

Environmental Water Management Plan Guidelines

for Rivers and Wetlands (Version 6)

June 2022

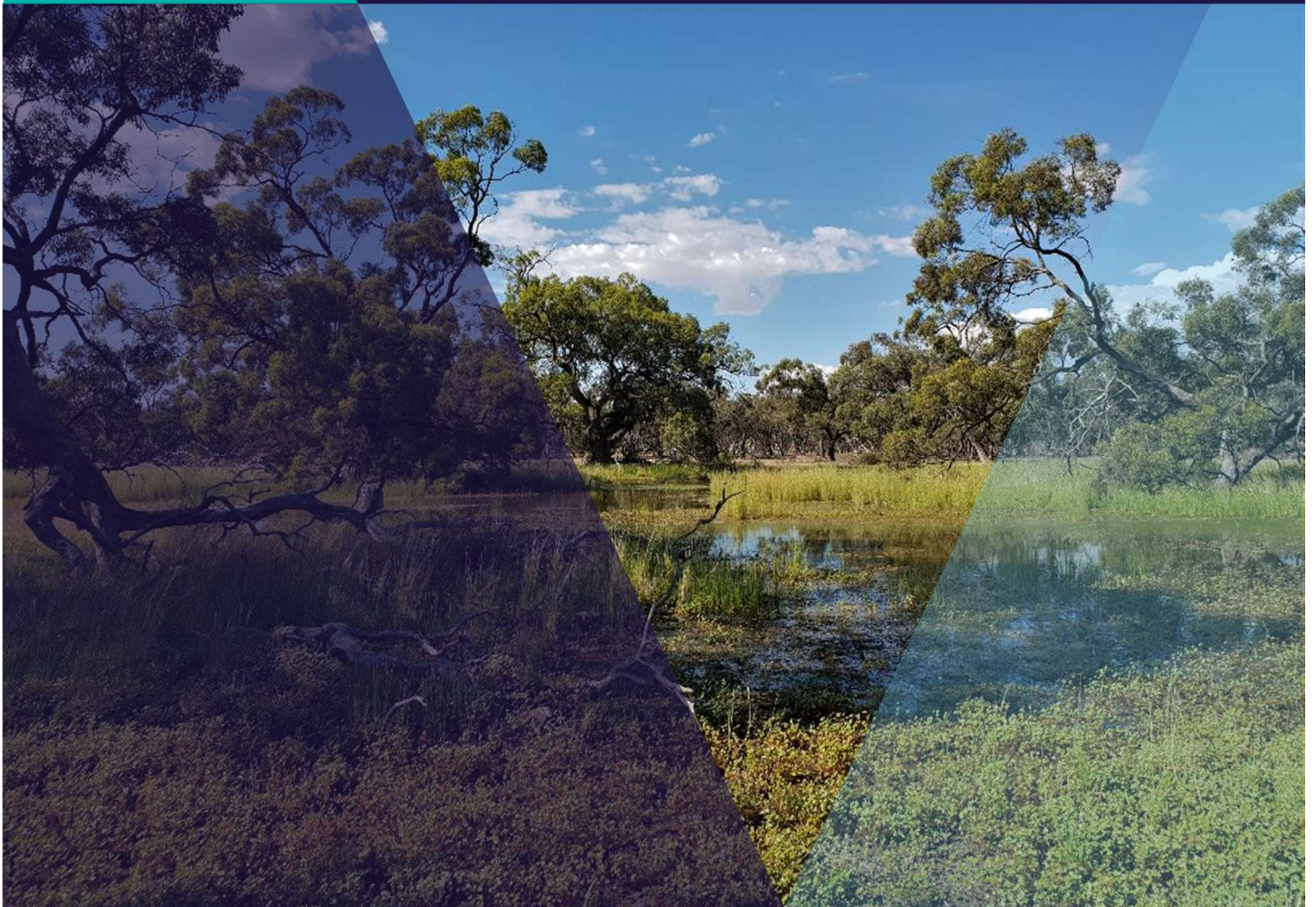


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Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.



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Abbreviations

ANAE	<u>Australian National Aquatic Ecosystem</u>
AWA	<u>Aboriginal Waterways Assessment</u>
BWS	<u>Basin-wide Environmental Watering Strategy</u>
CMA	<u>Catchment Management Authority</u>
DELWP	<u>Department of Environment, Land, Water and Planning</u>
DIWA	<u>Directory of Important Wetlands in Australia</u>
EVC	<u>Ecological Vegetation Classes</u>
EWAG	<u>Environmental Water Advisory Group</u>
EWMP	<u>Environmental Water Management Plan</u>
GBCMA	<u>Goulburn Broken Catchment Management Authority</u>
GMW	<u>Goulburn-Murray Water</u>
IAP²	<u>International Association for Public Participation</u>
IEC	<u>Index of Estuary Condition</u>
ISC	<u>Index of Stream Condition</u>
IUCN Red List	<u>International Union for Conservation of Nature's Red List of Threatened Species</u>
IWC	<u>Index of Wetland Condition</u>
LTWP	<u>Long-term Watering Plan</u>
MDBA	<u>Murray-Darling Basin Authority</u>
MLDRIN	<u>Murray Lower Darling Rivers Indigenous Nations</u>

PEA	<u>Priority Environmental Asset</u>
PEF	<u>Priority Ecosystem Function</u>
RAP	<u>Registered Aboriginal Party</u>
SMART	Specific, Measurable, Achievable, Relevant and Time-bound; criteria to guide setting appropriate EWMP targets.
VEWH	<u>Victorian Environmental Water Holder</u>
VEFMAP	<u>Victorian Environmental Flows Monitoring and Assessment Program</u>
WetMAP	<u>Wetland Monitoring and Assessment Program for environmental water</u>
VVMS	<u>Victorian Waterway Management Strategy</u>

Glossary

Conceptual model	Conceptual models express ideas about components and processes deemed important for waterway ecosystems (Gross, 2003).
Cultural flows	One widely cited definition is that: “‘Cultural Flows’ are water entitlements that are legally and beneficially owned by Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations” (MLDRIN, 2007).
Ecosystem components	Include the physical, chemical and biological parts of an asset, from large scale to very small scale, e.g. habitat, species and genes (adapted from (Ramsar Convention, 2005)).
Ecosystem function	Under <u>Basin Plan definitions</u> ecosystem functions are equivalent to ecosystem processes (see below).
Ecosystem processes	Dynamic forces within an ecosystem. They include all those processes that occur between organisms and within and between populations and communities, including interactions with the nonliving environment, that result in existing ecosystems and that bring about changes in ecosystems over time (Australian Heritage Commission, 2002). They may be physical, chemical or biological.
Ecosystem resilience	The ability of ecosystems to resist regime shifts and maintain ecosystem functions, potentially through internal reorganisation. Much of the concern regarding ecosystem resilience is related to impacts of climate change.
Ecosystem services	Benefits that people receive or obtain from an ecosystem (Ramsar Convention, 2005). The components of ecosystem services include (Millenium Ecosystem Assessment, 2005): <ul style="list-style-type: none"> • provisioning services — such as food, fuel and fresh water • regulating services — the benefits obtained from the regulation of ecosystem processes such as climate regulation, water regulation and natural hazard regulation • cultural services — the benefits people obtain through spiritual enrichment, recreation, education and aesthetics • supporting services — the services necessary for the production of all other ecosystem services such as water cycling, nutrient cycling and habitat for biota. These services will generally have an indirect benefit to humans or a direct benefit in the long term.
Ecosystem type	Ecosystems can be classified into types in a number of ways. In Victoria for wetlands we use the <u>Victorian Wetland classification</u> framework and in Basin Plan the <u>Australian National Aquatic Ecosystem</u> .
Environmental asset (or asset)	A spatially defined component of the environment that has particular values associated with it. For example, an individual wetland, wetland complex, river or river reach.
Environmental objective	Specifies the desired outcome(s) for the trajectory of change for a particular value or group of values over a specified period (e.g. ten years) that will achieve the management

	goal. This may require environmental watering as well as complementary management actions.
Environmental target	The fully measurable description of an environmental objective.
Environmental values	The flow dependent species, communities, processes and habitats that form the basis of the environmental objectives and flow recommendations for the system. Environmental values should be reflected in environmental objectives.
Environmental water	Water held in environmental entitlements, along with other water in the system that can contribute to environmental outcomes, such as passing flows, and 'above cap' water. These comprise the Environmental Water Reserve that is established in the <i>Victorian Water Act 1989</i> .
Environmental watering	Activities to deliver environmental water to specific environmental assets to achieve environmental objectives.
Environmental water requirements	The flow regime needed to sustain the ecological values of aquatic ecosystems and biological diversity at a low-level of risk.
Expected watering effect	The physical, chemical, biological or behavioural effects expected from specific potential watering actions (flow components). Unlike environmental watering objectives that are achievable through delivery of flow components and complementary measures over a long period of time, the expected watering effects relate to physical, chemical, biological or behavioural responses to specific components of the watering regime (e.g. response to a spring fresh, a low flow, a drying spell, a rate of drawdown, etc.) and are potentially measurable at shorter temporal scales.
Hydrological/flow/water (ing) regime	The magnitude, frequency, duration, timing, and rate of change of flows to a waterway.
FLOWS study	An assessment of the ideal flow requirements (watering regime) of an environmental asset made using the Victorian FLOWS method (DEPI, 2013). They are more targeted to rivers, although the method can also be used as an approach for other waterways.
Free, prior and informed consent	A principle protected by the international human rights standards that state, 'all peoples have the right to self-determination' and linked to this right, 'all peoples have the right to freely pursue their economic, social and cultural development'.
Intended flow/water(ing) regime	The quantity, duration and seasonal pattern of flows (watering actions) that are planned to be delivered to the asset, given likely availability of water and other constraints.
Management goal	The long-term (20+ year) vision or management goal(s) for the asset. The management goal(s) should reflect the overall values of an asset, and a vision for its future condition.
Ramsar wetlands or Ramsar sites	Wetlands of International Importance listed under the Ramsar Convention on Wetlands . The convention was adopted in the Iranian city of Ramsar in 1971 and came into force in Australia on 21 December 1975.
Reference condition	Pre-European or natural conditions with the assumed absence of human activity
Reference point condition	The condition at a particular point in time, for example at the time of EWMP development – to be used as a baseline
Regional Waterway Strategy	A single planning document for river, estuary and wetland management in each region of Victoria. They drive implementation of the management approach outlined in the Victorian Waterway Management Strategy.
Shared benefits	Secondary benefits that can be achieved from environmental watering, including social, cultural, recreational and economic benefits.
Traditional Ecological Knowledge	The knowledge, practice, and belief concerning the relationship of living beings to one another and to the physical environment, which is held by peoples in relatively nontechnological societies with a direct dependence upon local resources (Berkes, 1993).
Victorian Waterway Management Strategy	The detailed policy for managing Victoria's waterways over an eight-year period.

Summary

Environmental Water Management Plans (EWMPs) set long-term environmental objectives for wetlands or rivers that receive environmental water. EWMPs are an important part of the Victorian Environmental Water Planning Framework and inform the development of annual seasonal watering proposals. These EWMP Guidelines have been revised in consultation with environmental watering program partners to support the development and update of EWMPs.

An EWMP is a management plan for a Victorian river system (including their estuary where appropriate), wetland or wetland complex (hereafter referred to as an **environmental asset** or **asset**), that sets out the environmental watering goals, objectives and the water regime required to meet the set objectives. The development of EWMPs is led by asset managers (e.g. Catchment Management Authorities (CMAs) and Melbourne Water) with partners including Traditional Owners and land managers, and in consultation with stakeholders such as community groups, and are based on the best available knowledge, including scientific information, Traditional Ecological Knowledge (TEK), and environmental values and objectives. An EWMP describes the:

- partnership and consultation undertaken for EWMP preparation and implementation
- asset overview and characteristics
- water-dependent environmental values present
- water-related threats to the environmental values
- management goals for the asset
- environmental objectives, targets and values that environmental watering of the asset will support or improve
- watering requirements needed to meet environmental objectives
- environmental water delivery infrastructure, management and constraints
- risks associated with environmental water delivery
- outcomes intended to be demonstrated through monitoring and assessment, and
- knowledge gaps to address.

EWMPs need to contain sufficient information to inform environmental water management at an asset, and to enable asset managers to use them as the basis to prepare annual seasonal watering proposals. To facilitate this task, the Department of Environment, Land, Water and Planning (DELWP) has revised the EWMP Guidelines document in consultation with asset managers, Traditional Owner group representatives, and the Victorian Environmental Water Holder (VEWH) to provide asset managers with guidance to develop a comprehensive and well-structured EWMP, acknowledging that not all sections will be applicable to all assets (e.g. some recommendations are specific only to assets within the Murray-Darling Basin).

Changes to these EWMP Guidelines and next review

This version of the EWMP Guidelines builds on the 2014 Guidelines. Primary changes include:

- Merging of the previously separate EWMP Guidelines for wetlands and EWMP Guidelines for rivers into a single guidance document.
- Providing more guidance on stakeholder consultation and partnering processes, particularly with Victorian Traditional Owner groups.
- Providing more guidance for describing asset objectives and linking them clearly to other Victorian Government policy instruments, such as the Murray-Darling Basin Plan (Basin Plan), Regional Waterway Strategies and Long-Term Watering Plans.

- Providing more guidance including detailed steps on how to update existing or introduce new environmental objectives and targets for an EWMP. This includes guidance on the use of SMART¹ targets that, when monitored, will assist in assessing the performance of environmental watering actions against the stated objectives.
- Aligning more closely with the VEWH seasonal watering proposal guidelines, including consistent terminology (e.g. environmental objectives.) and definitions (e.g. climatic conditions), as well as introducing expected watering effects.

The next official review of the EWMP Guidelines will likely occur following the next update to the Murray-Darling Basin Plan Basin-wide Environmental Watering Strategy. A working list of potential improvements is being recorded for consideration in the upcoming and future reviews.

1. SMART is an acronym for Specific, Measurable, Achievable, Relevant and Time-bound, criteria to guide setting appropriate EWMP targets.

1. Introduction

An EWMP is a medium to long-term (i.e. 8-10 years) plan for environmental assets (wetlands, wetland complexes or river systems, including their estuaries where appropriate) in Victoria that describes the site, location, environmental values, condition and threats, management objectives and the watering regime required to achieve these. EWMPs also describe the hydrology of the site or system and any environmental water delivery infrastructure and complementary actions that are required, as well as knowledge gaps and recommendations.

Environmental values and objectives are determined based on scientific information (such as TEK and/or FLOWS studies), expert and partner opinion and stakeholder consultation. EWMPs are used by the relevant CMA, the Victorian Environmental Water Holder (VEWH) and DELWP for annual and multi-year environmental water planning, providing information to support seasonal watering proposals, water management and reporting obligations. In northern Victoria, EWMPs are a key reference for the Long-Term Watering Plans prepared by DELWP under the Basin Plan, and thus should align with Basin Plan obligations where relevant. EWMPs should also aim to be consistent with other State, Commonwealth and international legislation, policies and strategies where relevant, for example, Regional Waterway Strategies, the Directory of Important Wetlands in Australia and the Ramsar Convention.

Current EWMPs can be found on the [DELWP website](#).

The EWMP Guidelines

These Guidelines are intended as a state-wide document and have been developed to assist those preparing or updating EWMPs to:

- identify material that will help create a robust, science²-based planning document
- ensure that the content clearly outlines how it meets Victorian Government and Basin Plan requirements and obligations.

Guidance from Traditional Owner groups is included on how they want to be engaged in the EWMP development and implementation process, recognising the right of each group to determine the extent of their engagement in the process and that this extent may be subject to change.

² Including western science and TEK

1.1 EWMP development process

An outline of the steps to develop an EWMP is shown in Figure 1, with more detail about each step provided in the section(s) of this document indicated in brackets.

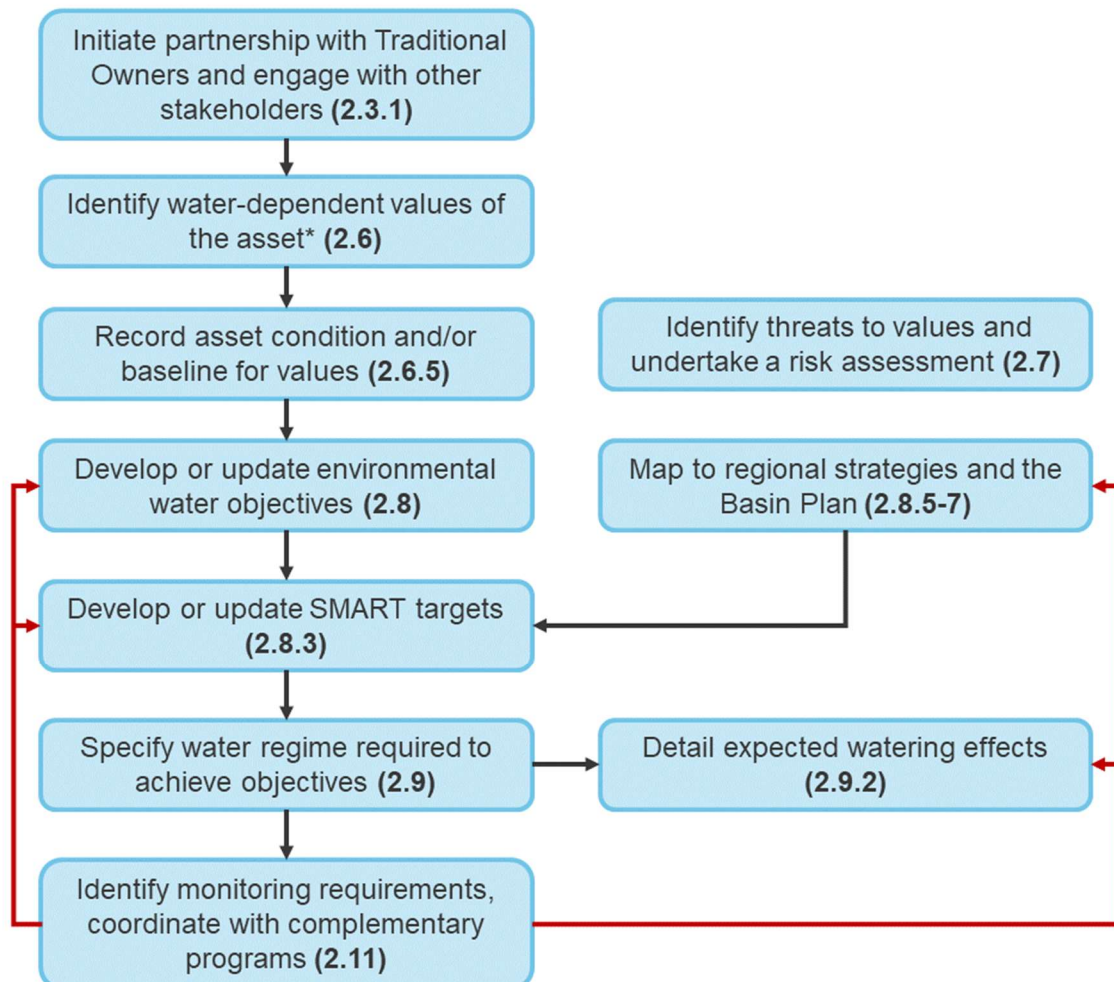


Figure 1: Steps required to either develop or update an EWMP. Red arrows indicate adaptive management pathways that allow for adjustment of management methods supported by new or improved information, to more closely align with objectives set for assets through an EWMP.

*Although the focus is on water dependent environmental values, cultural and recreational values that align with environmental values should also be identified.

As shown in the diagram, some steps in EWMP development will be iterative, informing and supporting other steps. For example, data collected from monitoring will be incorporated into updates to environmental objectives and targets.

Prior to developing an EWMP or carrying out a major update, the asset manager should provide the DELWP Environmental Water team with a short project plan to demonstrate which of the steps in Figure 1 will be addressed and how these will be delivered, including:

- the rationale for developing or updating the EWMP, e.g. why environmental water needs to be delivered to the waterway, why objectives, targets or watering requirements require updating
- arrangements for consultation and partnerships, including who the key stakeholders and partners are, and method of consultation (see Section 2.3)

- considerations for monitoring, including who will be consulted regarding monitoring, how past monitoring results will be considered and how coordination with complementary programs will occur
- governance/oversight arrangements.

Asset managers should provide VEWH the opportunity to review relevant sections of an EWMP to ensure it includes sufficient information to inform the development of annual seasonal watering plans (see also (VEWH, 2021)). Asset managers should provide a draft of the EWMP and opportunity for feedback to the DELWP Environmental Water team to facilitate provision of sufficient information to guide state-wide monitoring and reporting, and to facilitate consistency of EWMPs across the state. Overall decision-making and final endorsement for the EWMP lies with the waterway manager (CMAs and Melbourne Water).

1.2 Steps to update the objectives and targets of an existing EWMP

This section summarises the steps to update or change environmental objectives and targets for an existing EWMP. Not all steps or sections will be relevant for all EWMPs. While the focus is on updating objectives and targets, other sections in the EWMP may be updated at the discretion of the asset manager if there is new information or understanding (e.g. of asset information, risks, monitoring arrangements, or watering requirements). All steps should be carried out in consultation with partners, including Traditional Owners, and key stakeholders, with consultation undertaken as early as possible in the process.

