (reach 4) en route to meeting irrigation needs in the River Murray. This requires agreement with Goulburn Murray Water and the Murray-Darling Basin Authority.

Figure 15C.1 The Campaspe system



Table 15C.1 Water Holdings available for use in the Campaspe system

Entitlement	Description
Victorian Water Holdings	
Environment Entitlement (Campaspe River – Living Murray Initiative) 2007*	126 ML high-reliability entitlement 5,048 ML low-reliability entitlement
Bulk Entitlement (River Murray Flora and Fauna) 1999 [#]	27,600 ML high-reliability entitlement
Other Water Holdings	
Commonwealth Environmental Water Holdings [^]	5,783 ML Campaspe high-reliability water share 395 ML Campaspe low-reliability water share Potential to transfer Water Holdings from other systems in the southern connected Murray-Darling Basin dependent of trade restrictions

* Water allocated to this entitlement must be used for Living Murray 'icon sites'. However, this water must be released from the Campaspe system, environmental benefits to the Campaspe River en route.

[#] Sourced from the Murray system but can be transferred for use in the Campaspe system.

[^] Decisions about the use of Commonwealth Water Holdings are the responsibility of the CEWH. The VEWH will submit proposals for the use of CEWH water for Victoria's priority rivers and wetlands.

Current situation

Following an extended drought, the Campaspe system received well above average rainfall in the 2010–11 water year, and milder than average temperatures. This resulted in substantial river flows and volumes in storage.

Summer baseflows and freshes and winter bankfull and overbank flows occurred in reach 2. Because high flows did not start until spring, not all the winter high flows were met; in addition, the wet summer meant that no 'cease to flow' occurred. In reach 4, summer freshes and winter low flows, high flows and bankfull flows occurred. Summer flows were higher than the required summer baseflow, therefore this flow component is not considered to have been provided. The system is starting to recover with improved water quality; however, long-term ecological benefits will take a few years to be observed. Winter baseflows have been provided since June 2011 to aid in the system's recovery.

Priority watering actions

Table 15C.2 outlines the priority objectives and watering actions under a range of planning scenarios, with estimated volumes required to meet ecological objectives. The priority watering actions are:

- winter low flows in reach 2 (100-125 ML per day or natural flows from June to November)
- winter high flows in reach 2 (four events of 1,000-1,200 ML per day for four days each between June and November)
- summer low flows in reach 4 (10-20 ML per day from December to May)
- summer freshes in reach 4 (three freshes of 100 ML per day for six days between February and May)
- winter low flows in reach 4 (200 ML per day or natural flows from June to November)
- winter high flows in reach 4 (two events of 1,500 ML per day for four days between June to November).

The VEWH will also coordinate the delivery of CEWH water and authorise waterway managers to implement CEWH priority watering actions, provided there are no adverse impacts on Victorian rivers and wetlands.

Adaptive management considerations

Water for priority winter watering actions will need to be released out of Lake Eppalock, because they are aimed at reach 2 which cannot receive water from the Campaspe Siphon. It is also preferable that water for priority summer watering actions be released from Lake Eppalock rather than the Campaspe Siphon, because this will provide benefit in all reaches, rather than just reach 4. The ability to release water from Lake Eppalock is dependent on system operations and other water demands. North Central Catchment Management Authority will work with Goulburn-Murray Water to maximise the environmental benefits in delivering the Water Holdings.

Winter low flows have been identified as the highest priority in the Campaspe and are focused on reach 2. If the catchment receives good rainfall, the majority of these low flows will be met by natural runoff and the priority moves to providing winter high flows in reach 2. These winter high flows will provide benefit to downstream reaches after they pass through reach 2. If additional water is available, summer low flows and summer freshes are to be provided to reach 4. If additional water is available, the priority shifts to providing winter low flows and winter high flows in reach 4.

Releases can be made from the Goulburn system through the Western Waranga Channel into the Campaspe Siphon, watering reach 4. Where these arrangements occur, any associated losses will be deducted from the environmental water account.

There are Water Holdings in the Campaspe system held in trust for the Living Murray. Any water carried over under these entitlements must be used by 1 January 2011. This water must be delivered down the Campaspe but the timing of delivery is dependent on the needs of the Living Murray icon sites. The VEWH will liaise with the Murray-Darling Basin Authority to maximise the environmental benefits of this water delivery.

North Central Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. As conditions unfold and water becomes available throughout the year, seasonal watering statements will be issued to communicate decisions on the environmental watering actions that are to be undertaken. The seasonal watering statements authorise North Central Management Authority to implement those decisions. A transitional watering statement was released on 1 July 2011 to authorise the continued delivery of CEWH water approved in 2010–11 by the previous entitlement holder, the Minister for Environment and Climate Change. This may be complemented by or superseded by new seasonal watering statements when they are issued.

In the Campaspe system, implementation arrangements are outlined in Schedule 11 of the *Seasonal Watering Plan 2011–12*. In the future, implementation will also be guided by operating arrangements due for development by June 2012.

Risk assessment and management

Risks associated with the implementation of these watering actions include flooding of private land; however, this risk is considered low as the high winter flows targeted are well within channel capacity right along the system. In the event of a natural flood, environmental water will not be required to provide priority flow components and environmental water releases will be ceased.

Blackwater events are naturally occurring in the Campaspe system. There is a lower risk of this occurring in 2011–12 due to the 2011 summer floods which flushed organic material through the system. As winter low flows and freshes are the priority in the system, they will flush any further organics before the higher-risk period of summer. Monitoring of releases will be undertaken and summer freshes will only be initiated if there is sufficient water for a follow up fresh to mitigate any blackwater issues.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedule 11.