1. Consider the documented environmental values and whether any updates are needed (Sections 2.3, 2.6.1).
2. Identify where environmental watering may contribute to cultural objectives and outcomes, and improve recreation and amenity values without impacting environmental outcomes (Sections 2.3, 2.6.2, 18.2060072.1422256685, 18.2060072.1422256685).
3. Re-state the outcomes of steps 1 and 2: document the environmental values with any updates and describe any alignment with other values, objectives and outcomes.
4. In partnership with Traditional Owners and in consultation with other stakeholders, assess the adequacy of existing management goals (Section 2.8.1).
5. Confirm, refine or develop new environmental objectives for the asset, based on the identified environmental values (Section 2.8.2), and develop associated SMART targets to the extent practicable (Section 2.8.3).
6. Articulate the outcomes that will be achieved for the asset through environmental watering from a landscape-scale perspective, i.e. why an EWMP is needed and regional importance of the asset (Section 2.8.5).
7. For assets in the Murray-Darling Basin, environmental objectives should be grouped into Basin Plan themes of ecosystem type and diversity, ecosystem function and ecosystem resilience (see Chapter 5 Basin Plan), and identify where objectives meet any Basin Plan criteria (Section 2.8.6). Check the relevant Regional Waterway Strategy and the Basin-wide Environmental Watering Strategy (BWS) for references to this asset and species at this asset, and document as appropriate.
8. Document any updates to objectives, including mapping to Basin Plan (where relevant) and other policy instruments (Section 2.8.7), including:
 - a. The asset's environmental value(s) to which the updated objectives relate
 - b. Adoption of consistent language to describe objectives that align with the terms of legislation and policy frameworks including the Basin Plan and Victorian Long-Term Watering Plans (LTWPs), the Victorian FLOWS method, and Ramsar site management plans where relevant (Section 2.8.4)
 - c. The scale at which reporting on outcomes will be most appropriate (e.g. asset scale, regional scale, Murray-Darling Basin scale)

- d. Where relevant, mapping to the Basin Plan Chapter 8 (Environmental Watering Plan) objective(s) (Appendix D, Table 18), Basin Plan Schedule 7 targets (Appendix D, Table 19), and BWS expected outcomes (Appendix D, Table 20) to which objectives relate. Note that post June 2019 the target for Basin Plan objectives is to improve, not just maintain outcomes³
- e. Where relevant, the Victorian LTWP objective/targets to which objectives relate (see LTWP objectives listed in Appendix E)
- f. Where assets are within a Ramsar site, environmental objectives and targets may be linked to those within the relevant Ramsar site management plan
- g. Alignment with cultural objectives and recreational or other shared benefits
- h. Whether objectives are achievable given the available environmental water resources, and allowing for other factors (e.g. delivery constraints, complementary management actions, climate change and other threats) that may contribute to or adversely impact the expected outcomes. When possible, regional climate change scenarios as set out in DELWP's 2020 Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria should be used to describe how the objective will be impacted in future (DELWP, 2020)
- i. Monitoring arrangements, i.e. whether an environmental objective:
 - is currently monitored, and relevant details, e.g. through which monitoring program
 - is considered by the asset manager to be a high regional priority for monitoring, should funding become available
 - is not currently monitored and is not likely to be in the future (Section 2.11).

³ Note we interpret this to mean that *overall* outcomes are improving at a site – not necessarily that every outcome is improving.

2. Recommended EWMP structure and content

Section 2 of this document provides guidance on the structure of an EWMP including suggested sections and content.

2.1 Executive summary

This section should provide an overview of the key points of the EWMP, highlighting major changes or updates and the reason for change/s. The body of the document should not contain any major surprises for someone who has read the Executive Summary.

Include items such as a summary of:

- major updates to the EWMP and reasons for change/s
- asset overview and characteristics
- partnership and consultation undertaken for EWMP preparation and implementation
- water-dependent environmental values present
- water-related threats to the environmental values
- management goal for the asset
- environmental objectives, targets and outcomes that environmental watering will support or improve
- watering requirements needed to meet environmental objectives
- environmental water delivery infrastructure, management and constraints
- risks associated with environmental water delivery
- outcomes intended to be achieved through monitoring and assessment
- knowledge gaps to address.

2.2 Introduction

The purpose of this section is to introduce the asset (waterway: river, wetland or wetland complex) and state the aims of the EWMP.

The introduction should include short statements on:

- the purpose and scope of the EWMP
- asset characteristics
- the process used to develop or update the EWMP.
- A standard description of the current policy context which can be adapted to suit your EWMP is provided in Appendix A.

2.3 Partnership and consultation

The purpose of this section is to identify the partnership and consultation approach taken in preparing or updating the EWMP, as well as to identify target audience(s) and modes of consultation necessary to manage environmental water delivery, report against stated objectives and targets, and promote adaptive management over the life of the EWMP.

This section should clearly describe the extent of partnership and consultation and the key outcomes. Relevant Traditional Owner groups must be offered the opportunity to partner⁴ in the process of developing or updating an EWMP (see Section 2.3.1 below), and it is for each Traditional Owner group to self-determine the extent to which they wish to partner in the process. Where Traditional

4. "Partner" is equivalent to "collaborate" under the IAP² definition (see Table 1).

Owner groups choose not to, or cannot at a given time, participate in part of the EWMP process, this can be noted in the section on knowledge gaps.

The community consultation process to establish or verify environmental (and other aligned) asset values is an important element of an EWMP and the EWMP should describe the engagement that took place. Consultation approaches will vary from region to region, according to unique circumstances, and will reflect how the asset managers and their partners and stakeholders want to approach their engagement process.

A guide to the level of engagement and the outcomes that asset managers might seek from engagement are summarised in Table 1. Some regions have existing formal committees that may be called upon to contribute expertise or provide feedback. Other regions have indicated there is a lack of public interest in the EWMP development process or that community interest may vary depending on seasonal conditions (e.g. greater interest during dry conditions). Both formal and/or informal community input may occur. Groups to be engaged include Traditional Owners (IAP2 level collaborate), river operators, land holders, interest groups (e.g. irrigators, Field and Game, recreational groups) and land managers. Groups may need to be chosen depending on the role they play regarding the asset, and groups may need to have different levels of involvement, in line with different powers.

During preparation of the EWMP, asset managers should consult with relevant organisations that have knowledge of the asset (or of similar waterways in the region) to provide a basis for local knowledge and expertise. These may include scientific consultancies such as Arthur Rylah Institute where they have undertaken monitoring and research, and Traditional Owner groups with TEK that may already have been elicited via an Aboriginal Waterway Assessment (AWA). This consultation will ensure that the best available knowledge is used to inform proposed management objectives, targets and approaches.

Consultation with DELWP and the VEWH will also be required in outlining the monitoring and assessment arrangements that are recommended to demonstrate the outcomes of environmental watering delivery (see Section 2.11). DELWP will use this information to align with monitoring programs and planning for Victoria's reporting obligations, including against Matter 8 of the Basin Plan (for assets in northern Victoria), and to meet international obligations e.g. for Ramsar wetlands.

A summary of the proceedings of any formative or influential consultation events should be included as an appendix to the EWMP.

Table 1: IAP2's Public Participation Spectrum (with examples from (VEWH, 2020)).

IAP2 level	Inform	Consult	Involve	Collaborate	Empower
Participation goal	To provide the stakeholder with balanced and objective information to assist in understanding the problem, alternatives, opportunities and/or solutions	To obtain stakeholder feedback on analysis, alternatives and/or decisions	To work directly with the stakeholder throughout the process to ensure that concerns and aspirations are consistently understood and considered	To partner with the stakeholder in each aspect of the decision including the development of alternatives and the identification of the preferred solution	To place final decision making in the hands of the stakeholder
Promise to the public/stakeholder	We will keep you informed	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide
Examples	<ul style="list-style-type: none"> Local councils and community groups, who are sent emails or letters detailing planned watering actions (but without asking for feedback) 	<ul style="list-style-type: none"> Environmental water advisory groups (EWAGs) providing feedback on asset manager proposal Community forums Landholders who have been informed of proposals and asked to provide feedback. 	<ul style="list-style-type: none"> EWAGs working through watering options with asset manager and directly influencing final proposal Traditional Owners providing information on cultural values and aspirations, but who aren't directly involved in planning the delivery of environmental water 	<ul style="list-style-type: none"> VEWH GMW Water (Storage Manager) A community group who partners with the asset manager to plan specific timing of a watering event Traditional Owner group that will partner with the asset manager to determine the timing of a watering event and assist in delivery and monitoring of the event. 	N/A

2.3.1 Traditional Owners⁵

Historically, Traditional Owners have been excluded from water management decisions. Over the past few years, participation and recognition of the importance of the role of Traditional Owners in water management has substantially and rightfully increased. In 2019, the Victorian *Water Act 1989* and *Catchment and Land Protection Act (1994)* were amended to require recognition and involvement of Traditional Owners and Aboriginal Victorians in the planning and management of waterways and catchments. Furthermore, DELWP has committed to the self-determination of Traditional Owners and Aboriginal Victorians through *Pupangarli Marmarnepu 'Owning Our Future' Aboriginal Self-Determination Reform Strategy 2020-2025*, supporting Traditional Owners to make choices that best reflect them, their values and their connection to Country.

Accordingly, Traditional Owners must be offered the opportunity to partner with asset managers when developing or updating EWMPs. This requires genuine collaboration and empowerment, in line with the International Association of Public Participation (IAP2) engagement principles (Table 1 and Appendix B). Opportunities must be identified for Traditional Owner involvement in each step of EWMP development and implementation, including:

- membership of any steering committee/reference group/expert panel
- documentation of values (including environmental, cultural and other values)
- identification of environmental objectives
- identification of required watering regime
- determining annual watering actions and priorities
- delivery of environmental water
- monitoring and assessing watering actions
- review and refinement of EWMPs.

Following the incorporation of feedback or information provided as part of the EWMP process, Traditional Owner groups must have the opportunity to review relevant documents to consider whether their perspectives and knowledge have been accurately and meaningfully reflected and integrated.

Partnering with Traditional Owners in the development and update of EWMPs provides opportunities to build relationships, share knowledge and to empower Traditional Owners to participate in environmental water management decisions that impact their Country and thereby strengthen their connection to Country. This can be done through supporting Traditional Owner led activities, for example, tools that assist elicitation of TEK such as AWAs, monitoring and evaluation of environmental watering activities on Country, or other activities nominated by Traditional Owners. It is imperative that any sharing of TEK occurs according to free, prior and informed consent principles and in a culturally sensitive manner.

Asset managers are to invite Traditional Owner groups to share information on cultural values and uses, and associated objectives or outcomes which can be achieved through the management of environmental water and undertake monitoring of these, where funding is available. While the primary purpose of environmental watering is to support environmental objectives, these may align with cultural objectives (e.g. meeting some requirements of totem species, improved fishing or hunting opportunities, support of cultural events). See Section 18.2060072.1422256685 for more information on Traditional Owner cultural values.

Traditional name(s) for the asset or for important features are to be included in the EWMP where this is the wish of the relevant Traditional Owners. Aboriginal cultural values, place names and TEK must only be reproduced in EWMPs with the permission of the appropriate Traditional Owners. Reference

5. Traditional Owner groups include non-formally recognised groups and those formally recognised through the following instruments: Registered Aboriginal Parties under the *Aboriginal Heritage Act (2006)*; Native Title Determination under the *Native Title Act (1993)*; Recognition and Settlement Agreements under the *Traditional Owner Settlement Act (2010)*.

to Traditional Owners' plans for Country including Country Plans and other documents should be made in EWMPs where appropriate.

In northern Victoria, a useful reference for Traditional Owners' objectives and outcomes for water, water-related values and uses, and for how each group wishes to be engaged in water planning and management is [Traditional Owner objectives and outcomes: compilation of contributions to Victoria's water resource plans](#) (note: this document was published in 2019 so some information may be superseded; please verify with each Traditional Owner group).

At the request of Traditional Owner groups, peak advocacy bodies such as Murray Lower Darling Rivers Indigenous Nations (MLDRIN)⁶ and the Federation of Victorian Traditional Owner Corporations (FVTOC)⁷ may be engaged to support EWMP updates or development, however they cannot speak on behalf of Traditional Owners and Country.

Further direction and insight on Traditional Owner engagement in the EWMP process was provided by northern Victorian Traditional Owner groups during the update of these Guidelines, including some formal submissions. Where permission was provided these have also been directly reproduced in Appendix B.

Each asset manager may already have an agreed approach to engage with Traditional Owner groups, however the DELWP Regional Managers (Community and Partnerships Team) can also provide further advice on contacts and coordination of engagement. Asset managers are required to document the level of collaboration with Traditional Owners that occurred during the development of an EWMP.

2.4 Asset overview

The purpose of this section is to:

- *Provide the reader with an adequate understanding of the asset, including the scale of the system and its components.*
- *Describe the current management arrangements for the asset and potential sources of environmental water.*

Through the following sections, provide a concise description of the asset (current and recent past, if relevant) as a component of the landscape and as a managed resource. A crucial aspect of this and Section 2.6 (on water-dependent values) will be to establish clear links between important asset characteristics/values and water-related environmental objectives and outcomes. The importance of the asset should be reflected in the environmental objectives set for asset, both at a local and, where appropriate, regional or Murray-Darling Basin scale (e.g. refer to the Regional Waterway Strategy, Basin Plan, Ramsar site status, or similar).

2.4.1 Catchment setting

Provide a description, in relation to the asset, of major geographic features (e.g. position in the catchment, relationship to floodplains or other waterways, nearby features of relevance etc.) and geomorphic features (e.g. soil type(s) and depth/bathymetry).

In addition to describing the catchment setting, provide a map showing the main features of the asset and adjacent catchment (including coarse altitude contours, major infrastructure, associated irrigation development, etc.). The map should also include the current Registered Aboriginal Party areas.

Indicate on the map which part of the asset is covered by the EWMP. With an inset map, identify the asset location within the region or Victoria.

⁶ MLDRIN is a not-for-profit company that acts as an advocacy body for Indigenous water rights in the Murray-Darling Basin. MLDRIN is a confederation of First Nations from the southern part of the Murray-Darling Basin. The member Nations of MLDRIN recognise the value of a united voice to progress their unique rights, values and interests in water management.

⁷ FVTOC is a state-wide peak advocacy body representing the interests of its members, Victorian Traditional Owners who have or are in the process of gaining recognition under the Commonwealth Native Title Act 1993 and Victoria's Traditional Owner Settlement Act 2010 and the Aboriginal Heritage Act 2006. DELWP engages with the FVTOC regularly for various purposes and in situations where Traditional Owners have indicated that FVTOC represent them on a particular matter, then DELWP will respect that direction.

2.4.2 Land status and management

Provide a concise summary which includes the following:

- Land status (noting any recent changes)
- Management - provide a table or brief summary of the various roles and responsibilities for management of the asset
- Parties that are key to making decisions on water delivery to this asset (e.g. land managers, water authorities/corporations, landowners, Traditional Owner groups, community management committees), and any cooperative management arrangements
- Parties that have legal sign-off/involvement in asset management and water delivery
- Parties that have management involvement not required by law, but by practice, such as advisory groups or Landcare groups.

2.4.3 Asset characteristics

Provide details including information such as asset name and mapping ID, ecosystem type(s), conservation status, length for rivers/river reaches or area and volume for wetlands. Information can be presented as free text or in tabulated form. An example based on Doctors Swamp (GBCMA, 2011) is provided in Text Box 1.

Text Box 1: Example description of asset characteristics: Doctors Swamp.

Doctors Swamp is classified as a Shallow Freshwater Marsh under the wetlands 1994 layer. This classification is considered representative of the wetland during the time it was mapped and classified. Doctors Swamp is located within the Victorian Riverine and Goldfields bioregions. It varies in depth to approximately 600mm and has a volume of 1284ML from dry. Doctors Swamp is a 200ha swamp which is part of the Doctors Swamp Natural Features Reserve (263ha) and was identified in the Box-Ironbark Forest and Woodlands Investigations (ECC, 2001). The Swamp is of bioregional significance and is managed by Parks Victoria).

Characteristics	Description
Name	Doctors Swamp
Mapping ID	7924374458
Area (ha)	200
Bioregion	Victorian Riverina Goldfields
Conservation Status	Bioregionally Significant
Water Supply	Local catchment run-off, Cattnach Canal
1788 Wetland Category	Shallow Freshwater Marsh
1994 Wetland Category	Shallow Freshwater Marsh Subcategory: Red Gum and Rush
Wetland Volume (ML)	1284 from dry
Mean wetland depth at Capacity (m)	0.6m

2.4.4 Environmental water sources

List available environmental water types (such as entitlements and passing flow provisions) and responsible agencies (i.e. environmental water holders or other agencies) that may apply to the asset, referring to descriptions of these sources in the Victorian Water Register, or similar. An example is provided in Table 2.

Table 2: Example summary of environmental water sources available to Doctors Swamp (GBCMA, 2011).

Environmental Water Type	Volume (ML)	Responsible Agency
Victorian River Murray Flora and Fauna Bulk Entitlement	27,600	Victorian Environmental Water Holder
One Tree Swamp Bulk Entitlement	9.3	Parks Victoria
Gaynor Swamp Bulk Entitlement	24	
Stockyard Plain Bulk Entitlement	112	Department of Environment, Land, Water and Planning

2.5 Current/historical hydrological regime and system operations

The purpose of this section is to describe the typical hydrological regime of the asset, and how this may have been modified or operated under current or previous water management (including delivery of environmental water).

An asset’s hydrological regime is determined by a combination of surface and groundwater inflows and outflows, in addition to precipitation and evapotranspiration. Volume, duration, frequency and seasonality (timing) are the main components of the hydrological regime for the asset.

Natural

How did the asset receive water naturally?

- Describe the likely hydrological regime under pre-regulated conditions: seasonality, flow durations and volumes, etc.
- Describe the degree of interaction between surface and groundwater (and note if this is unknown, both here and in the ‘Knowledge gaps and recommendations’ Section 2.12).

Current

How is water currently being managed at the asset?

- Has it been used for irrigation storage, flood mitigation, drainage, outfalls, water quality management?
- Describe the current degree of interaction between surface and groundwater (note if unknown).
- Describe the water regime under these conditions.
- Note, description of any infrastructure for, and constraints to, environmental water delivery should be provided in Section 2.10.

2.6 Water-dependent values

The purpose of this section is to describe the water-dependent values (local and/or regional) associated with the asset, for which environmental objectives and targets will be set, any shared benefits, and the current condition and trajectory without management intervention.

2.6.1 Environmental values

This section should list the environmental values that will be the focus of management at the asset. The list of values for the asset should be the result of information from scientific studies and discussions with relevant scientists, Traditional Owners and stakeholders. These values should be reflected in environmental objectives and SMART targets that will be presented in later sections of the EWMP.

Allocating values into themes and subthemes⁸ may help with mapping outcomes to regional strategies and to the Basin Plan. An example of using subthemes based on the structure of the objectives in

8. In previous EWMPs four themes have been adopted – fish, waterbirds, vegetation, river connectivity which grouped aspects of biodiversity and function together. These have been being expanded and refined in these 2021 guidelines, with likely further refinement in the next update of the guidelines.

Basin Plan Chapter 8 (the Environmental Watering Plan) is presented in Appendix C. These are broadly based on an ecological hierarchy of composition, structure, function and resilience at multiple scales (e.g. see (Dale & Beyeler, 2001)) and capture the common elements for which environmental water outcomes are targeted.

Ecosystem type

This section should list the aquatic ecosystem types present at the asset, including extent and key features. The EWMP Guidelines relate predominantly to the aquatic ecosystems of wetlands, rivers and creeks, but there is increasing inclusion or consideration of connected floodplain ecosystems and appropriate detail on these should be included. Spatial representations of ecosystem types at the asset are recommended in this section and can include a map of the asset area depicting ecosystem classification, rarity and depletion since European settlement. The following spatial layers can be used where appropriate: the Corrick (WETLAND_1994) layer, the current **Victorian wetland classification** (2014, wetland layer updated in 2017) and the Australian National Aquatic Ecosystem (ANAE)⁹. The significance of the asset or components of the asset according to national (e.g. if listed in the **Directory of Important Wetlands of Australia**) or international agreements (e.g. Ramsar wetland) should also be indicated.

Additional data on aquatic ecosystem type can be sourced from these spatial datasets:

- **WETLAND_CURRENT**
- **WETLAND_PRE_EUROPEAN**
- ANAE ecosystem type¹⁰.

Flora and fauna values

Vegetation is a key attribute used in the classification of aquatic ecosystems. The Ecological Vegetation Classes (EVC) found at the asset should be included in the mapping of the asset. Record the bioregional significance of the EVCs present at the asset (Table 3) and include full EVC description in an appendix.

Table 3: Example of conservation status of water-dependent EVCs in the target area for the Murray Fans Bioregion.

EVC number	EVC name	Bioregional Conservation Status
810	Floodway Pond Herbland	Depleted
106	Grassy Riverine Forest	Depleted
812	Grassy Riverine Forest / Riverine Swamp Forest Complex	Depleted (both EVCs)
295	Riverine Grassy Woodland	Vulnerable
814	Riverine Swamp Forest	Depleted
816	Sedgy Riverine Forest	Depleted
817	Sedgy Riverine Forest / Riverine Swamp Forest Complex	Depleted
819	Spike-sedge Wetland	Vulnerable
821	Tall Marsh	Least Concern

A detailed description of all water-dependent fauna (species and communities with or without conservation status) for which the asset and surrounding area is important for all/part of their life cycle should be provided in this section. The detail should include:

- conservation status and/or significance status of water-dependent species and communities (where applicable), including where listed in regional, Victorian, Commonwealth and international

9. ANAE type has been mapped for the Victorian Basin Plan area.

10. The current ANAE mapping layer is currently being updated by the Commonwealth Department of Agriculture, Water and the Environment (DAWE). In the interim, CMAs can obtain a copy of the ANAE GIS layer from the Environmental Water Team at the DELWP.

legislation, policy and listing and ranking systems¹¹. Reasons for the conservation status, threats to the species/communities and proposed recovery actions to mitigate the threat to be included (where known)

- detail of the watering requirements to support water-dependent species, including life history stages and habitat requirements for breeding, nesting, feeding and or nursery areas
- indication of whether the species are residents, regularly present or vagrants at the asset.