Further information

More detail about the planned watering actions in the Campaspe system can be found by downloading Schedule 11 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

Table 15C.2 Priority watering actions under a range of planning scenarios in the Campaspe system

	Planning scenario		
	DROUGHT	DRY	AVERAGE/WET
Expected availability of Water Holdings*	21,200 ML	15,600 ML	10,600 ML
Environmental objectives	Maintain pool habitat and water quality for fish populations. Improve potential for fish movement. Maintain macroinvertebrate populations. Reduce encroachment of terrestrial vegetation instream. Enhance river red gum recruitment.	Maintain pool habitat and water quality for fish populations. Improve potential for fish movement. Maintain macroinvertebrate populations. Reduce encroachment of terrestrial vegetation instream. Enhance river red gum recruitment.	Maintain pool habitat and water quality for fish populations. Improve potential for fish movement. Maintain macroinvertebrate populations. Reduce encroachment of terrestrial vegetation instream. Enhance river red gum recruitment.
Flow components	Winter low flows (reach 2). Winter high flows (reach 2). Summer low flows (reach 4). Summer freshes (reach 4). Winter low flows (reach 4). Winter high flows (reach 4).	Winter low flows (reach 2). Winter high flows (reach 2). Summer low flows (reach 4). Summer freshes (reach 4). Winter low flows (reach 4). Winter high flows (reach 4).	Winter low flows (reach 2). Winter high flows (reach 2). Summer low flows (reach 4). Summer freshes (reach 4). Winter low flows (reach 4). Winter high flows (reach 4).
Possible volume required from the Water Holdings	13,500 ML	7,900 ML	3,000 ML
Possible carryover into 2012/13[#]	N/A	N/A	N/A

* Comprises water held in trust for the Living Murray and the Commonwealth Environmental Water Holdings. Assumes some water was carried over into the 2011–12 water year and if the season is wet, water will be lost due to storage spill. The River Murray Flora and Fauna entitlement can be traded into the system depending on trade restrictions. Reconfiguration of the Campaspe system means it is not currently possible to assess trade options; therefore the volume is not included in the available volume.

[#] Decisions to carry over will be driven by the environmental water demands of the Living Murray icon sites and Commonwealth Environmental Water Holder priorities, rather than the needs of the Campaspe River in 2012–13.



15D Loddon system (including Bullarook)

Loddon River downstream of Boort – Durham Road, North Central Catchment Management Authority

Waterway manager – North Central Catchment Management Authority

The Loddon system is located in north-central Victoria, and includes the ecologically important Boort wetlands. The Boort wetlands, consisting of a system of freshwater lakes, are known for their abundant bird life and ecologically productive wetlands. The wetlands provide breeding grounds for bird species such as ibis, herons, ducks and egrets. The Loddon River is also home to native fish species such as the river blackfish, Murray cod, golden perch and silver perch, and supports an active tourism industry due to its intact forests and high value vegetation. Also part of the Loddon system is the smaller Bullarook system, including Birch Creek. The Bullarook system has its own entitlement; planned use of this entitlement is described on page 75.

Planned environmental water use in 2011–12

The priority environmental objectives in the Loddon system for 2011–12 are maintaining channel form; maintaining instream and riparian vegetation; reducing encroachment of terrestrial vegetation; and maintaining water quality.

The priority river reach is reach 4 from Loddon Weir to Kerang Weir, as it has the largest water demands. Reaches 1 to 3 and reach 5 benefit from the flows being passed from the upper storages to Loddon Weir, and also from Kerang Weir to the River Murray.

Environmental watering will focus, in priority order, on winter low flows; a spring fresh; and summer freshes.

With full use of all available Water Holdings, it is likely that the majority of priority flow components can be provided under all planning scenarios.

System overview

The environmental flow reaches are shown in Figure 15D.1. Water Holdings in the Loddon system are released from Cairn Curran (reach 1), Tullaroop (reach 2) and Lannecoorie (reaches 3 to 5). Water in the Goulburn system can be delivered through the Western Waranga Channel to the Loddon Weir and delivered to reach 4.

While all reaches in the Loddon are important, environmental watering is targeted at reach 4 as it has the largest environmental water demand. The measurement point for target flows is downstream of Loddon Weir. Environmental water releases from Tullaroop or Cairn Curran Reservoirs also benefit reaches 1 and 2, while releases from Lannecoorie will benefit reach 3.

In addition to the Water Holdings, passing flows are provided under Goulburn-Murray Water's bulk entitlement and consumptive water is delivered down the Loddon to meet downstream irrigation needs, which together with unregulated flows provide significant environmental benefit.

Figure 15D.1 The Loddon system

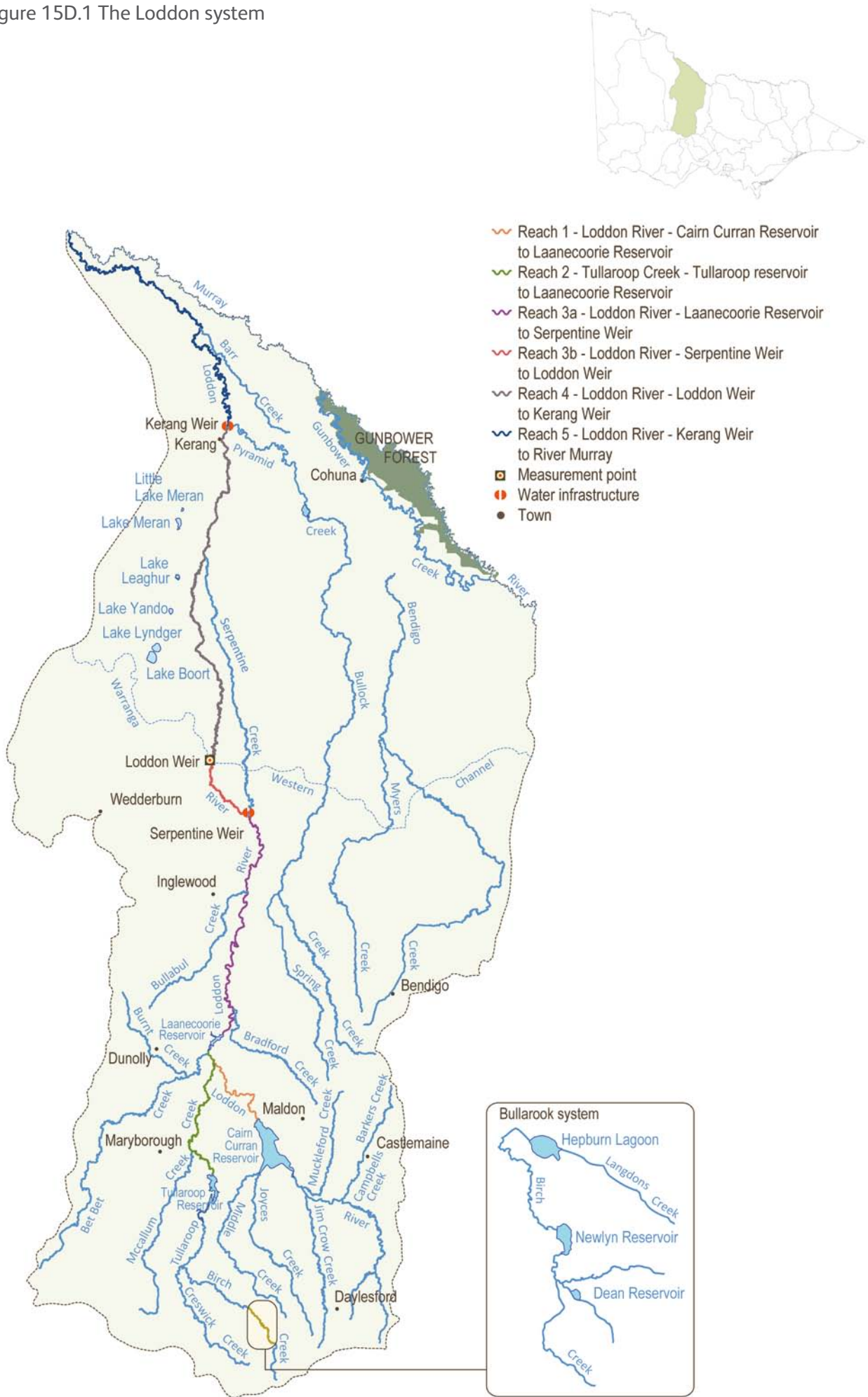


Table 15D.1 Water Holdings available for use in the Loddon system

Entitlement	Description
Victorian Water Holdings	
Bulk Entitlement (Loddon River – Environmental Reserve) 2005	<ul style="list-style-type: none"> • 2,000 ML high-reliability entitlement for Boort wetlands • 2,024 ML low-reliability entitlement • 7,490 ML high-reliability entitlement for use below Loddon Weir • Passing flows, including withheld flows account¹ • Access to surplus flows (flows which cannot be captured in the regulated system and pass downstream)
Goulburn River Environmental Entitlement 2010	<ul style="list-style-type: none"> • 1,432 ML high-reliability entitlement from Goulburn-Wimmera-Mallee Pipeline savings
Bulk Entitlement (River Murray Flora & Fauna) 1999 ²	<ul style="list-style-type: none"> • 27,600 ML high-reliability entitlement
Environmental Entitlement (Birch Creek – Bullarook System) 2009	<ul style="list-style-type: none"> • 100 ML entitlement (available when allocations for Bullarook high-reliability water shares are at 20%)³ • Passing flows • Above cap water (i.e. all water not allocated to other entitlement holders)
Other Water Holdings	
Commonwealth Environmental Water Holdings ⁴	<ul style="list-style-type: none"> • 1,700 ML Loddon high-reliability water share • 527 ML Loddon low-reliability water share

¹ Passing flows can be withheld in storage and released at a time that provides maximum environmental benefit.

² Sourced from the Murray system but can be transferred for use in the Loddon system.

³ Available from December of any year to November of the following year.

⁴ Decisions about the use of Commonwealth Water Holdings are the responsibility of the CEWH.

The VEWH will submit proposals for the use of CEWH water for Victoria's priority rivers and wetlands.

Current situation

Following an extended drought, the Loddon system received a sequence of high rainfall and high flow events, including three major floods in September and December 2010 and January 2011. Flow components recommended in the scientific flow study, including bankfull and overbank flows, were largely provided naturally. The only flows that did not occur were early winter baseflows and freshes as it was early in the water year and water was not available. All wetlands in the Boort District received significant inflows after the September flood. Wetlands from Lake Boort through to Little Lake Meran were linked for the first time in many years.

As a result of 2010–11 flows, there was opportunistic fish migration through the Kerang fishway and terrestrial vegetation was cleared from the channel. A range of bird species made use of the wetlands early in the flood period and some species were observed to have two breeding events. Watering in 2011–12 will be focused on continuing the recovery of the system from last year's flows. With significant volumes of environmental water available it should be possible to provide most priority planned flow components.

Priority watering actions

Table 15D.2 outlines the priority objectives and watering actions under a range of planning scenarios. The priority watering actions are for reach 4 and comprise:

- winter low flows (100 ML per day from May to October)
- spring fresh (750 ML per day for 6–10 days between September and November)
- summer fresh (two freshes of 100 ML per day for 10–14 days each between December and February).

Winter and summer low flows in reaches 1 to 3 are also priority flow components; however these are provided year round by passing flows required under the Bulk Entitlement (Loddon River – Environmental Reserve) Order 2005. No management action is required to provide these flows. Environmental flow requirements were determined for bankfull flows in reach 4 of the Loddon; however these were provided naturally in 2010–11 and are thus not a priority in the next two to three years.

The VEWH will also coordinate the delivery of CEWH water and authorise waterway managers to implement CEWH priority watering actions, provided there are no adverse impacts on Victorian rivers and wetlands.