This section should include and refer to a table of significant species recorded at the asset (see Table 4 below as an example). Provide a full list of species present at the asset, including breeding records, as an appendix.

Table 4: Example of how to record water-dependent species of conservation significance. Note that the Victorian status examples are provisional.

Common name	Scientific name	Type	International agreements	EPBC status**	Victorian status - FFG
Western Swamp Cray	<i>Gramastacus insolitus</i>	I			EN
Growling Grass Frog	<i>Litoria raniformis</i>	A		VU	EN
Murray River Turtle	<i>Emydura macquarii</i>	R			CR
Freshwater Catfish	<i>Tandanus tandanus</i>	F			VU
Yarra Pygmy Perch	<i>Nannoperca obscura</i>	F			VU
White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>	B			CR
Regent Parrot*	<i>Polytelis anthopeplus</i>	B		VU	VU
Australasian Shoveler	<i>Spatula rhynchotis</i>	B			VU
Freckled Duck	<i>Stictonetta naevosa</i>	B			EN
Hardhead	<i>Aythya australis</i>	B			VU
Common Greenshank	<i>Tringa nebularia</i>	B	B, J, C, R		EN
Brolga	<i>Antigone rubicunda</i>	B			EN
River Swamp Wallaby Grass	<i>Amphibromus fluitans</i>	P		VU	-
Ridged Water-milfoil	<i>Myriophyllum porcatum</i>	P		VU	CR
Legend Type: Invertebrate, Amphibian, Reptile, Fish, Bird, Plant International agreements: Bonn Convention, JAMBA, CAMBA, RoKAMBA EPBC status: EXtinct, CRitically endangered, ENdangered, VUInerable Victorian status: EXtinct, CRitically endangered, ENdangered, VUInerable					

* Species included as vital habitat is water-dependent.

** Status under Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Note: At this point in the EWMP, authors may consider to what extent species are dealt with separately or in groups such as guilds or functional groups. For example, it might be appropriate to refer to large-bodied native fish as a single entity (e.g. for minimum depth of water to enable longitudinal connectivity), or to groups of species that are expected to respond to a watering event in a similar manner (e.g. flood spawners including golden perch and silver perch).

11. Victoria is undergoing a process of regulatory reform to harmonise environmental legislation and is moving towards a single list of threatened species and communities. Provisional assessments of the conservation status of FFG and Advisory Listed species have been made and are being finalised in 2021, for latest updates check <https://www.environment.vic.gov.au/conserving-threatened-species/threatened-list>. Species have been assessed using the IUCN classification and where previously were listed as threatened under the FFG, they will now have a Victorian status like that of the EPBC (i.e., critically endangered, endangered, and vulnerable).

Current ecological condition

The current ecological condition of the asset should be described in this section focussing on components of condition that can serve as a reference point or baseline (not to be confused with reference condition) for future condition monitoring and/or intervention monitoring. This section should be kept short but provide scene setting for the asset, focussing on condition that may be impacted by the environmental watering, particularly the factors that are addressed in environmental objectives.

This section should describe the current situation and the likely outcome of continuing current hydrological management (i.e. the trajectory for ecological condition). Future condition monitoring should be able to refer to this section.

This may include a literature review of reports or other information to date, or reference to other documents if necessary or relevant. If available, provide an Index of Wetland Condition (IWC) or Index of Stream Condition (ISC) assessment for the asset and a description of what the results mean. Be sure to include the year the most recent IWC or ISC assessment was undertaken. An example based on the Nyah Vinifera EWMP (Mallee CMA, 2015) is presented in Text Box 2.

2.6.2 Shared benefits

While the primary requirement of environmental watering is to achieve environmental objectives and outcomes, environmental water can provide benefits beyond **environmental** objectives. Both Water for Victoria – Victoria’s water plan that sets long-term direction for managing Victoria’s water resources (DELWP, 2016) - and the 2019 *Water Act* amendments state that all water management agencies, including CMAs, Melbourne Water and the VEWH, will consider achieving **shared benefits** in environmental watering decisions. Shared benefits will arise from improving the condition of an asset by using environmental watering, which in turn may contribute to benefits or outcomes for other water users and values, including for cultural outcomes and increased recreation and amenity value. Some examples of environmental watering actions that have resulted in shared benefits are provided in Table 5.

Table 5: Example of shared benefits derived from environmental water delivery (VEWH, 2020).

Value	Year	Beneficiary	Description	Alignment with potential watering actions
Recreational, economic	2017-18	Kayakers, rafting companies	An autumn fresh will be timed so that kayakers can take advantage of the white-water rafting conditions. If possible, the peak of the flow will occur over the ANZAC day long weekend to maximise opportunities. The adjusted timing will not impact environmental outcomes associated with the fresh targeting grayling movement and spawning	Autumn fresh
Recreational	2017-18	Shooters	Autumn, winter and spring freshes make waterbird habitat available by connecting billabongs that provide game hunting opportunities for landholders.	Autumn fresh
Economic	2018-19	Irrigation diverters	Summer freshes will improve water quality along the Loddon River providing a benefit for licenced diverters	Summer fresh and low flows
Aboriginal cultural	2018-19	Traditional Owners; Gunditj Mirring Traditional Owners Aboriginal Corporation; Barengi Gadjin Land Council and Glenelg	The timing of environmental water released from Rocklands Reservoir for a summer-autumn fresh to improve river health and reduce salinity may be aligned to coincide with the Johnny Mullagh community cricket match, an important community and cultural event for Traditional Owners and the local Harrow township. Some of the Aboriginal values at Harrow that can be supported by environmental water releases include cultural heritage sites, particularly scarred trees and native plants which are sources of traditional foods and medicines.	Summer fresh

As environmental water delivery to achieve environmental objectives and outcomes is the **primary focus**, shared benefits will only be considered where they are compatible with the set environmental objectives and outcomes. Watering actions may be modified to accommodate shared benefits where the modification does not compromise the environmental outcome.

Traditional Owner cultural values

With the amendment of the *Water Act 1989* in 2019, water management agencies have obligations to genuinely consider Traditional Owner values and uses when making decisions about the use of environmental water and to provide opportunities for relevant Traditional Owner groups to participate or contribute to decision-making. Traditional Owner cultural values must therefore be considered when setting environmental objectives. In the context of an EWMP, Traditional Owner cultural values are relevant where they are shared with the environmental values being managed.

Relevant Traditional Owner groups must be offered the opportunity to provide information on Traditional Owner cultural values and how they relate to the environmental values of the asset.

Any information provided by Traditional Owners must only be shared and presented in an EWMP with free prior and informed consent from the relevant Traditional Owners, in a culturally sensitive way.

While the primary purpose of environmental watering is to support environmental objectives, which may often align with cultural objectives (e.g. meeting watering requirements of totem species, improved fishing or hunting opportunities, support of cultural events), cultural values are not equivalent to environmental values. Cultural values have intrinsic significance and include a spectrum of diverse values that will differ between Traditional Owner groups and individuals. Cultural values may also relate to cultural heritage or contemporary or ongoing values.

Where possible, environmental water must be managed in a way that supports Traditional Owner objectives, cultural values and connection to Country, and provides opportunities for Traditional Owners to partner in water management. More information on how individual Traditional Owner groups wish to be partnered with in water management and an insight into associated values, uses, objectives and outcomes for water is included in Appendix B and in the Water Resource Plans' compilation of Traditional Owner objectives and outcomes (note: some of this information may now be superseded, please verify with each Traditional Owner group that the information is current).

In 2020, *First Nations People participation in environmental watering* was released (MDBA, 2020), which aggregates information provided by sixteen participating Nations to identify shared objectives, priorities, and issues across eight key themes including:

- waterways and places in need of water
- species in need of water
- Basin Plan annual watering priorities (relating to BWS expected environmental outcomes):
 - native fish
 - vegetation
 - waterbirds
 - flows and connectivity
- waterway threats and impacts
- preferences for Traditional Owners' involvement and participation.

The themes above provide a strong basis for discussions with Traditional Owners and Aboriginal Victorians about the development or update of EWMPs in northern Victoria.

It may be useful to include a table to capture the cultural values identified by Traditional Owner groups across each of the eight key themes listed above at the asset. Where possible, the cultural values identified should be linked to the environmental values.

Recreational values

The relevant historic and current recreational values of the asset should be identified in this section following a discussion with stakeholders, including the community (include information in a table format if appropriate). When possible, a description of innovative ways environmental water delivery can achieve shared benefits for recreational values identified by stakeholders should be included.

2.6.3 Trajectory of change

How is the condition expected to respond without (further) management intervention?

- Use a timescale of 10 years.
- Where possible, use terms aligned with the Victorian Waterway Management Strategy, VEWH's Seasonal Watering Plans and Basin Plan (e.g. improve, increase, reduce, maintain, re-establish – see Section 2.8.4).
- Map out the 'do nothing' option: will the asset deteriorate? In what way? What are the ecological or condition risks associated with not providing water/actively managing water?
- Will the asset change without long-term (≥ 10 years) environmental watering? Picture the EWMP as a business case for watering – if not done, will the asset change for the worse? How will climate change impact this asset?
- If the 'do nothing' trajectory would result in deterioration of asset condition, and proposed changes to the watering regime through the EWMP update or development could improve asset condition, such changes can be justified in this section (for example, watering at a different time of year/altering watering frequency).
- Information about the environmental condition of the system within which the asset is situated (catchment/basin/ecosystem/bioregion) can be included here. This would ideally include whether environmental condition of the entire system (or only part of the system) is improving or deteriorating based on the current environmental watering regime for the asset, or likely from proposed changes to the watering regime at the asset through the EWMP update/development.
- Note the potential of Basin Plan implementation to alter the flows and condition - a sub-heading and short statement on Basin Plan implications should be added where appropriate.

Text Box 2: Example description of asset condition, Nyah and Vinifera (Mallee CMA, 2015).

The condition of two of the eleven wetlands within the target area of the Nyah Vinifera waterway management unit were assessed in December 2009 using the Index of Wetland Condition (IWC). The overall IWC score for both wetlands assessed in this area in December 2009 was 6 out of 10, which is considered to moderate (see table below).

IWC sub-index	Wetland #7527147125*		Wetland #7527153101+	
	Score /20	Category	Score /20	Category
Wetland catchment	18	Excellent	18	Excellent
Physical form	20	Excellent	20	Excellent
Hydrology	0	Very poor	0	Very poor
Water properties	17	Excellent	17	Excellent
Soils	19.8	Excellent	19.8	Excellent
Biota	11.4	Poor	8.4	Poor
Overall IWC score	6 / 10	Moderate	6 / 10	Moderate

*Unnamed Wetland #7527147125 situated at the north end of Nyah section

+Unnamed Wetland #7527153101 situated in the middle of Nyah section

The hydrology and biota sub-indices were considered to be in very poor and poor condition, respectively. Hydrology was considered to be very poor due to a lack of water reaching the wetlands in more than a decade due to river regulation, dry conditions and being beyond the extent of recent environmental water events. These altered conditions are in turn reflected in the poor biota score which indicates a lack of diversity and abundance of the species expected to be present in the EVC for the wetland.

The altered water regime is considered the major threat for the target area and is the primary factor behind the development of the Nyah and Vinifera EWMP.

2.7 Managing water-related threats

The purpose of this section is to identify water-related threats to the asset that may limit achievement of environmental objectives, as well as the likelihood and consequences (risk) of these threats occurring. Threats can be related to factors that constrain the achievement of the stated objectives, as well as inadvertent outcomes associated with the delivery of environmental water, including consideration of potential impacts to cultural heritage. This section is intended to lead into the setting environmental objectives in the 'Management Objectives' section.

In Section 2.7, the water-related threats to the environmental values indicated in 'Water dependent values' should be stated and described. Types of threats that may be identified and described are outlined in the **Threats Classification Scheme of IUCN Red List**. Noting climate change and severe weather as threats to water-dependent values is highly recommended in this section. Waterway managers also participate in annual risk assessment workshops with VEWH and other program partners for the seasonal watering proposal process. It is likely that this work will also identify and evaluate longer term threats and risk treatments. This information should also be included in EWMPs, when updated. An example description of water-related threats for Doctors Swamp (GBCMA, 2011) is presented in Text Box 3.

Text Box 3: Example description of water related threats to Doctors Swamp (GBCMA, 2011).

- Altered water regime –The natural hydrological regime of Doctors Swamp has been altered by the construction of the Cattnach Canal and the regulation of the Goulburn River. This in turn has modified the structure and composition of the aquatic vegetation. However, due to a successful environmental water trial, it is now possible to deliver water to allow a more natural hydrological regime.
- Altered physical form – Doctors Swamp has been physically reduced by past excavation activities, the construction of the Cattnach Canal to its northern margin and the construction of roads along the southern and western margins. Impacts on the bathymetry of the wetland have not yet been identified. Future impacts on the physical form of the wetland are unlikely to occur due to the protection provided by its current land status.
- Poor Water Quality – Poor water quality including low dissolved oxygen may reduce habitat availability and quality for native aquatic biota, reducing its diversity and abundance. The water quality in Doctors Swamp may be impacted by:
 - Run-off containing high nutrient loads or pollutants entering from surrounding agricultural land.
 - Introduction of exotic fish such as carp (*Cyprinus carpio*) via water delivery from the Cattnach Canal.

The EWMP should identify the relative risk rating (Table 6) that each threat poses to achieving the environmental objectives (i.e. high, medium, low) in a manner consistent with AS/NZS ISO 31000:2018 Risk Management principles¹². It should also describe the proposed risk management measures or treatments and the residual risk once these are applied.

Risk management measures are to be decided in consultation with relevant partners, including Traditional Owners, and agencies. Further guidance for risk ratings and management to be considered for the next update to the Guidelines.

Some threats and resulting risks may be difficult to manage or remediate (i.e. residual risk remains high, even after management measures are in place). These are important to identify and note for monitoring in either the 'Demonstrating outcomes' or 'Knowledge gaps and recommendations' Sections 2.11 and 2.12.

Operational risks for specific events, including potential impacts to cultural heritage, should also be set out in seasonal watering proposals.

12. A standard set of likelihood and consequence criteria descriptions is planned for the next update to the EWMP guidelines.

Table 6: Example risk matrix (H: High; M: Medium; L: Low).

Cause	Threat	Likelihood	Consequence	Risk	Proposed risk management measure (risk treatment)	Residual risk
Presence and operation of irrigation infrastructure	Altered water regime that impacts aquatic vegetation structure and composition	H	M	M	Water delivered from irrigation channel via an inlet gate	L
Entrainment of organic matter and nutrients in agricultural runoff	Poor water quality (e.g. low DO, high nutrients) that reduces habitat quality for aquatic fauna, including native fish and invertebrates	M	M	M	Fence off and increase riparian ground cover to intercept nutrients in runoff	L
Disturbance due to carp	Poor water quality (e.g. increased turbidity) due to disturbance of sediments that reduces native fish and aquatic macrophyte habitat quality	H	H	H	Installation of carp screens on inlet structure	L
Erosion and sedimentation caused by wave action and/or in channel flows	Displacement of stone artefacts, accelerated deterioration of shell middens and destabilisation of dead scar trees	H	L*	M	Regular watering to increase growth of native vegetation and stabilise soil; localised protection measures as required (e.g. relocation of artefacts, geofabric to protect sensitive areas, baffles to reduce flow velocities)	L

* Increased erosion has been assessed relative to erosion that would occur under a natural watering regime.

Note that the details and roles of responsibility for the management of each threat are to be set out for particular watering events in seasonal watering proposals.

2.8 Management goals, objectives and targets

*The purpose of this section is to identify the long-term **goal** for the asset, the environmental **objectives** which describe the intended outcomes of watering and measurable **targets**.*

2.8.1 Management goal

State the long-term (20+ year) vision or management goal(s) for the asset. The management goal(s) should reflect the overall values of an asset, and a vision for its future condition. It should also be consistent with the long-term aspirations presented in regional waterway strategies, or similar. It needs to have been derived by a transparent and documented process and have a sound rationale (especially if proposing a substantive change from recent management).

An example of a management goal from the Wimmera River and Terminal Lakes EWMP (Wimmera CMA, 2020) is provided in Text Box 4.

Text Box 4: Example management goal from the Wimmera River and Terminal Lakes EWMP, demonstrating the link to the Wimmera Waterway Strategy.

The management goal for the Wimmera River and Terminal Lakes EWMP is:

Environmental water will maintain and enhance the condition of the Wimmera River and terminal lakes to support its formally recognised status, its role in providing connectivity for flora, fauna, carbon and nutrients as well as maintaining its strong environmental values. This includes diverse, abundant and resilient native fish and vegetation communities, geomorphic diversity, sustainable platypus population and mitigated impacts of poor water quality.

It is strongly linked to the goals of the Wimmera Waterway Strategy:

- Maintaining and improving the values and condition of waterways that have formally recognised significance.
- Improve connectivity and condition along priority wetland systems and riparian corridors.
- Improved water quality in priority areas for water supply, environmental condition and recreation.
- Waterways with high social, cultural and economic values are maintained in a state that continues to support those values in line with climatic conditions.

2.8.2 Environmental objectives and targets

Set one or more environmental objectives for an EWMP, and one or more targets for each objective. Translating the management goal into environmental objectives is the most important part of the EWMP.

Environmental objectives describe the asset manager and community's intended 10-year outcomes of the deployment of environmental water. They will aim to meet the management goal.

The objectives may be based on the scientific studies undertaken, Traditional Owner and community and/or other stakeholder goals. Indicate on what basis the objectives have been chosen and reference any relevant documents or legislation. Sub-objectives may also be used, e.g. the objective to improve broilga population numbers may be supported with several sub-objectives covering geomorphology, vegetation, invertebrates, etc., required to support this objective.

Targets are fully measurable sub-objectives¹³.

For the purposes of EWMPs, environmental objectives can be more general, but targets require measurable ecological parameters. They should be as SMART as possible (see Section 2.8.3).

The key features of effective environmental objectives and targets are that they (modified from (Davies, 2013)):

- are structured within a hierarchy (overall goal > environmental objectives > environmental 'sub-objectives' (where appropriate) > targets)
- define the matters which each objective relates to (e.g. connectivity, life cycles, lake levels, representative populations, species richness, etc.)
- articulate defined desired **outcomes**
- employ general terms of intent such as: protect; restore; ensure resilience; able to support; no loss of, or degradation; improvements (as specified in Section 2.8.4 on consistent terminology)
- facilitate setting of annual watering priorities and quantifying watering event regimes
- provide a core basis for design of monitoring and evaluation activities at asset and regional scales
- establish integration with objectives being established by other parties/policy instruments/strategies
- use SMART criteria.

13. This objective/target hierarchy is being introduced to align EWMPs better with Victorian Long-Term Watering Plans (LTWPs) and the Victorian FLOWS method and provide greater clarity for allocating environmental water and monitoring purposes. It is also consistent with the approach being incorporated into objectives for Victorian Living Murray icon sites.

More examples of environmental objectives and targets are shown in Table 8.

Note that under the Basin Plan Management Framework, any asset that is considered a priority environmental asset or that supports priority ecosystem functions is required to have environmental objectives and targets relevant to the Schedule 8 and 9 criteria that the asset meets (see Section 2.8.6 for further guidance).

The use and allocation of environmental water is one of the significant programs in Victoria with the potential to maintain and improve the values of Ramsar sites, in addition to routine catchment and land management. Environmental objectives for assets within Ramsar sites should align with the management objectives in the relevant Ramsar site management plan. This aligns with the Basin Plan objective for the protection and restoration of Ramsar wetlands that depend on Basin water resources to maintain their ecological character (Basin Plan s 8.05(2)(a)).

Text Box 5: Definitions used in these Guidelines.

EWMP Environmental Objective (see Section 2.8.2)

Specifies the desired outcome(s) for the trajectory of change for a particular value or group of values over a specified period (e.g. ten years) that will achieve the management goal. This may require a mixture of environmental watering and other complementary management actions.

*e.g. Improve condition from baseline (2006) levels of River Red Gum (*Eucalyptus camaldulensis*), Black Box (*E. largiflorens*) and Lignum (*Duma florulenta*) by x% to sustain communities and processes typical of such communities at site x by 2025.*

EWMP SMART Targets (see Section 2.8.3)

The fully measurable description of an environmental objective.

e.g. In standardised transects that span the floodplain elevation gradient and existing spatial distribution at site x, 70% of River Red Gum trees with Tree Condition Index $\geq x$ and annual mortality $< x\%$.

EWMP Expected Watering Effects (see Section 2.9.2)

Specifies the intended environmental water delivery and the water regime required (which flow components/events) to achieve the desired environmental outcome(s) over a specified period.

e.g. Provide an annual flow fresh in spring of magnitude and shear stress sufficient to redistribute sediment within the channel in order to improve the quality of riffle habitats and replenish low lying bars in Reach X of River Y.