Table 15D.2 Priority watering actions under a range of planning scenarios in the Loddon system

	Planning scenario			
	DROUGHT	DRY	AVERAGE	WET
Expected availability of Water Holdings*	14,005 ML Victorian Water Holdings 880 ML Commonwealth Environmental Water Holdings	15,000 ML Victorian Water Holdings 1,373 ML Commonwealth Environmental Water Holdings	13,139 ML Victorian Water Holdings 1,700 ML Commonwealth Environmental Water Holdings	11,338 ML Victorian Water Holdings 1,700 ML Commonwealth Environmental Water Holdings
Environmental objectives	Maintain channel form. Maintain instream and riparian vegetation. Reduce encroachment of terrestrial vegetation. Maintain water quality.	Maintain channel form. Maintain instream and riparian vegetation. Reduce encroachment of terrestrial vegetation. Maintain water quality.	Maintain channel form. Maintain instream and riparian vegetation. Reduce encroachment of terrestrial vegetation. Maintain water quality.	Maintain channel form. Maintain instream and riparian vegetation. Reduce encroachment of terrestrial vegetation. Maintain water quality.
Flow components	Winter low flows. Spring fresh.	Winter low flows. Spring fresh.	Winter low flows. Spring fresh. Summer fresh.	Winter low flows. Spring fresh. Summer fresh.
Possible volume required from the Water Holdings^	12,900 ML for instream 0–1,500 ML for Boort wetlands	12,900 ML for instream 0–1,500 ML for Boort wetlands	16,000 ML for instream 0–1,500 ML for Boort wetlands	16,000 ML for instream 0–1,500 ML for Boort wetlands
Possible carryover into 2012/13#	5,632–7,132 ML	7,120–8,620 ML	5,147–6,647 ML	5,147–6,647 ML

* Includes water available only for the Boort wetlands (2,000 ML entitlement). Does not include water available from the Bulk Entitlement (River Murray Flora & Fauna) 1999, which could be traded into the system if required.

^ Assumes passing flows are provided, but no unregulated volumes above passing flows, therefore volumes are upper limits of water required from the Water Holdings.

Decisions to carry over will depend on the environmental water demands of other VEWH and CEWH priorities in 2011–12. Carryover includes passing flows that are assumed to be kept in storage rather than being released under all planning scenarios (estimated to be an additional 5,147 ML).

Adaptive management considerations

The preference is for environmental water to be released from Tullaroop or Cairn Curran reservoirs to provide environmental benefit to all reaches if required. This is dependent on system operations. The North Central Catchment Management Authority will work closely with Goulburn-Murray Water to provide the preferred pattern of release from the upper storages to meet the targeted flows at reach 4 below Loddon Weir.

Under the *Bulk Entitlement (Loddon River – Environmental Reserve) 2005*, there is 2,000 ML of entitlement that can only be used in the Boort wetlands: Lake Leaghur; Lake Yando; Lake Meran; Little Lake Meran; Big Boort; and other Boort wetlands identified as priorities by North Central Catchment Management Authority. Water available under this entitlement ranges from 700 ML under a drought scenario to 4,000 ML under a wet scenario (includes 2,000 ML carryover, assuming storage does not spill). All the wetlands were filled in 2010–11 and the majority will be allowed to draw down and dry out. Watering is only planned for Big Lake Boort, and this would only be required under a drought or dry

scenario (1,000–1,500 ML required). Big Lake Boort may be filled by unregulated flows under an average or wet scenario. In this case, no water would be required from the Water Holdings and since this water can only be used in the Boort wetlands, the full 4,000 ML would be carried over into 2012–13; however this would be lost if Cairn Curran or Tullaroop Reservoirs spill.

Instream environmental watering actions are targeted on reach 4 of the Loddon system, and will focus in priority order on winter low flows from July 2011 to October 2011; a spring fresh between September and November 2011; then summer freshes between December 2011 and February 2012. Summer passing flows are provided for under the entitlement, however these are not the priority for this year and are likely to be withheld to deliver priority flow components in 2012–13.

North Central Catchment Management Authority will monitor the flows occurring naturally in the system, and assess the best time to make releases to provide the priority flow components most efficiently and with maximum environmental benefit.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. As conditions unfold and water becomes available throughout the year, seasonal watering statements will be issued to communicate decisions on the environmental watering actions that are to be undertaken. The seasonal watering statements will also authorise North Central Catchment Management Authority to implement those decisions. A transitional watering statement was released on 1 July 2011 to authorise the continuation of watering actions that were approved in 2010–11 by the previous entitlement holder, the Minister for Environment and Climate Change. This may be complemented by or superseded by new seasonal watering statements when they are issued.

In the Loddon system, implementation arrangements are outlined in Schedule 12 (Loddon River) and Schedule 13 (Bullarook system) of the *Seasonal Watering Plan 2011–12*. The Loddon River bulk entitlement is guided by the environmental operating strategy agreed by the North Central Catchment Management Authority and Goulburn-Murray Water in 2005. Operating arrangements will be reviewed by June 2012 and will include the Bullarook system.

Risk assessment and management

Risks associated with the implementation of these watering actions include flooding of private land; however the likelihood of this is low. This will be managed by delivering environmental flows in line with flow recommendations and investigating potential changes to channel form following the recent floods. For the Boort wetlands, no environmental water would be released except under a drought or dry scenario. There is also a risk that environmental watering could cause water quality issues, such as:

- blackwater events (reduced dissolved oxygen levels resulting from leaf litter and other organic matter being washed instream)
- sulphate generation and low pH (from acid sulphate soils being exposed and then rewet)
- blue-green algal blooms (from nutrient-rich water being flushed instream from the floodplain).

These risks are assessed as low, and will be managed by avoiding low flows during summer and providing freshes to dilute water if necessary.

Also important are risks to successfully achieving the desired environmental outcomes from watering actions. Details on these can be found in Schedules 12 and 13.

Further information

More detail about the planned watering actions in the Loddon system can be found by downloading Schedules 12 and 13 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

Planned environmental water use in 2011–12 in the Bullarook system

The Bullarook system is a tributary of the Loddon River and includes Birch Creek which rises on the northern slopes of the Great Dividing Range. The area is highly developed from mining which continued after the gold rush, broad acre agriculture and dairy farming. However, Birch Creek still supports some significant environmental values, including important habitat for the endangered river blackfish.

The environmental flow reaches in the Bullarook system are shown in Figure 15D.1. The Bullarook environmental entitlement includes passing flow requirements for each of the reaches. The 100 ML that can be actively managed can be released from Newlyn Reservoir or Hepburn Lagoon and provided to all reaches. The environmental objectives in 2011–12 are to maintain river blackfish populations; flush sediments; allow fish movement; reinstate instream and riparian vegetation diversity; and minimise low dissolved oxygen risks. The full 100 ML will be used if required to provide:

- summer baseflows in reach 3 (8 ML per day between December and May)
- summer freshes in reach 3 (four freshes of 15 ML per day for three days each between December and February).

Water under the Bullarook environmental entitlement cannot be carried over.





15E Northern wetlands and floodplains

Hattah Lakes, Bob Merlin, Mallee Catchment Management Authority

Waterway manager – Mallee Catchment Management Authority, North Central Catchment Management Authority and Goulburn Broken Catchment Management Authority

The Northern Victorian wetlands and floodplains are numerous and cover three catchment management authority boundaries: Mallee; North Central; and Goulburn Broken. Included within the area are four Living Murray 'icon sites': Barmah Forest; Gunbower Forest; Hattah Lakes; and Lindsay-Wallpolla Islands. Barmah Forest and Gunbower Forest are Australia's largest river red gum forests. These forests together with Hattah, Lindsay-Wallpolla and Kerang wetlands are recognised as wetlands of international importance under the Ramsar Convention. There are other significant wetlands and floodplains in the Goulburn Broken area, around Boort and Kerang and along the River Murray.

Planned environmental water use in 2011–12

The priority environmental objectives for northern Victorian wetlands and floodplains in 2011–12 are to improve ecological resilience and, where appropriate, initiate drying regimes, returning these systems to a more natural flow regime.

The systems which require environmental water in 2011–12 include Boort wetlands; Kerang wetlands; Mallee-River Murray wetlands; Barmah Forest; Gunbower Forest; and Lindsay-Wallpolla Islands. Other systems, including the Goulburn Broken wetlands, are sufficiently full or currently in a drying phase.

Environmental watering will focus on ensuring resilience of the systems, providing habitat and breeding opportunities for water-dependent species, such as frogs and waterbirds, and increasing the opportunity for recruitment of vegetation.

The seasonal outlook for 2011–12 is positive, with good allocations likely in the Murray and Goulburn systems. The suite of Water Holdings in northern Victoria provides a good opportunity to meet the majority of ecological objectives across the priority northern Victorian wetlands and floodplains. Decisions on use of the Victorian Water Holdings will be influenced by seasonal opportunities and the allocation of water by other water holders.



System overview

The northern Victorian wetlands and floodplains are part of the southern connected Murray-Darling Basin. The southern connected Basin is highly regulated and can deliver water from a number of storages including Lake Victoria, Hume and Dartmouth Dams on the Murray; Lake Eildon on the Goulburn; Lake Eppalock on the Campaspe, Cairn Curran and Tullaroop Reservoirs on the Loddon and the mid-Murray storages in Kerang.

Victoria has priority wetlands in the majority of these systems, in addition to a number of Living Murray icon sites: Barmah-Millewa Forest; Gunbower-Koondrook-Perricoota Forest; Hattah Lakes and Chowilla Floodplain, Lindsay and Wallpolla Islands.

The Ovens and Kiewa systems are also included in the southern connected basin. They are less regulated than the other systems, with relatively small storages. They currently contain no wetlands or floodplains which can receive regulated environmental water.

The highly connected and regulated nature of northern Victoria also provides opportunities to use environmental water to build on consumptive water en route and unregulated flows to enhance the environmental benefit.