2.8.3 SMART criteria

While EWMP environmental objectives *can* be more general, the associated EWMP targets should aim to meet SMART criteria. If targets set prior to an EWMP update are not SMART they should be updated to meet SMART criteria, e.g. Figure 2 and Table 8 (modified from (Davies, 2013)):

- **Specific** – clear and unambiguous. The use of general statements should be avoided. Targets should include the asset name and common as well as species names. Magnitude of outcome and scale should be clearly specified.
- **Measurable** – quantifiable, containing a measurable element that can be readily monitored to determine success or failure. Indicators should be available or easily developed, and data collected can be analysed using accepted statistical practices.
- **Achievable** – realistic and attainable within a specified timeframe and the resources available or anticipated. Constraints, such as limitations on water delivery, and current climate variability should also be considered.
- **Relevant** – considerate of asset values and the spatial and temporal scale of environmental response to the environmental watering regime applied. Considered feasible by knowledgeable stakeholders.
- **Time-bound** – specifies a time scale in which the expected environmental outcome is met/assessed. Takes into consideration likely lags in responses.

Setting SMART targets (including to meet all SMART criteria) may not be a simple process and may require specialist input to ensure they are realistic and measurable within a specified timeframe.

The aim is to make targets as SMART as possible. Outline reasons why any SMART criterion may not be fully developed, and the level of associated uncertainty (e.g. moderate level of uncertainty associated with achievability due to insufficient knowledge on the factors that might impact/constrain timely environmental outcomes). It is also important to document for each target whether monitoring is a) ongoing, b) planned, c) aspirational, or d) not intended.

Whilst many SMART targets might start with high levels of uncertainty, this will be reduced over time as new knowledge is gained through an adaptive management approach to assessing watering outcomes at individual assets and across multiple assets at a regional scale. SMART targets can be refined to better meet SMART criteria with new and relevant data.

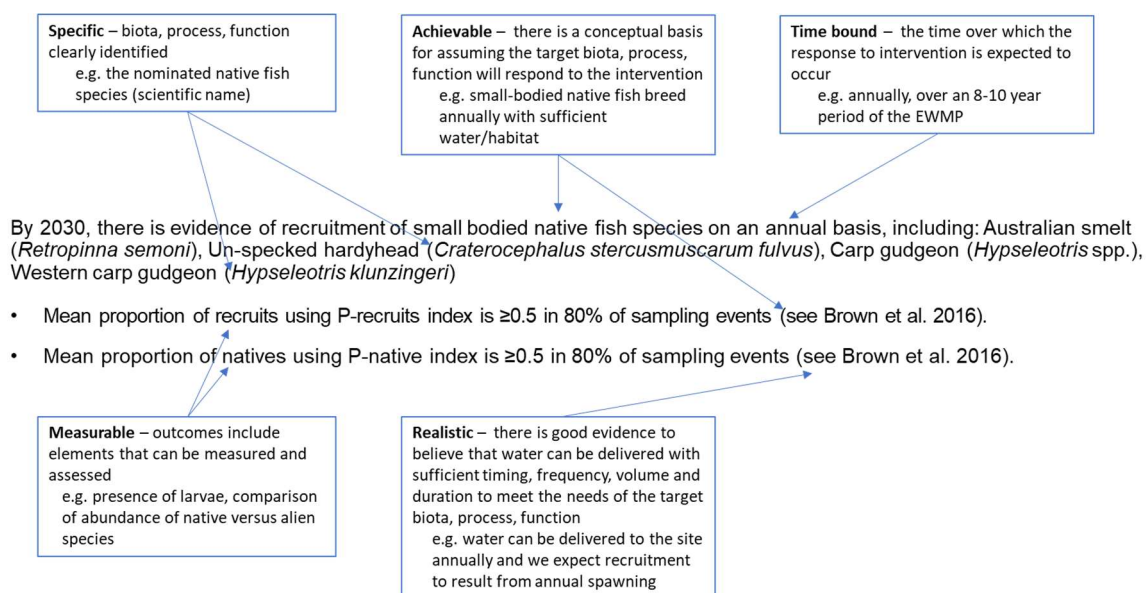


Figure 2: Example SMART target related to the recruitment of small-bodied native fish (adapted from (Butcher, 2019a)).

2.8.4 Consistent terminology

When writing environmental objectives, care should be taken to avoid the use of variable or ambiguous terms (particularly verbs) wherever possible. This will increase clarity and consistency when describing the desired outcomes. Where applicable, the terms of the environmental objectives should align with terminology used in the Victorian FLOWS method, seasonal watering plans and regional waterway strategies; the Basin Plan (e.g. Schedule 7 targets, see Appendix D in these Guidelines), and Ramsar site management plans. Some examples are provided in Table 7.

Table 7: Example terminology to be adopted in environmental objectives (adapted from (VEWH, 2020)).

Preferred term	Examples to avoid	Example of preferred usage
Improve	Enhance, ameliorate	Improve water quality in river pools, ensuring adequate dissolved oxygen concentration in water to maintain aquatic animals (environmental objective)
Increase	Extend, expand, grow	Increase longitudinal connectivity to allow native fish to access new habitat (expected watering effect)
Maintain	Support	Maintain the population of resident platypus (environmental objective)
Reduce	Decrease, limit, prevent	Reduce colonisation of exotic plant species on riparian zone (expected watering effect)

Table 8: Example targets linked to environmental objectives for Lindsay Mulcra and Wallpolla TLM (The Living Murray) Icon Site (adapted from (Butcher & Cottingham, 2019b)).

Example environmental objectives	Example targets
<p>Condition of priority environmental asset - Species richness and abundance aquatic vegetation</p> <p>Improve the species richness and abundance of native wetland aquatic vegetation functional groups in the Lindsay, Mulcra, Wallpolla Island wetland complex from baseline (2006) levels by 2030.</p>	<p>Relevant functional groups include those identified in (Huntley, 2016): amphibious plants, amphibious floating plants, amphibious herbs, amphibious woody plants, floating plants and terrestrial and drought tolerant functional groups. By 2030, achieve:</p> <p>Reference target for wetland vegetation communities at Lindsay, Mulcra, and Wallpolla for water responsive species richness 90th percentile ≥ 4 in ephemeral wetlands in 80% of years.</p> <p>Reference target for wetland vegetation communities at Lindsay, Mulcra, and Wallpolla for water responsive species abundance 90th percentile ≥ 27 in semi-permanent wetlands in 80% of years.</p> <p>Reference target for wetland vegetation communities at Lindsay, Mulcra, and Wallpolla for water responsive species abundance 90th percentile ≥ 31 in ephemeral wetlands in 80% of years.</p>
<p>Condition of priority ecosystem function - Create vital habitat – feeding habitat for waterbirds</p> <p>Maintain or increase vital habitat (feeding) that supports sustainable communities of colonial nesting waterbirds, waterfowl, waders and piscivores to maintain the current species diversity at the Lindsay, Mulcra, and Wallpolla icon site by 2030.</p>	<p>By 2030, maintain or increase feeding habitat for waterfowl, herbivores and piscivores of waterbirds, 8 years in 10, with the following common species recorded annually:</p> <p>Australian Wood Duck (<i>Chenonetta jubata</i>), Australian Darter (<i>Anhinga novaehollandiae</i>), Australasian Grebe (<i>Tachybaptus novaehollandiae</i>), Little Pied Cormorant (<i>Microcarbo melanoleucos</i>), Pacific Black Duck (<i>Anas superciliosa</i>), Pied Cormorant (<i>Phalacrocorax varius</i>), White-faced Heron (<i>Egretta novaehollandiae</i>), and Yellow-billed Spoonbill (<i>Platalea flavipes</i>).</p> <p>Feeding habitat is defined as a mixture of deep feeding areas (area of water >1m) and shallow feeding areas (area of water <5m depth and/or drying mud) with intermittent inundation of densely vegetated shrublands (flooding of lignum habitat for 5-6 months every 2 years).</p>
<p>Recruitment and populations of native fish- Native fish recruitment</p> <p>By 2030, improve native fish populations (large and small bodied fish) across Lindsay, Mulcra, and Wallpolla and their relative abundance and diversity; assessment to include comparison with 2006-2012 levels for short-lived species and the spread of age-classes for long-lived fish.</p>	<p>By 2030, average (mean \pm 95% CI) number of large bodied native species recorded per site for riverine, anabranch and channel habitats is ≥ 6.7 (see (Huntley, 2016)) in 80% of years. Species include: Murray Cod (<i>Maccullochella peelii</i>), Silver Perch (<i>Bidyanus bidyanus</i>), Golden Perch (<i>Macquaria ambigua</i>) and Catfish (<i>Tandanus tandanus</i>).</p> <p>By 2030, average (mean \pm 95% CI) number of small bodied native species recorded per site for wetland habitats is ≥ 4.8 (see Huntley et al. 2016b) in 80% of years. Species include: Australian Smelt (<i>Retropinna semoni</i>), Bony Herring (<i>Nematalosa erebi</i>), Carp Gudgeon (<i>Hypseleotris</i> spp.), Western Carp Gudgeon (<i>Hypseleotris klunzingeri</i>), Flyspecked Hardyhead (<i>Craterocephalus stercusmuscarum fulvus</i>), Murray-Darling Rainbowfish (<i>Melanotaenia fluviatilus</i>).</p> <p>By 2030, evidence of recruitment of small bodied native fish species on an annual basis, including: Australian Smelt (<i>Retropinna semoni</i>), Bony Herring (<i>Nematalosa erebi</i>), Carp Gudgeon (<i>Hypseleotris</i> spp.), Western Carp Gudgeon (<i>Hypseleotris klunzingeri</i>), Flyspecked Hardyhead (<i>Craterocephalus stercusmuscarum fulvus</i>), Murray-Darling Rainbowfish (<i>Melanotaenia fluviatilus</i>):</p> <p>Mean proportion of recruits using P-recruits index is ≥ 0.5 in 80% of sampling events (see (Brown, 2016)).</p> <p>Mean proportion of natives using P-native index is ≥ 0.7 in 80% of sampling events (see (Brown, 2016)).</p>

2.8.5 Regional significance

A description of the regional importance of the asset should be included to inform broader prioritisation of watering actions (see also Sections 2.8.6 and 2.8.7 specifically regarding Basin Plan significance). How will meeting objectives at this particular asset contribute to landscape or regional scale outcomes? This is an important factor for environmental water holders planning water allocations.

The description should refer to information described in previous sections on 'Water dependent values', including 'Environmental values', 'Current condition', etc. (Sections 2.6 and 2.6.1). Listed species and significant ecosystem types are captured in the descriptions of water-dependent biota at the asset scale in Section 2.6.1. In this section of the EWMP, the significance of environmental values at a broader scale – the landscape, regional, Basin¹⁴, State, Commonwealth (e.g. [Directory of Important Wetlands in Australia](#)) or international (e.g. Ramsar sites)¹⁵ scale – should be captured, where applicable and known, as this will inform decisions on environmental water allocation. For example, assets which support Matters of National Environmental Significance (MNES) under the *EPBC Act* will likely be deemed of greater significance than those without these values and may be considered higher priority for watering.

The description should also reference the relevant Regional Waterway Strategy that identifies priority waterways for management actions, including delivery of environmental water, to maximise environmental outcomes at the regional scale. The iterative renewal of regional waterway strategies provides opportunities for partners and stakeholders, including Traditional Owners and community members, to input to regional priorities.

The above information should be used to:

- explicitly consider the relative importance of ecosystem values, components, processes and ecosystem services the asset provides within an international, Commonwealth, State, Basin/region context
- identify environmental objectives that are a high priority to achieve at the asset through environmental watering actions, and that are also a high priority at a landscape scale
- identify other asset-based environmental objectives that contribute (but are not essential) to achieving landscape-scale outcomes
- give a clear focus to the environmental objectives addressed at both the asset and at larger scales, as well as when setting SMART targets and undertaking monitoring and evaluation of outcomes.

The VEWH in consultation with DELWP are also currently developing a prioritisation framework to aid in transparent decision making regarding annual watering actions and ensure both asset and landscape/regional outcomes are achieved in environmental water management. When this framework is ready, these guidelines will be updated as required.

2.8.6 Alignment to Basin Plan (northern Victoria EWMPs)

EWMP objectives/targets should be updated to *improve* consistency with the [Basin Plan](#); full alignment will be a complex task that is not likely to be achieved in the near-term, but is an important future goal.

A process to align management objectives/targets to Basin Plan and include SMART criteria has been carried out for the Victorian Living Murray icon sites (see (Butcher, 2019a)). This process can be used as a model for future updates of EWMP objectives at other assets (see Step by Step, Section 1.2). Further materials and examples are available from DELWP to assist with this process.¹⁶

14. Where appropriate (i.e. in northern Victoria).

15. (Ramsar Convention, 2005).

16. MDBA requires DELWP to complete 5-yearly reporting on the achievement of environmental outcomes at an asset (site) scale. This is legislated in Schedule 12 of the Basin Plan (Matter 8). Environmental objectives for each asset are required to align with objectives stated in Chapter 8 of the Basin Plan (see Appendix D, Table 18). Aligning EWMP objectives and targets (wording and themes) with Chapter 8 objectives will be required in all new or updated EWMP objectives. This will avoid having to "retrofit" information provided by CMAs and will enable more accurate reporting to the MDBA. Further, aligning all EWMP objectives and targets to Basin Plan language will improve consistency across northern Victoria, which will assist in state-scale environmental water management and reporting. In citing the relevant Basin Plan objectives, emphasis should be given to including only those objectives for which the asset is likely to make an important contribution at the Basin-scale (i.e. the aim is to focus on a smaller number of important, realistic objectives and outcomes, rather than an exhaustive list).

Basin Plan (Schedule 7) targets (see Appendix D, Table 19) can serve as a useful guide to help word EWMP targets in Basin Plan language.¹⁷ Basin-wide environmental watering strategy (BWS) outcomes (see Appendix D, Table 20) should also be linked to EWMP objectives and targets.

Alignment of EWMP objectives with the Basin Plan objectives and targets will also be improved by citing the Basin Plan criteria for Priority Environmental Assets (PEAs) (Schedule 8) and Priority Ecosystem Functions (PEFs) (Schedule 9) (Appendix F, Table 24 and Table 25). When citing the criteria met, EWMPs should also specify as far as possible the relevant ecosystem, species or ecological function that meets each criterion. It is expected that each criterion met will be accompanied by one or more environmental objective.

2.8.7 Documenting EWMP updates and mapping to Basin Plan and other legislative and policy instruments

When updating existing EWMP objectives all changes should be documented including a rationale or justification of why changes have been made. Where alignment to the Environmental Management Framework of the Basin Plan is applicable line of sight to the following is required:

- the Chapter 8 Environmental Watering Plan objectives and expected environmental outcomes as specified in the Basin-wide Environmental Watering Strategy (see Appendix D)
- Long Term Watering Plan (LTWP) objectives and targets (Appendix E)
- Schedules 7-9 targets and criteria (Appendix F).

An example of this mapping is provided in Table 9. This material can be included as an appendix of the EWMP to record the adaptive management of assets and changes in priorities over time.

Table 9: Example updated EWMP objective outlining factors to be considered if mapping to Basin Plan Environmental Management Framework (adapted from (Butcher & Cottingham, 2019a)).

Items to consider	Explanation and example
Previous EWMP objective	Restate the original objective. Example: <i>Increase distribution, number and recruitment of local wetland fish – including hardyhead, Australian smelt and gudgeon by providing appropriately managed habitat.</i>
Comments	Provide a short justification of why the objective has been updated. Consider the following: <ul style="list-style-type: none"> • All species included in objectives and targets should have the scientific species name included, as they can have different common names. • Splitting this objective, e.g. an objective for increased distribution, for increased number, for increased recruitment; or addressing objective through multiple expected watering effects and/or multiple targets. • A supporting statement is required for the objective, e.g. survey results indicate that the small-bodied fish species present at the asset are relatively predictable; all species included in the objective are expected to be encountered over several sampling events (cite reference(s) in support). • Including objectives for Aboriginal cultural values where information has been provided and there is alignment with environmental values. Example: <i>Objective is not SMART as it does not identify the species names – which hardyhead is relevant? It has multiple outcomes in the one objective: distribution, number of fish, recruitment of fish and managed habitat. “Number” is ambiguous as it could mean species richness or abundance. “Local wetland fish” is also poorly articulated – this could include wetland specialists, small and large bodied species, or just small bodied species. The mention of “appropriately managed habitat” is vague.</i>
Basin Plan Chapter 8 (EWP) objective(s)	Identify the most relevant Basin Plan Environmental Watering Plan (EWP) objective. Depending on how the original objective is written several EWP objectives may be relevant. List them in order of relevance. Most of the Basin Plan objective provide a range of options for an outcome in a single objective. For example, objective 8.06,6(a) is about ecosystem functions that maintain populations – the outcome of objective 8.06,6(a) could relate to

17. Although note that Schedule 7 targets are not themselves SMART.

Items to consider	Explanation and example
	<p>recruitment, and so aligns with one of the potential examples in our example objective which requires updating.</p> <p>8.06,6(a) Protect and restore ecosystem functions of water-dependent ecosystems that maintain populations (for example recruitment, regeneration, dispersal, immigration and emigration) including by ensuring that: flow sequences, and inundation and recession events, meet ecological requirements (for example, cues for migration, germination and breeding)¹⁸.</p> <p>The EWP objective can be shortened to just the code and the ecosystem functions that are to be addressed at this asset. As there are multiple outcomes in the example objective it is likely that multiple EWP objectives would be identified as relevant. Due to the vagueness and in the absence of any other guidance a general 'all-purpose objective' is 8.05,3(b) which is focused on representative populations and communities, and preventing declines in native biota, of in this case, fish.</p> <p>8.05,3(b) An objective is to protect and restore biodiversity that is dependent on Basin water resources by ensuring that: representative populations and communities of native biota are protected and, if necessary, restored.</p> <p>Example: 8.06,6(a) – <i>recruitment of native fish.</i> 8.05,3(b) – <i>representative communities of wetland fish.</i></p>
Schedule 7 targets	<p>Where possible, define the spatial extent of the population and associated habitat and/or function so that contribution(s) to Schedule 7 targets can be assessed. Schedule 7 targets will be used to assess if the EWP objectives are met.</p> <p>Example: <i>Increased recruitment and populations of native water-dependent species: recruitment and populations of native fish.</i></p>
PEA/PEF¹⁹ criteria met	<p>Several criteria in Schedule 8 and 9 may be of relevance for a single objective. In this case record them in order of relevance. In other instances, only one may be relevant. In the example relating to native fish recruitment, the ecosystem function criteria would be listed first.</p> <p>Example: PEF: 1(c): <i>a diversity of important feeding, breeding and nursery sites for native water-dependent biota.</i> PEA: 5(a): <i>The water-dependent ecosystem supports, or with environmental watering is capable of supporting, significant numbers of individuals of native water-dependent species.</i></p>
BWS outcome	<p>The BWS focuses on four main themes, river connectivity, vegetation, waterbirds and fish. Not all assets will have objectives for which there are expected environmental outcomes.</p> <p>Example: B4.6: <i>Restored distribution and abundance to pre-2007 levels: Un-specked hardyhead, Australian smelt and gudgeon spp.</i></p>
LTWP objective(s) and target(s)	<p>LTWPVM16: Maintain distribution of threatened small-bodied native fish in wetlands.</p> <p>Example: LTWPVM16: <i>Maintain distribution of threatened small-bodied native fish in wetlands.</i></p>
Updated environmental objective and target	<p>Update the language of the objective to align to the Basin Plan instruments listed above. If either of the BWS outcome or LTWP target are appropriate, then use these. Otherwise write both the objective and target using the SMART approach.</p> <p>Example: Objective – <i>By 2030, maintain recruitment and nativeness of populations of small-bodied native fish at Example Lakes.</i></p>

¹⁸ Emphasis added

¹⁹ Criteria for identifying an asset as a PEA (Priority Environmental Asset) or an ecosystem function as a PEF (Priority Ecosystem Function) are set in Schedules 8 and 9 of Basin Plan. All assets with EWMPs in northern Victoria are considered to be PEAs.

Items to consider	Explanation and example
	<p><i>Target – By 2030 maintain self-sustaining populations of carp gudgeon spp. (Hypseleotris spp.), Australian smelt (Retropinna semoni), and unspotted hardyhead (Craterocephalus fulvus) at Example Lakes. Measured as:</i></p> <ul style="list-style-type: none"> • Adults or YoY for each species recorded in 8 out of 10 years • Abundance of adult fish increased by 30% from 2015 levels.
Watering effects	<p>The watering effect describes the expected environmental response to the watering regime being put in place.</p> <p>Example:</p> <p><i>To achieve the objective of improved recruitment of native fish at Example Lakes it will be filled to 45m AHD 1 in 3 years and to Full Supply Level 1 in 5 years.</i></p> <p><i>The short term watering effects would be to maintain the quality and quantity of feeding habitat by keeping salinity levels below 3000 EC units to support food resource diversity (invertebrates). The longer term watering effects would be improved breeding habitat in the littoral zone by promoting macrophyte growth and diversity. Also inundate the edge and littoral vegetation to maintain structural habitat and entrain nutrients and carbon to support food webs that sustain native fish.</i></p>
Regional or Basin priority	<p>High priority for environmental watering at a Basin scale as the asset is an important breeding site for unspotted hardyhead (<i>Craterocephalus fulvus</i>), whose distribution in the southern Basin has been significantly reduced (Lintermans 2009); dispersal of the species from this asset will help maintain the distribution and populations of the species across the lower Murray River system.</p>
Shared benefits	<p>Filling the wetland to Full Supply Level also supports recreational activities including kayaking and swimming.</p>
Updated EWMP Target	<p>Evidence of recruitment of small bodied native fish species on an annual basis, including: Australian smelt (<i>Retropinna semoni</i>), unspotted hardyhead (<i>Craterocephalus fulvus</i>), carp gudgeon (<i>Hypseleotris</i> spp.), Western carp gudgeon (<i>Hypseleotris klunzingeri</i>)</p> <ul style="list-style-type: none"> • Mean proportion of recruits using P-recruits index is ≥ 0.5 in 80% of sampling events (see Brown et al. 2016). • Mean proportion of natives using P-native index is ≥ 0.5 in 80% of sampling events (see Brown et al. 2016).