Figure 15E.1 The northern wetlands and floodplains

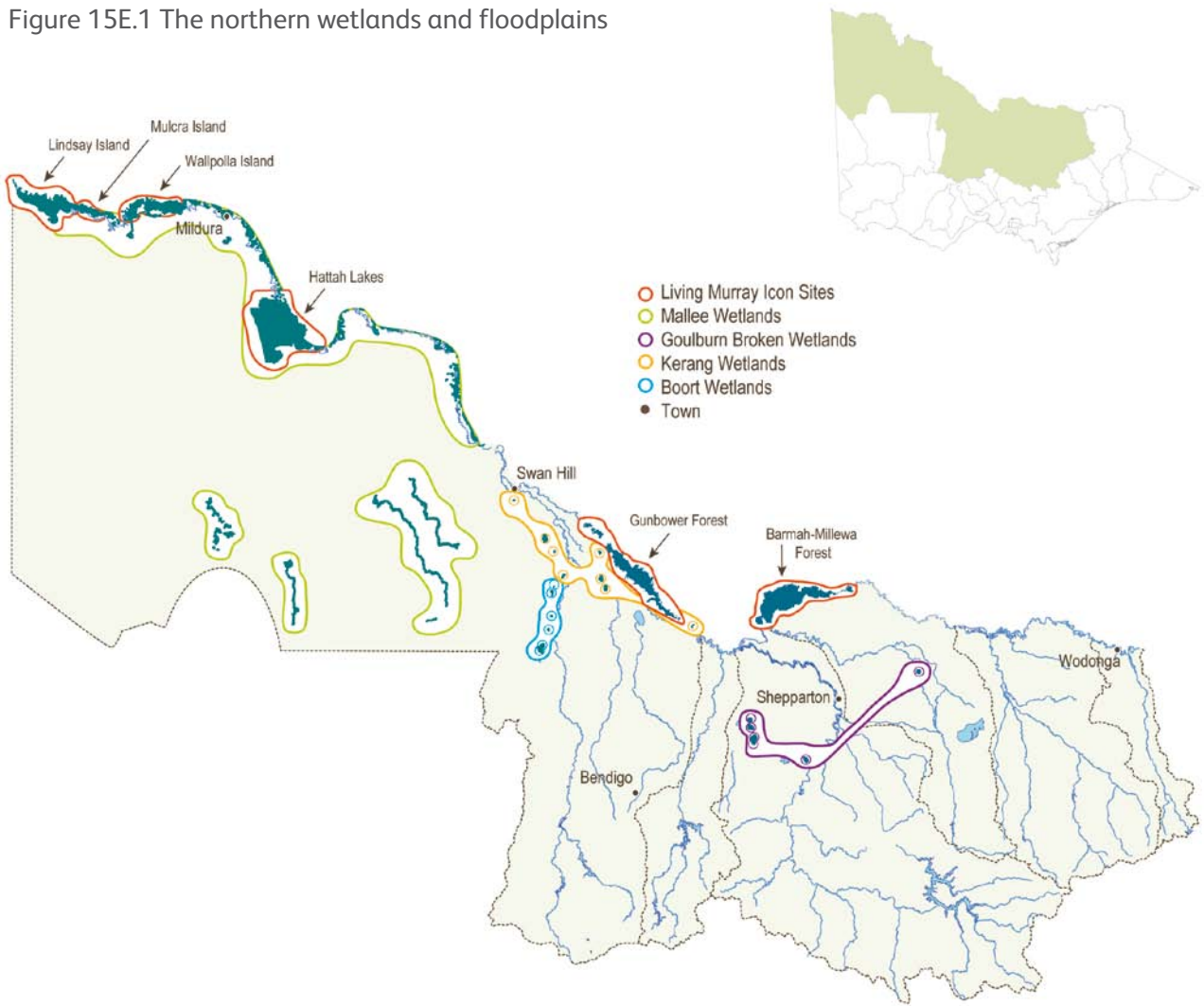


Table 15E.1 Water Holdings available for use in northern Victorian wetlands and floodplains

Entitlement	Description
Victorian Water Holdings	
Bulk Entitlement (River Murray Flora & Fauna) 1999	27,600 ML high-reliability entitlement 40,000 ML unregulated entitlement 50,000 ML high-reliability Barmah-Millewa Environmental Water Allocation 25,000 ML low-reliability Barmah-Millewa Environmental Water Allocation
River Murray Environmental Water Savings Supply Deed	One-third of water savings created in the Murray system as a result of modernisation works completed as part of Stage 1 of the Northern Victoria Irrigation Renewal Project Mitigation water reserve (water which was deemed required to mitigate against impacts of reduced outfalls into environmental sites resulting from modernisation)
Goulburn Environmental Water Savings Supply Deed	One-third of water savings created in the Goulburn system as a result of modernisation works completed as part of Stage 1 of the Northern Victoria Irrigation Renewal Project Mitigation water reserve (water which was deemed required to mitigate against impacts of reduced outfalls into environmental sites resulting from modernisation)
Goulburn River Environmental Entitlement 2010	1,432 ML high-reliability entitlement (for use in the Loddon system)
Bulk Entitlement (Loddon River Environmental Reserve) Order 2005	2,000 ML high-reliability entitlement for Boort wetlands 2,024 ML low-reliability entitlement 7,490 ML high-reliability entitlement for use at or below Loddon Weir
Environment Entitlement (Campaspe River – Living Murray Initiative) 2007*	126 ML high-reliability entitlement 5,048 ML low-reliability entitlement
Environmental Entitlement (Goulburn System – Living Murray) 2007*	39,625 ML high-reliability entitlement 156,980 ML low-reliability entitlement
Bulk Entitlement (River Murray – Flora and Fauna) Conversion Order 1999* – Living Murray	5,710 ML high-reliability entitlement 101,850 ML low-reliability entitlement 34,300 ML unregulated entitlement
Other Water Holdings	
Other Living Murray entitlements*	17,518 ML high-reliability water shares in Victoria 1,887 ML of high-security entitlement in New South Wales 212,127 ML of general-security entitlement in New South Wales 12,965 ML of unregulated entitlement in New South Wales 350,000 ML of supplementary entitlement in New South Wales 43,765 ML water licence entitlement in South Australia
Commonwealth Environmental Water Holdings [#]	129,946 ML Murray high-reliability water shares 11,125 ML Murray low-reliability water shares 95,705 ML Goulburn high-reliability water shares 10,526 ML Goulburn low-reliability water shares 47 ML Broken high-reliability water shares 4 ML Broken low-reliability water shares 5,783 ML Campaspe high-reliability water shares 395 ML Campaspe low-reliability water shares 1,564 ML Loddon high-reliability water shares 527 ML Loddon low-reliability water shares

* Water allocated to this entitlement must be used for the Living Murray 'icon sites'.

[#] Decisions about the use of Commonwealth Water Holdings are the responsibility of the CEWH. The VEWH will submit proposals for the use of CEWH water for Victoria's priority rivers and wetlands. Current as at 31 May 2011. Does not include Commonwealth Environmental Water Holdings in other states.

Current situation

In 2010–11, much of northern Victoria experienced above average rainfall. Significant flooding occurred in the Murray, Goulburn, Broken, Campaspe and Loddon systems.

During the start of 2010–11, environmental water was being delivered to a number of priority wetlands. However, as a result of the wet conditions across the state over summer, rainfall and catchment runoff has filled many wetlands to capacity and generated high natural river flows in a number of systems. These natural events filled many wetlands and floodplains, with relatively small amounts of managed environmental water used to build on these events.

Flooding along the River Murray provided water to many wetlands and floodplains including the Hattah Lakes, Lindsay, Wallpolla and Mulcra islands and many smaller wetlands along the River Murray floodplain. Large-scale flooding around Boort and Kerang connected a number of significant wetlands and floodplains. Wetlands in the Goulburn Broken area also received significant inundation. A large portion of these wetlands and floodplains are still full or retaining water, and may require only small top-ups or in some cases no managed environmental water in 2011–12.

The seasonal outlook for 2011–12 is positive, with good allocations likely in the Murray and Goulburn systems. The suite of Water Holdings in northern Victoria provides a good opportunity to meet the majority of ecological objectives across the priority northern Victorian wetlands and floodplains. Decisions on use of the Victorian Water Holdings will be influenced by seasonal opportunities and the decisions of other water holders.

Priority watering actions

The majority of wetlands and floodplains in northern Victoria have wetting and drying cycles, reflecting the requirements of important ecological communities. For example, the optimum flow regime in some wetlands is one year of full inundation, followed by two years with no active water management allowing the wetland to dry. Other wetlands may require three years of inundation, with only one dry year between.

Wetting cycles are important in maintaining environmental values, such as sustaining the health of river red gum forests, or providing breeding habitat for waterbirds. Equally important is the drying cycle, to ensure that wetting does not exceed the requirements of the relevant ecological community. Maintaining the balance between wetting and drying is important in maintaining the diversity and health of the wetland system.