2.9 Environmental water requirements and intended water regime

The purpose of this section is to outline the environmental water requirements needed to meet the environmental objectives described in the previous section, and the intended water regime.

2.9.1 Watering requirements and intended watering regimes

The environmental **water requirements** will be determined by the supporting evidence to achieve the environmental objectives stated for the asset. Watering requirements describe the optimal hydrological characteristics for the asset to support all environmental values to be improved, maintained or enhanced as determined by the environmental objectives. The **intended watering regime** is the set of planned flows to be delivered to the asset, given likely availability of water and other constraints.

Rivers and creeks

For rivers and creeks, information for environmental watering requirements to achieve environmental objectives can be derived from relevant FLOWS studies where they are available. Basin Plan s 8.51 gives a breakdown of the characteristics of environmental watering requirements which can be used as a guide to describe the types of flows needed to support the environmental objectives. Environmental watering requirements (of environmental assets and ecosystem functions) should:

- be supported by relevant information relating to the underlying physical geomorphic processes driving the flow-ecological relationship; and
- include the following flow components that are relevant to the watering requirements:

- (i) cease-to-flow events
- (ii) low-flow-season base flows
- (iii) high-flow-season base flows
- (iv) low-flow-season freshes
- (v) high-flow-season freshes
- (vi) bank-full flows
- (vii) over-bank flows; and
- (c) be determined having regard to:
 - (i) groundwater-derived base flows; and
 - (ii) groundwater recharge associated with groundwater resources that are highly connected to surface water resources; and
- (d) be within the range of natural flow variability and seasonality.

The environmental watering requirements should also be expressed, where relevant, in the following terms:

- (a) a flow threshold or total flow volume
- (b) the required duration for that flow threshold, or the duration over which the volume should be delivered (as the case requires)
- (c) the required timing of the flow event
- (d) the required frequency of the flow event
- (e) the maximum period between flow events
- (f) the extent and thresholds for any groundwater dependency; and
- (g) the required inundation depth at the site.

It is recommended that the main elements of the intended watering regime are captured in table format. Refer to Table 10 for an example of such a table for a river or creek – in this case, for the Gunbower Creek System within the North Central CMA region.

In addition to describing the flow recommendations for different flow components for the asset (example shown at Table 10), a potential ten year watering regime for the asset (assuming watering availability) can also be included in this section to acknowledge that to achieve long term objectives, flow regimes need to be adaptable, vary from one year to the next, and consider long term time frames. Table 11 shows a modified version of the potential ten-year watering regime for the Gunbower Creek System for the flow components described in Table 10 (NCCMA, 2015).

Wetlands and lakes

The Victorian Wetland Classification Framework 2014 can be used to describe the characteristics of the intended water regime for the full range of wetland system types: lacustrine, palustrine, marine and estuarine. The characteristics (see also Table 12) include:

- wetland system type
- water regime category
- water regime subcategory if applicable (periodically inundated: seasonal, intermittent, or episodic)
 - frequency of inundation (constant/annual/near annual/holds water in at least x years in every 10 years, etc.)
 - duration of inundation (never dries/rarely dries/holds water for X period then dries, etc.)
 - volume required to fill completely/partly/dry out (noting bathymetry data to determine this may not be available for all wetlands).

The wetland system and water regime categories of the Victorian framework align with those of the Australian National Ecosystems (ANAE) classification of the Murray-Darling Basin²⁰, however the Victorian framework extends the wetland classification to include those with a tidal influence (marine and estuarine).

An example of an **intended watering regime** for a wetland is provided at Table 13 for Heywood's Lake in the Mallee CMA region. Where possible, a watering regime should be specified for likely best-case or optimal conditions, as well as the maximum and minimum tolerable watering scenarios. It is recommended that the main elements of the intended watering regime are captured in a table format.

²⁰ The Australian National Ecosystems (ANAE) classification of the MDB is another framework to define ecosystem types across the Basin (e.g. water regime, water source, salinity, landform and dominant vegetation). The classification is currently used by the Murray-Darling Basin Authority (MDBA) and Commonwealth Environmental Water Office (CEWO) to support monitoring, evaluation and adaptive management of water resources in the Basin and was last updated in 2021.

Table 10: Flow recommendations for the Gunbower Creek system and the linked ecological objectives (excerpt from Table 22 of the Gunbower Creek EWMP (NCCMA, 2015). Table 22 in the Gunbower Creek System EWMP includes additional flow recommendations for flow components not shown here, including for spring-summer modified freshes, and opportunistic flow components including winter freshes.

Flow component	Flow magnitude at target location				Duration	Timing	Frequency	Daily flow variability	Additional info including critical tolerances	Ecological objectives
	Reach 1 Headworks	Reach 2 Gunbower Weir	Reach 3a Cohuna Weir	Reach 3b Koondrook Weir						
Winter base flow	No prescribed flow as targeting flows in lower reaches If flows are >300 ML/day open lagoon regulators to facilitate throughflow	>250-300 ML/day ⁴ If flows are >300 ML/day open lagoon regulators to facilitate throughflow	250-500 ML/day If forest inundated, open lower landscape regulators to facilitate bi-directional flow ⁵	>150 ML/day	Approx. 3 months	Between 15 May to 15 Aug	1 event per year each year (opening of lower landscape regulators is opportunistic) Max. 2 in 3 years for opening lagoon regulators (to maintain aquatic community structure)	(+/-) 50-100 ML/day including ramp up at start of Aug to integrate with spring-autumn low flow/ irrigation demand 15 ML/day bidirectional flow per lower landscape regulator	Magnitude to vary depending on conditions (i.e. lower end of range if delivering to forest) however flows to occur in all years. Close lagoon regulators if levels in the creek begin to drop to maintain >1 metre depth in critical lagoons	1.1*, 1.2, 1.3, 1.4, 1.5, 1.6, 1.8 *E.g. ecological objective 1.1: "Increase the abundance and improve age class distribution of small and large-bodied native fish species", etc.
Winter-spring high flow	No prescribed flow as targeting flows in lower reaches	1,200 ML/day N.B. during forest water years majority of flow may be diverted @ Hipwell Road	Pass flow through reach to return to Murray River or if watering forest maintain winter base flow conditions D/S Hipwell Road (see winter base flow for Reach 3a and Reach 3b)		Up to 3 months	Between June and Nov	1 event per year every 2 in 3 years	(+/-) 50-100 ML/day Including ramp up and down to integrate with preceding and proceeding flows		1.1, 1.2, 1.5, 1.6
Spring-autumn base flow	No prescribed flow as targeting flows in lower reaches		>400 ML/day If forest inundated, open lower landscape regulators to facilitate bidirectional flow	>150 ML/day	Up to 8 months	Between 15 Aug to 15 May	1 event per year each year Opportunistic opening of regulators depending on conditions	(+/-) 50-100 ML/day where possible ~15 ML/day bidirectional flow per regulator	Flow likely to be exceeded due to irrigation demand. Flow can be adjusted to dilute water entering creek from a forest watering event (i.e. to maintain habitable DO in creek D/S Cohuna Weir)	1.2, 1.4

Table 11: Potential ten-year watering regime for the Gunbower Creek System (assuming water availability). Excerpt from Table 23 of Gunbower Creek System (NCCMA, 2015).

Environmental watering focus		Year									
		1	2	3	4	5	6	7	8	9	10
Gunbower Forest		Large scale forest watering	Moderate to small scale forest watering	Dry	Large scale forest watering	Moderate to small scale forest watering	Dry	Large scale forest watering	Moderate to small scale forest watering	Dry	Large scale forest watering
Gunbower Creek System		Maintain fish populations	Maintain fish populations	Promote fish populations	Maintain fish populations	Maintain fish populations	Promote fish populations	Maintain fish populations	Maintain fish populations	Promote fish populations	Maintain fish populations
Gunbower Creek System flow component	Winter base flow	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Winter-spring high flow	✓	✓		✓	✓		✓	✓		✓
	Spring-autumn base flow	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 12: Water regime categories adopted in the Victorian wetland classification framework (DELWP, The Victorian wetland classification framework 2014, 2016b).

Wetland system	Water regime category	Category description	Water regime subcategory	Subcategory description	
				Frequency of inundation	Duration of inundation
Lacustrine and palustrine	Permanent	Inundated constantly, rarely drying completely		Constant, annual, or less frequently but before usually wetland dries.	Never dries or dries rarely (i.e. holds water at least 8 years in every 10), but levels may fluctuate within or between years
	Periodically inundated	Inundated annually to infrequently, holding water for at least 1 month to more than 1 year before drying	Seasonal	Annual or near annual inundation (i.e. holds water at least 8 years in every 10)	Holds water 1-8 months then dries
			Intermittent	Infrequent, holds water, on average, 3-<8 years in every 10	Holds water > 1 month to > 1 year then dries
			Episodic	Infrequent, holds water, on average, less than 3 years in every 10	Holds water > 1 month to > 1 year then dries
	Unknown	Water regime category unable to be determined			
Estuarine and marine	Intertidal	Inundated twice daily, with inundation lasting hours	-	-	-
	Supratidal	Inundated several times per year, with inundation lasting hours	-	-	-
	Unknown	Water regime category unable to be determined			

Table 13: Hydrological requirements or objectives to meet environmental objectives for Heywood's Lake. Excerpt from Table 12 of Heywood's Lake Environmental Water Management Plan (Riverness, 2015). Minimum (min), optimal (opt.) and maximum (max) values indicated for some of the hydrological parameters.

Hydrological Objectives													
Ecological objectives	Mean frequency of events (No. per 10 years)			Tolerable interval between events		Duration of ponding (months)			Preferred timing of inflows	Target supply level (mAHD)	Volume to fill to TSL (ML)	Volume to maintain at TSL (ML)	Total volume per event (ML)
	Min	Opt.	Max	Min.	Max	Min	Opt.	Max					
Maintain Black Box Woodland diversity and productivity (EVCs 103 and 813)	1	2	3	3	10	2	4	6	Winter/ Spring	56.8* 57.0*	5,200**	2,000**	8,000
Promote diverse aquatic macrophyte zones	2	5	10	0	1	1	6	12	Spring/ Summer	53.5	Provided by natural drawdown/evaporative losses following watering to meet Black Box objective		
Provide open water habitat to encourage diversity and abundance of deep water foraging and piscivorous waterbirds	2	3	3		8	24			n/a	54 - 56.8			
Provide shallow water habitat that supports foraging, nesting and recruitment of dabbling ducks and large and small waders***										54			
Encourage a productive aquatic ecosystem through the release of nutrients and organic matter from the sediments and decomposition of inundated terrestrial vegetation through inundation of the wetlands following a dry phase***										56.8			

* Heywood's and Little Heywood's.

**Volumes provided based on watering events from 2010/11 (empty to full inundation) and 2011/12 (top up of previous event).

***Ecological objective met through other hydrological objectives.

2.9.2 Expected watering effects

The inclusion of explicitly stated **expected watering effects** clarifies the outcomes expected with environmental water actions (e.g. delivery of base flow, filling to target water level) from that of other (complementary) actions that may be necessary to achieve the environmental objectives set for an asset. Examples are provided in Table 14 and Table 15.

Environmental objectives describe a desired outcome for a particular value or group of values over a specified period that will contribute to the management goal. This may require a mixture of environmental watering and other complementary actions.

Expected watering effects²¹ describe the physical, chemical, biological or behavioural effects expected from specific potential watering actions (flow components). Unlike environmental watering objectives, which are achievable through delivery of a suite of flow components and complementary measures over a long period of time, the expected watering effects relate to physical, chemical, biological or behavioural responses to specific components of the watering regime (e.g. response to a spring fresh, a low flow, a drying spell, a rate of drawdown etc.) and are potentially measurable at shorter temporal scales.

Clear descriptions of expected watering effects will help asset managers, the VEWH and other stakeholders evaluate the relative importance of particular watering actions and, where appropriate, measure the success of those watering actions to report outcomes and support adaptive management.

Potential watering action – an environmental flow component expressed with the timing, duration, magnitude and frequency of flows required, for example, 1 spring fresh of 100 ML per day for 4 days during November.

Table 14: Example environmental objectives and the potential watering actions and expected watering effects required to achieve them in riverine systems.

Environmental objective	Potential watering action	Expected watering effects
Maintain channel form diversity and variable hydraulics to support habitat diversity	Winter fresh (one fresh in every two years of 1,000 ML/day for six days during July to August)	Create sufficient shear stress to redistribute sediment within the channel to improve the quality of riffle habitats and replenish low lying bars
Increase in-channel primary production	Annual spring high flow (one high flow of 450 ML/day for six to 10 days during October to November)	Entrain organic matter and nutrients, and increase primary production to support of food webs
Increase the condition maintain the extent and diversity of submerged, emergent and streamside vegetation	Winter/spring low flow (50-100 ML/day during June to November)	Inundate low benches and maintain soil moisture within the bank to support littoral and riparian vegetation
	Summer/autumn low flow (25-50 ML/day during December to May)	Provide sufficient depth in channel to maintain emergent vegetation
Increase the abundance of macroinvertebrates	Winter/spring low flow (50-100 ML/day during June to November)	Maintain width and depth of riffle habitat for macroinvertebrates
	Annual spring fresh (one fresh of 700 ML/day for three days during November)	Create sufficient shear stress to disturb biofilms present on rocks and woody debris to stimulate new growth and provide food for macroinvertebrates
Increase golden and silver perch populations	Spring fresh (one fresh in every four years of 700 ML/day for three days during November)	Trigger the spawning migration of silver perch (<i>Bidyanus bidyanus</i>) and golden perch (<i>Macquarie ambigua</i>)

21. Past EWMP guidelines specified hydrological objectives, however expected watering effects more explicitly link the watering actions (flow components) directly to the desired outcomes. Hydrological objectives provided in EWMPs often described the desired effect, but not consistently. The expected watering effect term is also consistent with the VEWH usage.

Environmental objective	Potential watering action	Expected watering effects
	Winter/spring low flow (50-100 ML/day during June to November)	Maintain sufficient depth to allow fish movement along and between river reaches
Increase the Australian grayling population	Autumn fresh (one to two freshes every two years of 800 ML/day for four days each during April to May)	Trigger the downstream migration (and spawning) of Australian grayling (<i>Prototroctes maraena</i>)

Table 15: Example environmental objectives and the potential watering actions and expected watering effects required to achieve them in wetland systems.

Environmental objective	Potential watering action	Expected watering effects
Maintain the extent and condition of black box trees	Complete fill in spring once in every 10 years	Inundate black box on the floodplain to stimulate growth and increase the condition of mature trees
Increase the extent of emergent and aquatic vegetation	Annual top up in spring	Increase water levels to wet the outer boundaries of the wetland to support the growth and flowering of littoral, emergent and submerged aquatic wetland plants
Maintain adequate food resources for species covered in international waterbird agreements	Annual top up in spring and allowing a recession from 20.0 m AHD to 19.0 m AHD during summer	Expose mudflat to increase foraging habitat for shorebirds

2.9.3 Seasonally adaptive approach

The annual environmental water planning process in Victoria uses a seasonally adaptive approach (Figure 3), which identifies the priorities for environmental watering under different climatic conditions, i.e. drought, dry, average and wet. This means that watering events can be tailored to current conditions and be easily adapted in response to short-term climatic variability, as conditions can change quickly during a water year.

The EWMP should outline how the seasonally adaptive approach will be used at the asset as part of annual environmental water planning. The information should complement the information provided in seasonal watering proposals and could be provided as additional columns to tables such as in example Table 14 and Table 15.

Planning scenario	Drought	Dry	Average	Wet to very wet
Expected Conditions	No or negligible contributions from unregulated flows. Waterways may stop flowing at times, more likely during summer/autumn	Minor contributions from unregulated reaches and tributaries, more likely in winter/spring	Unregulated flows provide extended low flows and multiple freshes, more likely in winter/spring. Minor storage spills may occur	Extended unregulated high flows, multiple large storage spills and overbank flooding, more likely in winter/spring but possible any time of year
Management Objectives	<ul style="list-style-type: none"> Avoid critical loss Maintain refuges Avoid catastrophic events 	<ul style="list-style-type: none"> Maintain river functioning with reduced reproductive capacity Maintain key functions of high-priority wetlands Manage within dry-spell tolerances 	<ul style="list-style-type: none"> Improve ecological health and resilience Improve recruitment opportunities for key plant and animal species 	<ul style="list-style-type: none"> Restore key floodplain wetland linkages Maximise recruitment opportunities for key animal and plant species
Example watering actions to support management objectives	Provide low flows and trigger-based freshes to maintain water quality in deep refuge pools	Provide summer/autumn low flows to manage water quality and maintain connectivity	Provide year-round low flows to maintain habitat connectivity to support fish movement	Maintain year-round low flows and seasonal freshes to improve the quality of in-stream and bank vegetation and trigger the spawning and movement of native fish
		Extend the duration of flow peaks to freshen water quality in deep pools	Extend the duration and/or magnitude of peaks to provide spawning cues for fish	Maintain connectivity and the exchange of nutrients between the river and floodplain
			Provide seasonal freshes to support the establishment and maintenance of bank vegetation	Slow the recession of natural peaks to avoid bank slumping and erosion
				Top up natural flows if needed, to meet targets for winter low flows and spring peaks

Figure 3: Example planning scenarios for a river system under a range of climatic conditions (VEWH, 2020).

2.10 Environmental water delivery infrastructure

The purpose of this section is to describe the infrastructure to be used to deliver environmental water, as well as any constraints that may affect the timing, volume or duration of water delivery.

2.10.1 Water delivery infrastructure

Existing infrastructure

Describe how environmental water will be delivered to the asset using existing infrastructure.

- What structures and channels have been installed that might provide water or restrict water movement? Who owns any infrastructure?
- Are there links to modernisation programs planned or underway?

Irrigation modernisation

If relevant, a description of links with current or planned modernisation infrastructure programs and how such programs will influence the delivery of environmental water is to be provided.

Complementary works

A description of any recommendations for complementary works (e.g. fencing and other land management practices) to improve outcomes of environmental water delivery can be included in this section.

It is important to detail how works (existing or planned) will improve the achievement of environmental watering objectives. Supporting figures may be included in this section that depict how works will improve environmental water delivery, e.g. a hydrograph for a system comparing flow with and without works.

2.10.2 Constraints

This section is to include available information on constraints to delivering environmental water.

If the required watering events cannot be delivered under current constraints, for example due to lack of infrastructure, because private land would be flooded and landholder agreements are required before watering can occur, then this information should be included.

2.11 Demonstrating outcomes – monitoring and assessment

The purpose of this section is to outline the monitoring and assessment arrangements that are recommended to be used to demonstrate the effectiveness of environmental water delivery to the asset. This information will be important for the adaptive management of the asset, as well as contributing to Victoria's Matter 8 reporting obligation under the Basin Plan.

It is important that the links between the stated objectives and outcomes for the asset are clearly aligned to the monitoring indicators adopted, the type of analysis (i.e. intervention analysis or long-term condition assessment), and other study design and assessment considerations (e.g. selection of a baseline/benchmark from available data or expert opinion; before-after comparison). An example based on Johnson Swamp (adapted from (North Central CMA, 2016)) is provided in Table 16.

This section should also identify how demonstration of outcomes and assessment against the stated environmental objectives and target fits into the adaptive management process.

Victoria's primary environmental water monitoring programs, funded by DELWP, are VEFMAP (the Victorian Environmental Flows Monitoring and Assessment Program, for rivers) and WetMAP (the Wetland Monitoring and Assessment Program for environmental watering). The selection of key evaluation questions for monitoring through these programs is based, in part, on EWMP objectives and targets. VEFMAP and WetMAP cannot monitor outcomes at all assets, so seeking alternative funding or integrating with complementary programs (e.g. Flow-MER, The Living Murray Program, etc.) should be considered where VEFMAP and WetMAP monitoring is not possible. Monitoring through citizen science projects should also be considered.

Table 16: Example of links between environmental objectives, monitoring questions and survey methods. Modified from (North Central CMA, 2016).

Objective number	Monitoring focus	Monitoring question	Method	When
Overarching management goal				
N/A	Wetland condition	Has there been an overall rehabilitation in the condition of the wetland by 2025?	Undertake IWC method assessment using nonstandard methodology during a phase comparable to the 2014 benchmark (Rakali Ecological Consulting, 2014a).	Every three years (i.e. after each watering event under optimum conditions)
Vegetation objectives				
1	Tall Marsh (cumbungi and common reed) and Aquatic Herbland	Has there been a twenty percent reduction in the extent of cumbungi in Tall Marsh (EVC 821) at Johnson Swamp West by 2025 and a corresponding: <ul style="list-style-type: none"> • increase in Aquatic Herbland • reduction in common reed density? 	Undertake comprehensive on ground mapping of the extent of Tall Marsh including the area of cumbungi and common reed as well as Aquatic Herbland. Undertake quadrat surveys to inform the average density of cumbungi and common reed. Compare results against the 2014 benchmark (Rakali Ecological Consulting, 2014b).	Every three years (i.e. after each watering event under optimum conditions)

As with each component of EWMP development or update, Traditional Owners should be offered the opportunity to partner in monitoring and assessment programs, particularly in relation to culturally significant species and sites, where funding is available.

Monitoring priorities at the asset

In this section, describe the monitoring priorities for the asset, given its environmental objectives, and considering relevant plans and strategies such as the relevant Regional Waterway Strategy and the Basin Plan, and Traditional Owner cultural monitoring needs, where known and appropriate.

2.12 Knowledge gaps and recommendations

The purpose of this section is to identify knowledge gaps to be addressed to better define environmental objectives and targets, inform environmental water delivery, define and manage threats, and undertake monitoring and assessment at the asset.

Key knowledge and data gaps specific to the EWMP should be identified in this section, linking to other EWMP sections, including:

- Partnership and consultation (e.g. identification of lower level or absence of engagement or collaboration during certain aspects of EWMP development with relevant partners and stakeholders)
- Asset overview
- Current and historical hydrological regime and system operations
- Water-dependent values
- Managing water-related threats
- Environmental water requirements and intended water regime
- Environmental water delivery infrastructure
- Demonstrating outcomes – monitoring and assessment.

Knowledge gaps related to consultation may stem from inadequate resources or opportunities to enable partners or stakeholders to contribute to EWMP development, or indicate alternate priorities at a particular time. As noted in Section 2.3, it is important to describe efforts made to engage partners and stakeholders

and opportunities offered to partner in EWMP development, implementation and monitoring, and note lack of engagement of any relevant group and any known reason for the absence.

For each of the knowledge or data gaps noted, actions can be recommended to address them with some level of priority and responsibility for implementation of these knowledge gaps assigned, including which parties should fund the actions (e.g. asset manager, state, research organisation). Categorising actions requiring funding into potential funding streams will assist DELWP and VEWH with funding decisions. Example streams include:

- technical – ecological, hydrological, other
- works and measures – to improve or enable delivery
- works – complementary works to improve outcomes
- monitoring
- empowering Traditional Owner groups and supporting Traditional Owner outcomes.

Recommendations for actions to address knowledge or data gaps may include:

- to address parts of the EWMP that are missing or not final (e.g. due to gaps in data, expert advice, knowledge, or out-of-date studies)
- opportunities for improvement of outcomes, such as overcoming constraints, or improving the partnership process with Traditional Owner groups
- additional monitoring.

2.13 EWMP references

Include citations for references used in preparing the EWMP.

2.14 EWMP abbreviations and acronyms

List and describe abbreviations and acronyms used throughout the EWMP (this list may be best placed at the beginning of the EWMP document).

2.15 EWMP appendices

Provide material such as lists of fauna and flora species and other supporting information in appendices. Examples include, but are not limited to, the following:

- fauna species: provide a list of fauna species present at the asset
- Ecological Vegetation Classes (EVCs): provide a list of EVCs at the asset. EVCs within each Victorian bioregion may be found at: <https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks>
- flora species: provide a list of flora species present at the asset
- partnership and consultation: provide a list of partners and stakeholders involved in the development or update of the EWMP and/or opportunities provided for involvement
- past environmental watering history at the asset.

3. References

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Appendix A Example EWMP Policy Context

An example policy context for an EWMP (adapted from several EWMPs) is provided below which can be adapted to include in an EWMP:

Context

Environmental water in Victoria is managed as an integral part of the Victorian Waterway Management Program, with the state-level Victorian Waterway Management Strategy (VWMS) providing the overarching framework for environmental water management (Figure 4). Regional Waterway Strategies (RWSs) drive the implementation of the VWMS at the regional level. Information from the region's RWS is a key input to environmental water planning arrangements, including the selection of eligible assets to receive environmental water. Environmental water management plans are site-specific plans developed for those assets deemed a priority to receive environmental water through the RWS development process.

Environmental water management in Victoria is now firmly established with water recovery enabling significant volumes of water being returned to the environment. The increased environmental water availability has provided opportunities to protect, restore and reinstate high value ecosystems throughout Victoria.

Environmental watering in Victoria has historically been supported by management plans such as this one, that document key information including the watering requirements of an asset, predicted ecological responses and water delivery arrangements. These plans support annual decisions about which sites should receive water and assist managers to evaluate how well those assets respond to the water they receive or what could be done better.

In the Murray-Darling Basin, environmental water management is further underpinned by the Murray-Darling Basin Plan 2012 (Commonwealth) and the associated Basin-wide environmental watering strategy. In accordance with Basin Plan requirements, Victoria has also developed relevant Water Resource Plans and Long-Term Watering Plans.

Victoria's Catchment Management Authorities (CMAs), Melbourne Water, Department of Environment, Land, Water and Planning (DELWP), the Victorian Environmental Water Holder (VEWH) and Traditional Owner groups have worked together to develop a number of Environmental Water Management Plans for watered assets throughout Victoria. These plans are continually updated through an adaptive management process. A primary purpose of the plans is to provide a consistent set of documents that support seasonal watering proposals to be submitted by asset managers to the VEWH annually. The supporting information includes:

- lead management agencies and their management responsibilities
- the water-dependent environmental, social and economic values of the asset
- the asset's environmental condition and threats
- environmental objectives and intended watering regime
- contributions from Traditional Owner groups (included in an EWMP with free, prior and informed consent) that may include information about cultural values, management goals, environmental objectives and intended watering regime
- opportunities for improved water delivery, efficiency or capacity through structural works or other measures
- scientific knowledge gaps and recommendations for future work.

This document is the Environmental Water Management Plan (EWMP) for asset x in the x Catchment Management region.

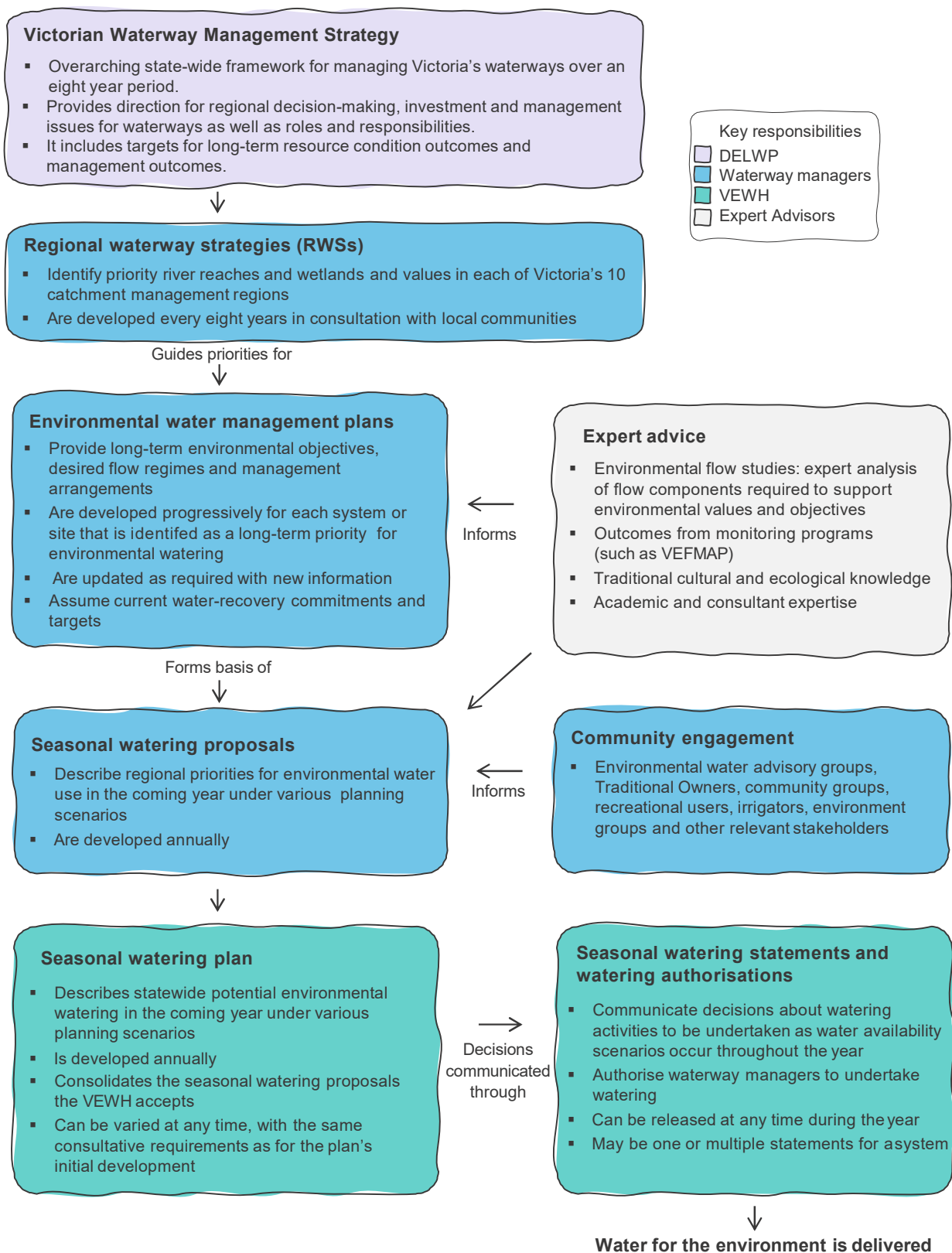


Figure 4: Victoria's environmental watering program planning framework (adapted from (VEWH, 2020)).

Roles and responsibilities with respect to environmental watering at this asset.

Partners	Roles and responsibilities/links with waterways
Department of Environment, Land, Water and Planning (DELWP)	<p>DELWP is the lead agency for waterway management. It is responsible for the development of waterway policy, co-ordination of regional delivery and prioritisation of Government investment in waterways. DELWP is also responsible for other aspects of natural resource management that are of relevance to environmental water management, including:</p> <ul style="list-style-type: none"> • sustainable management of Victoria’s water resources through managing the water allocation and entitlements framework • developing state policy for water resource and waterway management • DELWP also has a number of other responsibilities that relate to broader waterway management such as oversight of Crown land and integrated catchment management.
Victorian Environmental Water Holder (VEWH)	<p>The Victorian Environmental Water Holder is appointed under the <i>Water Act 1989</i> to manage Victoria’s environmental water entitlements. The Victorian Environmental Water Holder works with the waterway managers, Commonwealth Environmental Water Holder, Murray–Darling Basin Authority. Storage operators and land managers to ensure environmental water entitlements are used to achieve the best environmental outcomes in line with the Environmental Water Management Plan</p>
Murray–Darling Basin Authority (MDBA)	<p>The Murray–Darling Basin Authority was established under the federal Water Act (2007) as an independent, expertise based statutory agency. The primary roles of the Authority as outlined in the Water Act (2007) include:</p> <ul style="list-style-type: none"> • preparing and reviewing the Basin Plan • measuring, monitoring and recording the quality and quantity of the Basin’s Water resources • supporting, encouraging and conducting research and investigations about the Basin’s Water Resources • developing equitable and sustainable use of Basin water resources • disseminating information about the Basin’s water resources • engaging and educating the Australian community about the Basin’s water resources.
Commonwealth Environmental Water Office (CEWO)	<p>The Commonwealth Environmental Water Office manages an entitlement in the Wimmera CMA region to assist in its role to protect or restore the environmental assets of the Murray-Darling Basin. Water will be managed in accordance with the environmental watering plan that will be part of the Murray-Darling Basin Plan.</p>
Water Corporation	<p><i>Water corporations in Victoria are established under the Water Act 1989 and provide a range of water services to customers within their service areas.</i></p>
Local Government	<p><i>May be relevant, describe as appropriate for your EWMP</i></p>
Traditional Owner Group/s	<p><i>The Victorian Government supports the self-determination of Traditional Owners and their partnership in environmental water management, including in the development of EWMPs. Contributions from relevant Traditional Owner groups are to be included in an EWMP with free, prior and informed consent.</i></p>
Community members/representatives	<p><i>Community members who have a detailed understanding of these waterways can provide advice and feedback on the effect of environmental water management on local waterways. Often, they are responsible for managing riparian land either as freehold landowner or licensee of Crown land.</i></p>
Parks Victoria	<p><i>May be relevant, describe as appropriate for your EWMP</i></p>

Appendix B Traditional Owner Engagement

Permission has been granted to share the following contributions from some of the northern Victorian Traditional Owner Groups that include their comments on the previous draft EWMP Guidelines and guidance on how they wish to be engaged in future EWMP development.

Refer also to the Traditional Owner Objectives and Outcomes compiled for the Water Resource Plans, although note that some of this information may now be superseded.

Dja Dja Wurrung Clans Aboriginal Corporation (DDWCAC)



Dja Dja Wurrung Clans Aboriginal Corporation

10th August 2020

Environmental Water Team,
Department of Environment, Land, Water and
Planning

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The Dja Dja Wurrung Clans Aboriginal Corporation (DDWCAC) appreciate DELWP's invitation to participate in the review of the Environmental Water Management Plan (EWMP) guidelines on behalf of Dja Dja Wurrung people.

Dja Dja Wurrung people see our land and its waterways as central to our cultural identity and aspirations for community and economic development. In regards to the management of water and waterways on our country, Dja Dja Wurrung people wish to:

- *ensure all of our waterways are healthy, with the right water in the right place at the right time to meet the needs of the environment, Jaara people and the broader community*
- *have a recognised and legitimate role in water governance, with genuine consultation in policy development and a recognised role in decision-making about our waterways*
- *secure adequate and equitable water rights that meet our social, cultural, spiritual, economic and environmental needs*
- *share our creation stories to teach people of how water works in the landscape*

Dja Dja Wurrung Clans Aboriginal Corporation (DDWCAC) has a range of legal rights relating to the managing of natural resource management as defined in the Recognition and Settlement Agreement (RSA) with the State of Victoria.

This includes the right to be given the opportunity to "actively participate in the development and review of natural resource management policies and strategic plans" within the Agreement Area.

Re. Update of Environmental Water Management Plan Guidelines

This letter is in response to previous communications regarding Dja Dja Wurrung Clan Aboriginal Corporation's involvement in the review of the Environmental Water Management Plan (EWMP) guidelines.

DDWAC have reviewed the current draft points to be considered in the review, and overall are supportive of the initiatives being taken to further Aboriginal inclusion and participation in EWMP processes across Dja Dja Wurrung Country.

Below we have listed some thoughts and concerns around these draft points, for your consideration whilst developing the guidelines.

The current draft document states that '*Opportunities must be identified for TO involvement in each step of EWMP development, including membership of steering committee*'.



Dja Dja Wurrung Clans Aboriginal Corporation

While Dja Dja Wurrung appreciates this inclusion, we would like to note that this steering committee is quite high level and does not directly equip Traditional Owners with the means to integrate systems to include Cultural Knowledge into the existing EWMP structure at the ground level. Dja Dja Wurrung would like to note that EWMPs also have a reference or advisory group

which influence the detail of the plans at a closer level, and that DELWP also convenes an 'expert' review panel - which in the past has been used to address Western ecological knowledge. Dja Dja Wurrung feels that the inclusion of Aboriginal representatives into the reference group will help to achieve better direction from Aboriginal People on more of a ground level as well as promote better engagement and Self Determination for nations as they progress their water objectives. A clear defined goal of the level of representation on these groups would be appreciated, we would advocate for equal levels of representation with existing structures.

Dja Dja Wurrung also feels that the overall EWMP process will be more culturally appropriate if DELWP's review expert panel included equal representation of Traditional Owner expert representatives, or elected expert representatives on the behalf of Traditional Owner organisations. Examples of this may include Cultural Knowledge holders, ecologists, or other experts in the community that are familiar with both Western and Cultural practises around Gatjin (water), Wii (fire), Cultural Heritage and Traditional Ecological Knowledge. This will help the expert panel to have a better understanding of Aboriginal Culture overall and be better equipped to work with Nations in identifying watering objectives and priorities on Country, as well as identifying overlaps between Western and Cultural sciences to deliver both Cultural and ecological/environmental outcomes.

The current draft document states the EWMP process will *'use the development of an EWMP as an opportunity to enhance capacity for Traditional Owners to contribute to environmental water management. This can be achieved by inclusion of activities such as Aboriginal Waterways Assessment (AWA) or similar cultural exchange/mapping activities - to share cultural and western scientific knowledge.'*

While we are supportive of this, we would include that training opportunities for Aboriginal people to work more closely with CMA staff whilst writing the EWMPs would be valuable, building Aboriginal field assistants through ecological assessments and familiarizing them with the EWMP process through mentorship and participation. This would not only support water organisations in working more closely with Traditional Owner groups to manage water on Country, but also, in the long term, equip Water Policy Officers and other Aboriginal staff with the skills needed to develop their own water delivery plans on Country with a specific focus around Cultural objectives, values, uses and outcomes.

The current draft document states that *'Consideration of Aboriginal environmental values and objectives and continued monitoring of these where funding is available. The primary purpose of environmental watering is supporting ecological objectives, which may align with Aboriginal environmental objectives e.g. improved vegetation and numbers of fish, turtles, water birds and totem species.'* Whilst EWMP objectives are often high level with regard to species - e.g. providing feeding opportunities for a diverse range of waterbirds - they are currently driven primarily by the management of key threatened species and not holistically for all species or informed by long known objectives and outcomes for Country. There is an opportunity here for EWMP guidelines to specify where animals that are of cultural priority sit within that range and identify and develop monitoring programs based on overlap between the two. Additionally, it would be valuable to give a measure of cultural sensitivity to a landscape (to be taken in account when watering or doing EWMP related works). This could be represented through a simple 'high, medium, low' scale, with information based around Cultural values and accessed via consultation with the appropriate Traditional Owner group(s).



Dja Dja Wurrung Clans Aboriginal Corporation

There has been confusion in the past within the guidelines, with many EWMPs stating that Cultural values somehow align with Shared values. This is incorrect and needs to be rectified in future guidance notes. The future EWMP guidelines must include differentiation between Cultural and Western values with overlap (Shared values) being clearly outlined from the two. Similarly, in past EWMP's Cultural values have been listed as 'social values' – it is important to identify moving forward that Cultural values are not shared or social values, they are intrinsic values vital to both the water management process and Dja Dja Wurrung Culture. Put simply and sensibly is the benefit of water to species holistically and for its application in healing Country to create a greater abundance of species that are not at an immediate threat, this is to ensure that they are not to be at threat at a future time. It is a long-standing Cultural Belief of the interconnectedness of our people and species and as mentioned earlier the focus constrained to threatened and endangered species as a principal, is in fact seen by us as a flawed approach, that could put current healthy abundances of species at risk. We would add a real desire by us is to have the lead responsibility in water planning so ultimately we can apply our Cultural Values more fully across water matters to ensure sustainability and survival of Country's existing species.

In the past, the EWMP process has been largely based around delivering environmental outcomes based on ecological Western-based values. Dja Dja Wurrung would like to emphasise that there needs to be greater emphasis on cultural values delivering cultural outcomes in water management across Victoria overall, with an adequate evaluation process implemented around the monitoring of Cultural outcomes, we state here that Cultural Values are fundamental and principal outcomes, that have environmental outcomes already as a part of them, Cultural Values outcomes are holistic. There is long held knowledge within Country and Dja Dja Wurrung of how to live and be on Country and the role of Gatjin. Instead of looking to integrate cultural values and uses into EWMP's it is the goal of Dja Dja Wurrung to consider and support the needs of EWMP's and Western-based values in our informed decision making processes. A short term step to achieving this is to integrate cultural values and uses into EWMP's, through this we believe it will become apparent that the current approach needs the oversight and guidance of Dja Dja Wurrung to not only care for the physical of Gatjin but also the spiritual. To ensure these goals can be realised the continued increase in resourcing and training of Traditional Owners must be made available to ensure that knowledge and understanding is not misappropriated as has so often happened in the past.

Like Wi (fire) Dja Dja Wurrung hold the understanding that all Gatjin on Country is Dja Dja Wurrung. It is just that it currently isn't under Dja Dja Wurrung control although Dja Dja Wurrung remain and always will remain accountable for its use and misuse. To ensure these obligations to Gatjin, Country, Djaara and other Traditional Owners are able to be met EWMP's need to ensure that Dja Dja Wurrung at the least have a voice in how their water is used to manage their Country and at best control over how their water is used to manage their Country.

We look forward to working with you to positively understand how to embed new approaches to empower Dja Dja Wurrung to meet our obligations to care for Djandak (Country).

Regards,

Rodney Carter
Chief Executive Officer
Dja Dja Wurrung Group

First People of the Millewa Mallee Aboriginal Council

ABOUT First People of the Millewa-Mallee

The First People of the Millewa-Mallee are a community of family groups.

First Peoples of the Millewa-Mallee Aboriginal Corporation is formed by the **Latji Latji and Ngintait** peoples as the Traditional Owners and Custodians of Country, and the appointed Registered Aboriginal Party (RAP) in relation to an area in North West Victoria and holds functions and responsibilities under the Aboriginal Heritage Act 2006 (Vic).

FPMMAC is also a *Traditional Owner Corporation* and is established to advance the aspirations of First Peoples of the Millewa-Mallee Traditional Owners by managing their native title and cultural heritage rights and interests, and to be responsible for implementing aspects of any future settlement with the State of Victoria under the Traditional Owner Settlement Act 2010.

The principal objectives of the corporation include, among other things:

- To promote, protect and advance the rights, interests and aspirations of Traditional Owners of the Millewa-Mallee.
- To act in the best interests of Traditional Owners of the Millewa-Mallee.
- To promote, protect and manage Aboriginal Cultural Heritage.
- To carry out the functions of a Registered Aboriginal Party under the Aboriginal Heritage Act 2006 (Vic).
- To advance the economic and social interests of the Corporation, Traditional Owners and members.