Table 15E.2 outlines the priority watering actions for wetlands and floodplains across northern Victoria, and how watering requirements vary under different planning scenarios. This table does not show the priority wetlands which do not require watering in 2011–12 as they require a drying phase.

The VEWH will also coordinate the delivery of CEWH water and authorise waterway managers to implement CEWH priority watering actions, provided there are no adverse impacts on Victorian rivers and wetlands.

Adaptive management considerations

Decisions on priority watering actions for northern Victorian wetlands and floodplains will be influenced by the amount of water available for use, the watering history (wetting and drying cycle) of the wetland or floodplain system, and local rainfall or catchment runoff that may influence the watering requirements of wetland or floodplain system as the water year progresses.

The Northern Victorian Environmental Watering Project Control Board, consisting of Mallee, North Central and Goulburn Broken catchment management authorities and Parks Victoria, assists in the prioritisation process throughout the year, making recommendations to the VEWH on environmental water requirements of northern Victorian wetland and floodplain systems. This group will continue to review the volumes and management actions required for the sites as seasonal conditions unfold and allocation progressively becomes available for use.

The CEWH and partners in the Living Murray Program have varying interests in northern Victorian wetlands and floodplains, reflecting their different objectives. The ability to meet the water requirements of northern Victorian wetlands and floodplains is dependent on decisions by other water holders and seasonal conditions.

Implementation arrangements

This plan outlines the watering actions that are a priority in the coming year, provided there is sufficient water. As conditions unfold and water becomes available throughout the year, seasonal watering statements will be issued to communicate decisions on the environmental watering actions that are to be undertaken. The seasonal watering statements will authorise Mallee, North Central or Goulburn Broken catchment management authorities (as appropriate) to implement priority actions for particular wetlands and floodplains. There will be many statements released for the northern Victorian wetlands and floodplains, reflecting the complexity associated with different water holders, progressive water allocations, and multiple catchment management authorities.

Large-scale watering actions require inter-jurisdictional planning and coordination. The VEWH and relevant waterway managers will participate in planning and implementation meetings as required.

Implementation arrangements for northern Victorian wetlands and floodplains are outlined in Schedule 14. More specific arrangements, including costs and funding sources, will be confirmed through the development of a delivery plan before each watering action is authorised.

Risk assessment and management

Risks associated with the implementation of priority watering actions include flooding of private land and personal injury to river and wetland users. A broad risk assessment has been undertaken for each system and is included in Schedule 14. The assessment looks at risks to operational delivery, third parties such as if there is a risk of flooding private land, and risks of not communicating the rationale for undertaking the management action. More detailed risk assessments will be completed by the relevant waterway manager as part of the delivery plan for each watering action.

Further information

More detail about priority watering actions in the northern Victorian wetland system can be found by downloading Schedule 14 of the *Seasonal Watering Plan 2011–12* at www.vewh.vic.gov.au.

Table 15E.2 Priority watering actions under a range of planning scenarios in the northern wetlands and floodplains

Sites <u>other</u> than Living Murray icon sites								
	DROUGHT		DRY		AVERAGE		WET	
Wetlands and floodplains	Priority sites to receive environmental water in 2011–12	Total volume (ML)	Priority sites to receive environmental water in 2011–12	Total volume (ML)	Priority sites to receive environmental water in 2011–12	Total volume (ML)	Priority sites to receive environmental water in 2011–12	Total volume (ML)
Goulburn Broken wetlands	N/A	0	N/A	0	N/A	0	N/A	0
Boort wetlands*	Lake Boort	1,000	Lake Boort	1,500	Lake Boort	1,500	N/A	0
Kerang wetlands	Round Lake Lake Elizabeth Hirds Swamp Johnson's Swamp Richardson's Lagoon	3,900	Round Lake Lake Elizabeth Hirds Swamp Johnson's Swamp Richardson's Lagoon	3,900	Round Lake Lake Elizabeth Hirds Swamp Johnson's Swamp Richardson's Lagoon	3,500	Round Lake Lake Elizabeth Hirds Swamp Johnson's Swamp Richardson's Lagoon	2,000
Mallee River Murray wetlands	Nurrang wetlands Merbein Common Liparoo Ned's Corner Cardross Lakes Lake Koorlong	2,970	Heywoods Lake Nurrang wetlands Lakes Powell and Carpul Merbein Common Sandilong Creek Liparoo Cardross Lakes Lake Koorlong	10,520	Heywoods Lake Nurrang wetlands Lakes Powell and Carpul Merbein Common Sandilong Creek Liparoo Cardross Lakes Lake Koorlong	10,920	Heywoods Lake Lake Hawthorn Cardross Lakes Lake Koorlong	7,900
Total	7,870		15,920		15,920		9,900	

* The Boort wetlands are part of the Loddon system, which have their own water entitlement (as part of the *Bulk Entitlement (Loddon Environmental Reserve) 2005*). If there is insufficient water available under this entitlement, additional water could be sourced from other entitlements, such as the *Bulk Entitlement (River Murray Flora and Fauna) 1999*.

Table 15E.2 Priority watering actions under a range of planning scenarios in the northern wetlands and floodplains (continued)