As Traditional Owners we are the living Indigenous culture within the Australian community. We seek to repair the natural environment and our people's place in the environment. We will do this by rejuvenating the land, floodplains, and river system, while rejuvenating our culture and people. With our people, in conjunction with the broader community and governments, we will achieve the healing of our country through collaboration and partnerships.

We are implementing our Indigenous cultural model of self-determination, on **Country with Culture for People**.

To expand cultural activity, we will:

- Protect our Cultural Heritage and Indigenous rights.
- Develop employment & economic opportunities on-Country.
- Develop and support cultural activities.
- Expand traditional languages learning, knowledge, and use.
- Expand our Aboriginal community and foster ongoing relationships.



Summary

The FPMMAC identifies the follow key areas as a priority for Traditional Owner engagement:

9. Early involvement of Traditional Owners in the development of projects and e-watering programs.
10. Recognition for Traditional Owners to shape objectives and outcomes.
11. Facilitate Traditional Owner economic opportunities in the development and delivery of NRM and watering programs.
12. Expand opportunities for Traditional Owner's to share and celebrate cultural values and traditional practices.
13. Facilitate opportunities of Traditional Owner's in the ongoing management of e-watering programs.
14. Establish feedback loop to ensure ongoing communication and engagement.



Legislative Context

FPMMAC continues to fulfil its roles and responsibilities by protecting Cultural Heritage and enabling effective Aboriginal participation in land and water management within the First People's Country.

Including:

- Responsibilities outlined in Australian and Victorian legislation and policy, including Traditional Owner agreements, Native Title, Aboriginal Cultural Heritage, the National Water Initiative, Environment Protection and Biodiversity Conservation Act and the Catchment and Land Protection Act.
- Commonwealth Government Indigenous Procurement Policy (2019).
- Current and future Traditional Owner settlements.
- Closing the Gap in Indigenous disadvantage.
- Victorian Governments Aboriginal Affairs Framework, Victorian Aboriginal Economic Strategy
- United Nations Declaration on the Rights of Indigenous Peoples.
- Water for Victoria – Water Plan
- Victorian Aboriginal Heritage Act 2006.

OVERVIEW | ENGAGEMENT

Purpose

Establishing positive engagement practices with Traditional Owners to deliver both environmental and cultural outcomes and benefits is a priority, and to deliver upon the Victorian Environmental Water Management Plan guidelines.

The FPMMAC believe the opportunity to set long term objectives for waterway management can be better informed by the significant cultural knowledge and active participation of elders, Traditional Owners, and the First People of the Millewa-Mallee Aboriginal Corporation.

Methodology

The International Association of Public Participation (IAP2) engagement principles should be followed to inform the methodology for Traditional Owner engagement, with the objective to collaborate and empower Traditional Owners' in the decision-making process relating to cultural values, environmental impacts, and watering events.

A focus upon gathering stakeholder feedback, including information collection (both location and interest-specific), identification of aspirations, cultural practices, and actions, seeking guidance on specific topics and generating new ideas. Furthermore, developing partnership opportunities to foster relationships is vital in informing water management guidelines and meeting the interests of relevant stakeholders.



INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

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Communications Tools

Early engagement with FPMAC’s Natural Resource Management staff and *Community Engagement Coordinator* is essential and will form the focus of engagement and communication. Tools utilised during engagement with Traditional Owners require various methods including corporate engagement, face-to-face discussions, digital engagement, education programs including social media, email, fact sheets and flyers, phone conversations and website information. Collateral including short films, maps, photos, and drawings also form an important part of information sharing with Traditional Owners.

The tools need to be varied to suit the audience and required outcome or input being sought. Consideration for timely information must also be incorporated into planning for Catchment Management Authorities’ and other project related organisations. This includes allowing adequate time for information to be disseminated

to the community, seek feedback and questions answered with an opportunity to seek further clarification and revised actions as required.

Stakeholder Identification

A significant component of Traditional Owner engagement is ensuring a true reflection of the sentiment and ideas are captured from the relevant Aboriginal community. Following appropriate communication processes and engaging the necessary TO group through the FPMMAC is an important and necessary part of protocol. Understanding these protocols are developed through ongoing relationships and connections with the relevant Catchment Management Authorities and other relevant organisations.

Objectives

The primary objective of stakeholder engagement is to ensure stakeholders can offer advice, ideas, opinions, and aspirations for the delivery of projects and plans.

Goals for engaging with Traditional Owners should be:

- To ensure that FPMMAC is empowered with the knowledge and capacity to communicate essential information to its Board and Members.
- To ensure Traditional Owners understand the benefits, opportunities, and challenges of any future or planned works.
- Gather stories, sentiments, ideas and perspectives on the various sites and projects.
- Create sustainable opportunities for self-determination for the project and in the delivery of outcomes.
- To address concerns and expectations associated with all potential works.
- To provide clear and transparent communications to FPMMAC and Traditional Owners.
- Build FPMMAC and Catchment Management Authority staff knowledge and understanding of projects, protocols, and cultural values.
- Ensure appropriate engagement with FPMMAC and Traditional Owner representation at meetings, site visits, on-Country events, project planning and the ultimate decision-making process.

Engagement Summary

Methods for improved Traditional Owner engagement:

Resources:

Consultations with Traditional Owners is facilitated through First People of the Millewa-Mallee Aboriginal Corporation, as the Registered Aboriginal Party (RAP) and Traditional Owner Corporation (TOC) in the north-west of Victoria. To carry out the necessary consultations with Traditional Owners, who live throughout Victoria and inter-state, it will be necessary to engage and resource FPMMAC with the tools to engage, consult and report. These tools include, among others:

- Traditional Owner engagement fees
- Travel and accommodation
- Transportation
- External expert advice and counsel if required
- Venue costs if required

Outcomes:

Either short-term or long-term engagement contracts can be developed by proponents with FPMMAC, to ensure clarity over the terms of engagement and project costs. This process can ensure the smooth interaction between parties.

Important questions to consider when planning FPMMAC and Traditional Owner engagement:

- What will be the Traditional Owner management role in the program?
- What will be the economic opportunities from the project for FPMMAC and Traditional Owner's?
- How will the water be contained so as it does not impact sensitive areas (burial sites, fireplaces etc)?
- Has any CHMP's been conducted around the area that could be shared with Traditional Owner's?
- Can Traditional Owner's re-visit the area when the water has been delivered to see the impact?
- How much water will be delivered to the area? (ML's)
- How will the water be delivered – through pumps, levies etc?
- Who decides when and how water is delivered for an environmental watering event? What is the governance behind this? (Commonwealth Environmental Water Holder)
- How is the duration and length between watering events decided? The watering events are either not long enough or too far apart – and are not bringing back or sustaining the flora and fauna.
- What type of work is being done to identify, protect and sustain birds, fish, frogs etc?
- What will be the participation and role of Traditional Owners over the life of the project?

FPMMAC Objectives and Outcomes:

Objectives	Outcomes
Restock native fish species in waterways and bodies nominated by the First Peoples of the Millewa-Mallee: Establish a native fish hatchery, with initial focus on endangered species. Establish a native plant seed bank, nursery, and industrial planting capacity.	First Peoples of the Millewa-Mallee are empowered to make choices regarding locations and timing of fish releases based on sites that have cultural or historical importance, and areas that mirror fish movements and hunting in the past. FPMMAC develop business and employment opportunities throughout the life of the project.
Traditional Owners manage waterways of cultural significance and be empowered to culturally and environmentally regulate floodplains and waterways as required, to prevent damage to cultural heritage and the environment.	Cooperative management of sensitive cultural heritage and environmental lands.
The protection of sensitive cultural and environmental areas from other water users, including anglers, boaters, swimmers, joggers, four-wheel drivers, and trail bike riders, as this is currently a significant problem.	Improved and expanded environmental protections, with access to water for both cultural and visitation opportunities, which are more sustainably managed, protecting Country from erosion and degradation. Access to water for visitation is achieved in an indigenous culturally appropriate way, protecting culturally significant sites from damage caused by encroachment, foot, and vehicle traffic.
Traditional Owner management in environmental watering decisions be ongoing and include decisions on site selection, quantities, and timing. FPMMAC to work in partnership with government and non-government agencies. Establish in-house capacities and external commercial relationships. Completion of Native Title & Settlement Agreement. Establishment of contractual relationships with agencies to implement projects and funding agreements.	Cultural outcomes are identified and implemented when managing water for the environment to achieve shared benefits based on traditional ecological knowledge, environmental and cultural values.
Restore Song lines as discussed while on Country and restore them, so Traditional Owners can spend time on Country in places of high cultural significance.	The song lines are restored with access to fresh water via the naturally formed waterholes and Traditional Owners are enabled to make decisions regarding the song lines,

Objectives	Outcomes
<p>Establish teams of the Indigenous Cultural Ranger - Custodians of Country program.</p> <p>Establish a native seed bank of foods & fibre plants and commercial nursery. Establish contracting services and operational capacity.</p> <p>Focus upon land, water, wildlife, feral animal management, construction, cultural heritage, tourism, native plants & restorative farming.</p> <p>Re-occupy traditional lands by traditional people.</p>	<p>including in relation to economic opportunities through tourism and cultural activities.</p>
<p>Representatives from First Peoples of the Millewa-Mallee sit on water boards, including the Catchment Management Authorities, and Lower Murray Water, and Government supports First Peoples of the Millewa-Mallee to be confident, know the rules and requirements, and know how best to share knowledge.</p>	<p>First Peoples of the Millewa-Mallee are at the forefront of decision making and evaluation, of socio-cultural-economic factors and informing and influencing decision makers of how to plan, manage and accommodate cultural outcomes.</p>
<p>The First Peoples of the Millewa-Mallee takes a lead role in monitoring and evaluation.</p>	<p>The First Peoples of the Millewa-Mallee are respected, listened to, and resourced to monitor, evaluate and participate in research on Country to determine from a cultural perspective how water management and planning decisions are impacting positively or negatively on Country in regards to water quality, flora and fauna protection and regeneration health in particular in relation to culturally significant species, and the protection of culturally significant sites.</p>
<p>The Victorian Government resources the First Peoples of the Millewa-Mallee to employ sufficient professional staff to engage and interact with Governments and other relevant organisations.</p>	<p>Ongoing monitoring and evaluation of cultural and environmental outcomes is used to inform decisions regarding when and where to water sites of cultural significance, including but not limited to Lake Walla Walla, Kings Billabong, Brickworks Lagoon, Wallpolla Creek and Lyndsay Island.</p> <p>The First Peoples of the Millewa-Mallee are funded to make their own decisions about when and how it is best to evaluate the health of Country.</p>
<p>Fund and support FPMMAC's Environment and Ecosystem Restoration Program to facilitate improved natural resource management throughout their lands.</p> <p>Assist with the monitoring and evaluation of changes to Country that occur following different watering regimes, decisions, and climatic conditions.</p>	<p>The health of waterways and water bodies on the Country of the First Peoples of the Millewa-Mallee is improved, providing habitat for fish, birds and an environment that fosters native plant species important to cultural practices.</p>
<p>Funding for the First Peoples of the Millewa-Mallee to conduct Aboriginal Waterway Assessments at times determined by the Nation groups as the best way to gauge measures from a cultural perspective, including based on a seasonal calendar as determined by the First Peoples of the Millewa-Mallee based on their observations and cultural knowledge:</p> <ul style="list-style-type: none"> • Carry out responsibilities under the Victorian Aboriginal Heritage Act 2006. • Expand NRM capacities, structures, and objectives. • Complete negotiation of expanded RAP area of operations. • Expand the Resting Places Program for protection of Ancestral Remains. • Expand our Cultural Ranger-Custodians of Country capability and role. • Develop employment & economic opportunities on-Country. 	<p>Self determination to monitor and evaluate river and wetland health from a cultural perspective.</p>

Objectives	Outcomes
<ul style="list-style-type: none"> Assist with obtaining World Heritage status. 	

Feedback Loop

To ensure a robust engagement process a feedback loop must be incorporated into the project timeline to demonstrate how feedback and ideas gathered from Traditional Owners' have been incorporated into the management, planning processes and project outcomes.

Providing opportunities for Traditional Owners' to not only shape project planning but also visualise outcomes through self-determination, capacity building and co-management of our Country, greatly increases our understanding, knowledge, skills base and connection to our country and culture.

Reporting and Review | Measurement of Success

The success of engagement with Traditional Owner's will be measured by the following indicators:

- Partnerships with stakeholders – Development of co-management relationships and goals.
- Relationships – Development of formal contracts for engagement, expectations, processes, and outcomes.
- Increased Productivity – Better working environment for all parties.

Traditional Owner Role – Increased involvement of RAP and TOC in on country development and activities.

Taungurung Land and Waters Council

Taungurung Land and Waters Council (TLaWC) provided a submission on the previous draft of this update to the Environmental Water Management Plan Guidelines and a number of changes were made in response to this feedback. Although that submission is not available for publication, TLaWC is preparing another statement to be used in future.

Appendix C Water-dependent values aligned to Basin Plan

In describing water dependent environmental values, it is useful to group objectives in relation to components, processes and functions. The Basin Plan has adopted a three tiered approach of themes which include:

- Ecosystem type and biodiversity
- Ecosystem function
- Ecosystem resilience

The sub-themes and brief examples/descriptions are provided in Table 17 and the sections below.

Table 17: Environmental value themes and sub-themes based on the Basin Plan – Chapter 8 Environmental Watering Plan.

Theme	Sub-theme	Example
Ecosystem type and Biodiversity	Ecosystem type/ significance	Best available representative of an ecosystem type, near natural example of an ecosystem type typical of a region, rare ecosystem type, listed as Ramsar site or under DIWA.
	Supports migratory species	Species regularly occur at the asset which are listed on international treaties (Bonn Convention, JAMBA, CAMBA and or RoKAMBA).
	Support episodically high ecological productivity	Ecosystems are ‘boom and bust’ systems which periodically /episodically support high ecological productivity and its dispersal (e.g. Lake Eyre).
	Supports listed species and or communities	Listed at State and/or national level.
	Supports significant numbers of a species	Supports large numbers (compared to other assets in the region), typically in the 10s of thousands, but may be smaller but regionally significant numbers.
	Supports representative native biota/ prevents declines	Supports representative populations and communities of native biota, prevents declines in native biota.
Ecosystem function	Maintains water quality	Water quality does not negatively affect the water dependent ecosystem.
	Connectivity	Connectivity is protected/restored to support diversity and dynamics of geomorphic structures, habitat species and genes Ecological processes dependent on hydrological connectivity are supported – includes longitudinal, lateral and vertical connectivity Barriers to passage of biota, nutrients, carbon are overcome or mitigated.
	Instream and floodplain processes	Natural instream processes that shape landforms, formation of soils are protected or restored.
	Habitat	Supports habitat diversity at a range of scales – reach, region, asset type.
	Maintaining populations	Includes recruitment, regeneration, dispersal, immigration, emigration Water regime meets the requirements for maintaining populations – e.g. provides cues for spawning, breeding, migration, germination Habitat diversity, extent, condition supports life cycles of biota – e.g. nursery habitat provide protection from predators.
	Community structure and food webs	Supports species interactions and food webs that sustain water-dependent ecosystems, including by protecting and restoring energy, carbon and nutrient dynamics, primary production and respiration.

Ecosystem resilience	Climate change and variability	Ecosystems are resilient to climate change, climate variability and disturbances (for example, drought and fire).
	Provides refuge	Supports the long-term survival and resilience of water-dependent populations of native flora and fauna, including during drought to allow for subsequent re-colonisation beyond the refugia.
	Ecosystem resilience	Provide wetting and drying cycles and inundation intervals that do not exceed the tolerance of ecosystem resilience or the threshold of irreversible change – i.e. temporary wetlands are not permanently inundated.
	Invasive species and other anthropogenic threats	Mitigate human-induced threats (for example, the impact of alien species, water management activities and degraded water quality).
	Fragmentation	Reduce or minimise fragmentation.

Ecosystem type and biodiversity

If an asset meets any of the Schedule 8 PEA criteria met (see Table 24 in Appendix F) record this information as objectives will need to be developed for these values. Assets only become a PEA if environmental water is required to sustain the relevant values.

Ecosystem type and significance

For northern Victorian assets, the Basin Plan Schedule 8 criteria will help identify priority environmental assets (PEA). Significant environmental values relating to ecosystem type include rarity of type, condition or 'naturalness' of the type and if it is part of a Ramsar Wetland of International Importance. The Basin Plan adopts the ANAE classification of aquatic ecosystems and should be used where possible.

Supports migratory species

For inland aquatic ecosystems this will relate to support of migratory waterbirds listed under four international treaties – see <https://www.environment.gov.au/biodiversity/migratory-species>. These lists are updated semi-regularly and should be checked to keep information current. 'Support' means the migratory species occur at the site regularly. Single historic records are not adequate to suggest an asset supports migratory species.

Supports episodically high ecological productivity

A value of an asset may be that it supports episodic periods of high ecological productivity. Temporary wetlands are often sites of high productivity once inundated after an extended dry period. However, to be considered a value, this episodic 'boom' in productivity should be a natural characteristic of the site. 'Episodic' does not refer to the annual wetting and drying of temporary/seasonal wetland; episodic equates systems that are typically dry and only have rare and irregular wet events (approximately 1 in 10 years), with the wet phase lasting for several months which supports high productivity and dispersal. Lake Albacutya in the Wimmera system would most likely support episodically high ecological productivity if it flooded and or received environmental water.

Supports listed species and or communities

Supports significant numbers of a species

Significant numbers of individuals can be 10s of thousands of waterbirds, or 1% of the population of a species of conservation significance. Aquatic ecosystems are by nature productive systems and often support large numbers of biota, to be a value at an asset, the numbers should be greater than other similar assets in the region.

Supports representative native biota/ prevents declines

Ecosystem functions

In many instances the outcomes for past objectives for waterbirds and fish have been about ecosystem functions but have not been labelled as such. For example, recruitment of native fish is an ecosystem function as is the creation of feeding habitat for waterbirds. As for other environmental values, the key

ecosystem functions listed for an asset should be reflected in the environmental objectives and targets set for the asset.

Provide a short discussion on the ecosystem functions (e.g. creation or maintenance of habitats, longitudinal or lateral hydrological connectivity, transport and dilution of carbon and nutrients) that occur at the asset, and note the Basin Plan PEF criteria met (see Table 25 in Appendix F).

Schedule 9 of the Basin Plan provides some examples to consider writing about. As for other environmental values, the priority ecosystem functions listed for an asset should be reflected in the environmental objectives and targets set for the asset.

Maintains water quality

This environmental function is where, with the delivery of environmental water, the water quality is maintained so that habitats and biota are sustained; that water quality does not negatively affect the ecosystem or its components.

Connectivity

Connectivity is a key ecosystem function of all aquatic ecosystems and includes lateral, longitudinal vertical and temporal connectivity. Hydrological connectivity is critical ecosystem function which supports diversity and dynamics of geomorphic structures, habitat species and genes. The Basin Plan defines connectivity as referring to the connections between natural habitats, such as a river channel, adjacent wetland areas and along the length of rivers, including connections above ground (surface water) or below ground (groundwater) (MDBA 2012).

Hydrological connectivity is influenced by floods, rainfall and run-off with all three influencing the transport of terrestrial material through the landscape. The amount of material (biotic and abiotic) transported and or deposited is related to the degree of connectivity, which is a function of both the energy generated by runoff and how this is dissipated and the level of connectedness (how far it reaches). The key flow elements of hydrological connectivity include duration, frequency, magnitude, timing and sequence of inundation. Variation in the degree of hydrological connectivity will promote heterogeneity in physical habitat for biota, which in turn promotes diversity.

Instream and floodplain processes

Natural instream processes that shape landforms, formation of soils are protected or restored.

Habitat

Supports habitat diversity at a range of scales – reach, region, asset type.

Maintaining populations

Includes recruitment, regeneration, dispersal, immigration, emigration.

Water regime meets the requirements for maintaining populations – e.g. provides cues for spawning, breeding, migration, germination.

Habitat diversity, extent, condition supports life cycles of biota – e.g. nursery habitat provide protection from predators.

Community structure and food webs

Supports species interactions and food webs that sustain water-dependent ecosystems, including by protecting and restoring energy, carbon and nutrient dynamics, primary production and respiration.

Ecosystem resilience

Climate change and variability

Ecosystems are resilient to

, climate variability and disturbances (for example, drought and fire).

Provides refuge

Supports the long-term survival and resilience of water-dependent populations of native flora and fauna, including during drought to allow for subsequent re-colonisation beyond the refugia.

Ecosystem resilience

Provide wetting and drying cycles and inundation intervals that do not exceed the tolerance of ecosystem resilience or the threshold of irreversible change – i.e. temporary wetlands are not permanently inundated.

Invasive species and other anthropogenic threats

Mitigate human-induced threats (for example, the impact of alien species, water management activities and degraded water quality).

Fragmentation

Reduce or minimise fragmentation.

Appendix D Basin Plan objectives, targets and outcomes

Table 18: Basin Plan objectives – Chapter 8 Environmental Watering Plan.