Living Murray icon sites								
	DROUGHT		DRY		AVERAGE		WET	
Wetlands and floodplains	Priority sites to receive environmental water in 2011–12	Total volume (ML)	Priority sites to receive environmental water in 2011–12	Total	Priority sites to receive environmental water in 2011–12	Total	Priority sites to receive environmental water in 2011–12	Total
Barmah Forest	Top Island Boals Deadwoods Gooses Swamp Gulf Creek Smiths Creek Unregulated creeks which receive water (under 15,000 ML/day)	273,000	Top Island Boals Deadwoods Gooses Swamp Gulf Creek Smiths Creek Unregulated creeks which receive water (under 15,000 ML/day)	273,000–450,000	Top Island Boals Deadwoods Gooses Swamp Gulf Creek Smiths Creek Unregulated creeks which receive water (under 15,000 ML/day)	273,000–450,000	Top up natural inflow in whole of Barmah Forest	600,000
Gunbower Forest	Black Charlie Lagoon Little Gunbower Creek complex Little Reedy complex Reedy Lagoon Gunbower Creek	58,300	Black Charlie Lagoon Little Gunbower Creek complex Little Reedy complex Reedy Lagoon Gunbower Creek	72,000	Black Charlie Lagoon Little Gunbower Creek complex Little Reedy complex Reedy Lagoon Gunbower Creek	91,800	Top up natural inflows in whole of Gunbower Forest	97,000
Hattah Lakes	N/A	0	N/A	0	N/A	0	Lake Kramen	3,000
Lindsay Island	Lindsay Island	1,500	Lindsay Island Lake Wallawalla	3,500	Lindsay Island Lake Wallawalla	8,700	N/A	0
Mulcra Island	Mulcra Island (TLM works)	1,000	Mulcra Island (TLM works)	1,000	Mulcra Island (TLM works)	2,000	N/A	0
Wallpolla Island	Wallpolla Island	2,000	Wallpolla Island	1,500	Wallpolla Island	700	N/A	0
Total	335,800		351,000–528,000		376,20–553,200		700,000	

16. Glossary

Allocation bank account – water share owners hold allocation bank accounts (ABAs), which are credited as water allocations are made throughout the season

Carryover – allows entitlement-holders to retain ownership of unused water into the following season (according to specified rules)

Catchment management authority – statutory authorities established to manage regional and catchment planning, waterways, floodplains, salinity and water quality

Commonwealth Environmental Water Holder – (part of the Department of Sustainability, Environment, Water, Populations and Communities) holds and manages the water entitlements purchased through the Restoring the Balance water recovery program

Environmental flow regime – the timing, frequency, duration and magnitude of flows for the environment

Environmental flow study – a scientific study of the flow requirements of a particular basin's river and wetlands systems used to inform decisions on the management and allocation of water resources

Environmental water entitlement – an entitlement to water to achieve environmental objectives in waterways (could be an environmental entitlement, environmental bulk entitlement, water share, section 51 licence or supply agreement)

Flow component – components of a river system's flow regime that can be described by timing, seasonality, frequency and duration (for example, cease to flow and overbank flows)

Gigalitre (GL) – one billion (1,000,000,000) litres

High-reliability entitlement – legally recognised, secure entitlement to a defined share of water, as governed by the reserve policy (full allocations are expected in most years)

Low-reliability entitlement – legally recognised, secure entitlement to a defined share of water, as governed by the reserve policy (full allocations are expected only in some years)

Megalitre (ML) – one million (1,000,000) litres

Monthly Water Report – a report produced by the Department of Sustainability and Environment, which provides a summary of the status of Victoria's water resources and water supplies at the end of the reporting month

Northern Victoria Irrigation Renewal Program – an irrigation modernisation project, involving upgrading irrigation infrastructure in the Goulburn Murray Irrigation District, which will provide water to irrigators, Melbourne and the environment

Passing flow – water released out of storages to operate river and distribution systems (to deliver water to end users), provide for riparian rights and maintain environmental values and other community benefits

Permanent trade – transfer of ownership of a water share or licence

Restoring the Balance water recovery program – a Commonwealth Government program to return water to the environment through the purchase of water entitlements from irrigators

Seasonally adaptive approach – a planning approach which incorporates the likely availability of environmental water based on recent climate history and outlook, and determines the priority environmental objectives as a result

Seasonal allocation – the volume of water allocated to a water share in a given season, expressed as a percentage of total entitlement volume

Temporary trade – transfer of a seasonal allocation

The Living Murray – an intergovernmental program, which holds an average of 500,000 ML of environmental water per year, for use at six icon sites along the River Murray

Unregulated entitlement – an entitlement to water declared during periods of unregulated flow in a river system, that is, flows that are unable to be captured in storages

Victorian Environmental Flow Monitoring and Assessment Program – assesses the effectiveness of environmental flows in delivering ecological outcomes

Victorian Environmental Water Holder – an independent statutory body responsible for holding and managing Victorian environmental water entitlements and allocations (Victorian Water Holdings)

Victorian Water Register – a public register of water-related entitlements in Victoria

Waterways – can include rivers, wetlands, creeks, floodplains and estuaries

Water entitlement – the right to a volume of water that can (usually) be stored in reservoirs and taken and used under specific conditions

Water Holdings – environmental water entitlements held by the Victorian Environmental Water Holder

Waterway manager – agency responsible for the environmental management of waterways (includes catchment management authorities and Melbourne Water)

17. List of acronyms

ABA – allocation bank account

CEWH – Commonwealth Environmental Water Holder

CMA – catchment management authority

EWR –Environmental Water Reserve

NVIRP – Northern Victoria Irrigation Renewal Project

VEFMAP – Victorian Environmental Flow Monitoring and Assessment Program

VEWH – Victorian Environmental Water Holder

18. Schedules

Sections 13–15 outline the scope of planned watering actions during 2011–12 in southern, western and northern Victoria. The schedules provide further detail about these watering actions (see list below). They are available either by downloading from www.vewh.vic.gov.au or in hard copy from the VEWH office.

The schedules are the seasonal watering proposals prepared by the waterway managers. They have been accepted by the VEWH and now form part of the *Seasonal Watering Plan 2011–12*. As such, these schedules incorporate any changes resulting from feedback from the VEWH.

- Schedule 1: Latrobe, Thomson and Macalister systems
- Schedule 2: Tarago system
- Schedule 3: Yarra system
- Schedule 4: Werribee system
- Schedule 5: Moorabool system
- Schedule 6: Barwon system*
- Schedule 7: Wimmera-Glenelg system
- Schedule 8: Wimmera-Mallee wetlands*
- Schedule 9: Goulburn system
- Schedule 10: Broken system
- Schedule 11: Campaspe system
- Schedule 12: Loddon system
- Schedule 13: Bullarook system
- Schedule 14: Northern wetlands and floodplains

* These schedules will be added to the seasonal watering plan at a later date, following the finalisation of the Barwon environmental flow study, and planning and infrastructure works to connect further Wimmera-Mallee wetlands to the Wimmera-Mallee Pipeline.