Chapter 8 objective code	Chapter 8 (Environmental Watering Plan) objectives
8.05	Protection and restoration of water-dependent ecosystems
8.05,2(a)	An objective is to protect and restore a subset of all water-dependent ecosystems of the Murray-Darling Basin, including by ensuring that: declared Ramsar wetlands that depend on Basin water resources maintain their ecological character; and (Note: see paragraph 21(3)(c) of the Act.
8.05,2(b)	An objective is to protect and restore a subset of all water-dependent ecosystems of the Murray-Darling Basin, including by ensuring that: water-dependent ecosystems that depend on Basin water resources and support the life cycles of species listed under the Bonn Convention, CAMBA, JAMBA or ROKAMBA continue to support those species; and
8.05,2(c)	An objective is to protect and restore a subset of all water-dependent ecosystems of the Murray-Darling Basin, including by ensuring that: water-dependent ecosystems are able to support episodically high ecological productivity and its ecological dispersal.
8.05,3(a)	An objective is to protect and restore biodiversity that is dependent on Basin water resources by ensuring that: water-dependent ecosystems that support the life cycles of a listed threatened species or listed threatened ecological community, or species treated as threatened or endangered (however described) in State law, are protected and, if necessary, restored so that they continue to support those life cycles; and
8.05,3(b)	An objective is to protect and restore biodiversity that is dependent on Basin water resources by ensuring that: representative populations and communities of native biota are protected and, if necessary, restored.
8.06	Protection and restoration of ecosystem functions of water-dependent ecosystems
8.06,2	An objective is that the water quality of Basin water resources does not adversely affect water-dependent ecosystems and is consistent with the water quality and salinity management plan.
8.06,3(a)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the diversity and dynamics of geomorphic structures, habitats, species and genes are protected and restored; and
8.06,3(b)(i)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: ecological processes dependent on hydrologic connectivity: (i) longitudinally along watercourses;
8.06,3(b)(ii)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: ecological processes dependent on hydrologic connectivity: (ii) laterally between watercourses and their floodplains (and associated wetlands);
8.06,3(b)(iii)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: ecological processes dependent on hydrologic connectivity: (iii) vertically between the surface and subsurface; are protected and restored; and
8.06,3(c)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the Murray Mouth remains open at frequencies, for durations, and with passing flows, sufficient to enable the conveyance of salt, nutrients and sediment from the Murray-Darling Basin to the ocean; and
8.06,3(d)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the Murray Mouth remains open at frequencies, and for durations, sufficient to ensure that the tidal exchanges maintain the Coorong's water quality (in particular salinity levels) within the tolerance of the Coorong ecosystem's resilience; and Note: This is to ensure that water quality is maintained at a level that does not compromise the ecosystem and that hydrologic connectivity is restored and maintained.

8.06,3(e)(i)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the levels of the Lower Lakes are managed to ensure sufficient discharge to the Coorong and Murray Mouth and help prevent river bank collapse and acidification of wetlands below Lock 1, and to avoid acidification and allow connection between Lakes Alexandrina and Albert, by: (i) maintaining levels above 0.4 metres Australian Height Datum for 95% of the time, as far as practicable; and
8.06,3(e)(ii)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: the levels of the Lower Lakes are managed to ensure sufficient discharge to the Coorong and Murray Mouth and help prevent river bank collapse and acidification of wetlands below Lock 1, and to avoid acidification and allow connection between Lakes Alexandrina and Albert, by: (ii) maintaining levels above 0.0 metres Australian Height Datum all of the time; and
8.06,3(f)	An objective is to protect and restore connectivity within and between water-dependent ecosystems, including by ensuring that: barriers to the passage of biological resources (including biota, carbon and nutrients) through the Murray-Darling Basin are overcome or mitigated.
8.06,4	An objective is that natural in-stream and floodplain processes that shape landforms (for example, the formation and maintenance of soils) are protected and restored.
8.06,5	An objective is to support habitat diversity for biota at a range of scales (including, for example, the Murray-Darling Basin, riverine landscape, river reach and asset class).
8.06,6(a)	An objective is to protect and restore ecosystem functions of water-dependent ecosystems that maintain populations (for example recruitment, regeneration, dispersal, immigration and emigration) including by ensuring that: flow sequences, and inundation and recession events, meet ecological requirements (for example, cues for migration, germination and breeding); and
8.06,6(b)	An objective is to protect and restore ecosystem functions of water-dependent ecosystems that maintain populations (for example recruitment, regeneration, dispersal, immigration and emigration) including by ensuring that: habitat diversity, extent, condition and connectivity that supports the life cycles of biota of water-dependent ecosystems (for example, habitats that protect juveniles from predation) is maintained.
8.07	Ensuring water-dependent ecosystems are resilient to climate change and other risks and threats
8.06,7	An objective is to protect and restore ecological community structure, species interactions and food webs that sustain water-dependent ecosystems, including by protecting and restoring energy, carbon and nutrient dynamics, primary production and respiration.
8.07,2	An objective is that water-dependent ecosystems are resilient to climate change, climate variability and disturbances (for example, drought and fire).
8.07,3	An objective is to protect refugia in order to support the long-term survival and resilience of water-dependent populations of native flora and fauna, including during drought to allow for subsequent re-colonisation beyond the refugia.
8.07,4	An objective is to provide wetting and drying cycles and inundation intervals that do not exceed the tolerance of ecosystem resilience or the threshold of irreversible change.
8.07,5	An objective is to mitigate human-induced threats (for example, the impact of alien species, water management activities and degraded water quality).
8.07,6	An objective is to minimise habitat fragmentation.

Table 19: Basin Plan Schedule 7 Targets (part 2 from 1 July 2019).

<p>Longer term targets from 1 July 2019</p> <p>There are improvements in the following:</p>
<p>2(a) Flow regimes which include relevant flow components include the following flow components that are relevant to the watering requirements:</p> <ul style="list-style-type: none"> (i) cease-to-flow events; (ii) low-flow-season base flows; (iii) high-flow-season base flows; (iv) low-flow-season freshes; (v) high-flow-season freshes; (vi) bank-full flows; (vii) over-bank flows; <p>(Note: The improvements in flow regimes will be measured by progress towards natural flow regimes, having regard to the Basin-wide environmental watering strategy.)</p>
<p>2(b) Hydrologic connectivity between the river and floodplain and between hydrologically connected valleys;</p>
<p>2(c) River, floodplain and wetland types including the condition of priority environmental assets and priority ecosystem functions;</p>
<p>2(d) Condition of the Coorong and Lower Lakes ecosystems and Murray Mouth opening regime;</p>
<p>2(e) Condition, diversity, extent and contiguousness of native water-dependent vegetation;</p>
<p>2(f) Recruitment and populations of native water-dependent species, including vegetation, birds, fish and macroinvertebrates;</p>
<p>2(g) The community structure of water-dependent ecosystems.</p>

Table 20: Basin-wide environmental watering strategy – Expected Environmental Outcomes.

Theme	Code	Sub-theme	BWS Expected Environmental Outcome
River flows and connectivity	B1.1	Longitudinal connectivity	To keep base flows at least 60% of the natural level
	B1.2		A 30% overall increase in flows in the River Murray: from increased tributary contributions from the Murrumbidgee, Goulburn, Campaspe, Loddon and Lower Darling catchments collectively
	B1.3	Lateral connectivity	A 30 to 60% increase in the frequency of freshes, bank-full and lowland floodplain flows in the Murray, Murrumbidgee, Goulburn–Broken and Condamine–Balonne catchments
	B1.4		A 10 to 20% increase of freshes and bank-full events in the Campaspe, Loddon and Wimmera catchments
	B1.5		Current levels of connectivity maintained in the Kiewa, and Ovens catchments
Native Vegetation	B2.1	Forests and Woodlands	Maintain current extent of forest and woodland including approximately: <ul style="list-style-type: none"> • 360,000 ha of river red gum • 409,000 ha of black box
	B2.2		No decline in the condition of river red gum and black box across the Basin
	B2.3	Ovens	Maintain extent and condition** of water-dependent vegetation (10,200ha RRG, <100ha BB) near river channels and on the floodplain
	B2.4	Goulburn – Broken	Maintain extent of water-dependent vegetation near river channels and on low-lying areas of the floodplain. Improve condition of black box and river red gum (19,800ha RRG, 500ha BB)
	B2.5	Campaspe	Maintain extent and condition** of water-dependent vegetation near river channels (1,900ha RRG, <100ha BB)
	B2.6	Loddon	Maintain extent and condition** of water- dependent vegetation near river channels (2,200ha RRG, 700ha BB)
	B2.7	Murray	Maintain extent of water-dependent vegetation near river channels and on low-lying areas of the floodplain. Improve condition of black box and river red gum (90,600ha RRG, 41,700ha BB NSW & Vic).
	B2.8		By 2024 improve condition of black box and river red gum
	B2.9		By 2024 improve recruitment of trees within river red gum and black box communities

Theme	Code	Sub-theme	BWS Expected Environmental Outcome
	B2.10	Shrublands	Maintain extent of Lignum along the Murray River from the junction with the Wakool River to downstream of Lock 3, including Chowilla and Hattah Lakes
	B2.11	Non-woody vegetation	To maintain the current extent of non-woody vegetation
	B2.12		By 2024, increased periods of growth for communities that closely fringe or occur within the main river corridors (includes Avoca, Avon, Richardson and Wimmera rivers)
	B2.13		By 2024, increased periods of growth for communities that form extensive stands within wetlands and low-lying floodplains including Moira grasslands in Barmah–Millewa Forest
Waterbirds	B3.1		That the number and type of water bird species present in the Basin will not fall below current observations
	B3.2		A significant improvement in waterbird populations in the order of 20 to 25% over the baseline scenario, with increases in all waterbird functional groups
	B3.3		Breeding events (the opportunities to breed rather than the magnitude of breeding per se) of colonial nesting waterbirds to increase by up to 50% compared to the baseline scenario
	B3.4		Breeding abundance (nests and broods) for all of the other functional groups to increase by 30-40% compared to the baseline scenario, especially in locations where the Basin Plan improves over bank flows
Native Fish	B4.1	Broad outcomes	No loss of native fish spp currently present within the basin
	B4.2		Improved population structure of key fish species through regular recruitment
	B4.3		Increased movement of key fish species
	B4.4		Expanded distribution of key fish species and populations
	B4.5		Improved community structure of key native fish species
	B4.6	Short-lived species	Restored distribution and abundance to levels recorded pre-2007
	B4.7	Moderate to long-lived species	Improved population structure (i.e. a range of size/age classes for all species and stable sex ratios where relevant) in key sites. This will require annual recruitment events in at least eight out of 10 years at 80% of key sites, with at least four of these being 'strong' recruitment events.
	B4.8		A 10-15% increase of mature fish (of legal take size) for recreational target species (Murray cod and golden perch) in key populations (<i>check spp relevant to Wimmera</i>)
	B4.9		Annual detection of species and life stages representative of the whole fish community through key fish passages; with an increase in passage of Murray cod, trout cod, golden perch, silver perch, Hyrtl's tandan, congolli, short-headed lamprey and pouched lamprey through key fish passages to be detected in 2019–2024; compared to passage rates detected in 2014–2019
	B4.10		Significant increases in the distributions of key species (see key fish spp table) in the southern Basin.

Appendix E Long-term Watering Plan objective codes

Table 21: Victorian Murray LTWP objectives.

LTWP code	Objective
LTWPVM1	Improve connectivity between floodplains, anabranches and wetlands
LTWPVM2	Improve the species richness of aquatic vegetation in wetlands
LTWPVM3	Improve the species richness of in-channel aquatic vegetation
LTWPVM4	Improve the extent of aquatic vegetation
LTWPVM5	Improve the condition of river red gum dominated EVCs
LTWPVM6	Improve the condition of black box dominated EVCs
LTWPVM7	Maintain the extent of black box dominated EVCs
LTWPVM8	Improve the condition of shrub and lignum dominated EVCs
LTWPVM9	Successful growth and flowering of Moira grass plants
LTWPVM10	Improve breeding opportunities for colonial-nesting waterbirds
LTWPVM11	Improve breeding opportunities for waterbirds
LTWPVM12	Improve habitat for waterbirds
LTWPVM13	Improve feeding areas for waterbirds
LTWPVM14	Improve abundance of large-bodied native fish
LTWPVM15	Maintain abundance of small-bodied native fish in wetlands
LTWPVM16	Maintain distribution of threatened small-bodied native fish in wetlands
LTWPVM17	Improve habitat for native fish
LTWPVM18	Maintain species richness of native fish
LTWPVM19	Improve habitat for frog communities
LTWPVM20	Maintain species richness of frog communities
LTWPVM21	Improve habitat of turtle and crayfish communities
LTWPVM22	Improve abundance of macroinvertebrates
LTWPVM23	Improve number of macroinvertebrate functional groups present
LTWPVM24	Maintain water quality within an appropriate range to allow for ecosystem processes

Table 22: Northern Victoria LTWP objectives.

LTWP code	Objective
LTWPNV1	Improve longitudinal connectivity (between river reaches and with the Murray)
LTWPNV2	Maintain water quality within an appropriate range to allow for ecosystem processes
LTWPNV3	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)
LTWPNV4	Maintain the condition of aquatic vegetation in wetlands
LTWPNV5	Maintain the condition of in-channel aquatic vegetation
LTWPNV6	Improve the extent of aquatic vegetation
LTWPNV7	Improve the abundance of aquatic vegetation
LTWPNV8	Improve the species richness of aquatic vegetation in wetlands
LTWPNV9	Improve the species richness of in-channel aquatic vegetation
LTWPNV10	Maintain the extent of river red gum dominated EVCs
LTWPNV11	Maintain the condition of river red gum dominated EVCs
LTWPNV12	Improve species richness of river red gum dominated EVCs
LTWPNV13	Maintain the extent of Black Box dominated EVCs

LTWPNV14	Reduce the extent of exotic vegetation
LTWPNV15	Improve breeding opportunities for waterbirds
LTWPNV16	Improve habitat for waterbirds
LTWPNV17	Improve abundance of large-bodied native fish
LTWPNV18	Improve abundance of small-bodied native fish in rivers
LTWPNV19	Improve habitat for native fish
LTWPNV20	Improve movement of native fish
LTWPNV21	Maintain species richness of native fish
LTWPNV22	Improve breeding of Platypus and Rakali
LTWPNV23	Maintain abundance of Platypus and Rakali
LTWPNV24	Improve breeding of frog communities
LTWPNV25	Maintain species richness of frog communities
LTWPNV26	Improve abundance of macroinvertebrates
LTWPNV27	Improve number of macroinvertebrate functional groups present

Table 23: Wimmera Mallee LTWP objectives.

LTWP code	Objective
LTWPWM1	Maintain the species richness of aquatic vegetation in wetlands
LTWPWM2	Maintain the species richness of in-channel aquatic vegetation
LTWPWM3	Maintain the extent of aquatic vegetation
LTWPWM4	Improve the abundance of aquatic vegetation
LTWPWM5	Improve the condition of riparian EVCs
LTWPWM6	Improve the condition of wetland EVCs
LTWPWM7	Maintain the condition of Black Box dominated EVCs
LTWPWM8	Improve breeding opportunities for waterbirds
LTWPWM9	Improve habitat for waterbirds
LTWPWM10	Improve abundance of large-bodied native fish
LTWPWM11	Improve movement of native fish
LTWPWM12	Maintain species richness of native fish
LTWPWM13	Improve habitat for Platypus and Rakali
LTWPWM14	Maintain habitat for crayfish communities
LTWPWM15	Maintain habitat for turtle communities
LTWPWM16	Maintain habitat for frog communities
LTWPWM17	Improve longitudinal connectivity (between river reaches) to facilitate fish movement
LTWPWM18	Maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation
LTWPWM19	Maintain refuges for native fish species
LTWPWM20	Maintain the quality of geomorphic habitat (maintain channel form, clean substrates, prevent stream bed colonisation)

Appendix F Basin Plan Schedule 8 and 9 criteria for priority ecosystem assets and priority ecosystem functions.

Table 24: Basin Plan Schedule 8 criteria for which the asset is identified as a Priority Environmental Asset (PEA).

Schedule 8 criteria
<p>Criterion 1: The water-dependent ecosystem is formally recognised in international agreements or, with environmental watering, is capable of supporting species listed in those agreements.</p> <p>A water-dependent ecosystem is an environmental asset that requires environmental watering if it is:</p> <ul style="list-style-type: none"> (a) a declared Ramsar wetland; or (b) with environmental watering, capable of supporting a species listed in or under the JAMBA, CAMBA, ROKAMBA or the Bonn Convention.
<p>Criterion 2: The water-dependent ecosystem is natural or near-natural, rare or unique.</p> <p>A water-dependent ecosystem is an environmental asset that requires environmental watering if it:</p> <ul style="list-style-type: none"> (a) represents a natural or near-natural example of a particular type of water-dependent ecosystem as evidenced by a relative lack of post-1788 human induced hydrologic disturbance or adverse impacts on ecological character; or (b) represents the only example of a particular type of water-dependent ecosystem in the Murray-Darling Basin; or (c) represents a rare example of a particular type of water-dependent ecosystem in the Murray-Darling Basin.
<p>Criterion 3: The water-dependent ecosystem provides vital habitat.</p> <p>A water-dependent ecosystem is an environmental asset that requires environmental watering if it:</p> <ul style="list-style-type: none"> (a) provides vital habitat, including: <ul style="list-style-type: none"> (i) a refugium for native water-dependent biota during dry spells and drought; or (ii) pathways for the dispersal, migration and movements of native water-dependent biota; or (iii) important feeding, breeding and nursery sites for native water-dependent biota; or (b) is essential for maintaining, and preventing declines of, native water-dependent biota.
<p>Criterion 4: Water-dependent ecosystems that support Commonwealth, State or Territory listed threatened species or communities.</p> <p>A water-dependent ecosystem is an environmental asset that requires environmental watering if it:</p> <ul style="list-style-type: none"> (a) supports a listed threatened ecological community or listed threatened species; or <p>Note: See the definitions of listed threatened ecological community and listed threatened species in section 1.07.</p> <ul style="list-style-type: none"> (b) supports water-dependent ecosystems treated as threatened or endangered (however described) under State or Territory law; or (c) supports one or more native water-dependent species treated as threatened or endangered (however described) under State or Territory law.
<p>Criterion 5: The water-dependent ecosystem supports, or with environmental watering is capable of supporting, significant biodiversity.</p> <p>A water-dependent ecosystem is an environmental asset that requires environmental watering if it supports, or with environmental watering is capable of supporting, significant biological diversity. This includes a water-dependent ecosystem that:</p> <ul style="list-style-type: none"> (a) supports, or with environmental watering is capable of supporting, significant numbers of individuals of native water-dependent species; or (b) supports, or with environmental watering is capable of supporting, significant levels of native biodiversity at the genus or family taxonomic level, or at the ecological community level.

Table 25: Basin Plan Schedule 9 criteria for Priority Ecosystem Functions (PEFs).

Schedule 9 criteria
<p>Criterion 1: The ecosystem function supports the creation and maintenance of vital habitats and populations</p> <p>An ecosystem function requires environmental watering to sustain it if it provides vital habitat, including:</p> <ul style="list-style-type: none"> (a) a refugium for native water-dependent biota during dry periods and drought; or (b) pathways for the dispersal, migration and movement of native water-dependent biota; or (c) a diversity of important feeding, breeding and nursery sites for native water-dependent biota; or (d) a diversity of aquatic environments including pools, riffle and run environments; or (e) a vital habitat that is essential for preventing the decline of native water-dependent biota.
<p>Criterion 2: The ecosystem function supports the transportation and dilution of nutrients, organic matter and sediment.</p> <p>An ecosystem function requires environmental watering to sustain it if it provides for the transportation and dilution of nutrients, organic matter and sediment, including:</p> <ul style="list-style-type: none"> (a) pathways for the dispersal and movement of organic and inorganic sediment, delivery to downstream reaches and to the ocean, and to and from the floodplain; or (b) the dilution of carbon and nutrients from the floodplain to the river systems.
<p>Criterion 3: The ecosystem function provides connections along a watercourse (longitudinal connections).</p> <p>Assessment indicator: An ecosystem function requires environmental watering to sustain it if it provides connections along a watercourse or to the ocean, including longitudinal connections:</p> <ul style="list-style-type: none"> (a) for dispersal and re-colonisation of native water-dependent communities; or (b) for migration to fulfil requirements of life-history stages; or (c) for in-stream primary production.
<p>Criterion 4: The ecosystem function provides connections across floodplains, adjacent wetlands and billabongs (lateral connections).</p> <p>Assessment indicator: An ecosystem function requires environmental watering to sustain it if it provides connections across floodplains, adjacent wetlands and billabongs, including:</p> <ul style="list-style-type: none"> (a) lateral connections for foraging, migration and re-colonisation of native water-dependent species and communities; or (b) lateral connections for off-stream primary production.

Appendix G Conceptual model examples

1. Pictorial representation:

Plant life at the edge of wetlands (Brock and Casanova).

Wetland Management Handbook: Farm Management Systems (FMS) guidelines for managing wetlands in intensive agriculture (2011) Queensland Department Employment, Economic Development and Innovation [includes general information re understanding wetlands].

<http://wetlandinfo.ehp.qld.gov.au/wetlands/management/wetland-management/>

Macquarie Marshes Ramsar site: ecological character description (2012) NSW Office of Environment and Heritage. Chapter 6 conceptual models

<http://www.environment.nsw.gov.au/resources/water/120517MMECDPt3.pdf>

Riverine recovery monitoring and evaluation program: conceptual understanding of the ecological response to water level manipulation (2012) SA DEWNR.

https://www.waterconnect.sa.gov.au/Content/Publications/DEWNR/RRP_MonProg_Conceptual_understanding_TN.pdf

Riverland Ramsar site (2009) SA Department for Environment and Heritage. Section 3.5 'Conceptual models of the site'.

<https://www.environment.sa.gov.au/files/sharedassets/public/wetlands&form=IPRV10>

2. Flow chart diagrams:

Victorian environmental flows monitoring and assessment program (2006) Chee *et al.* Chapter 2 'Conceptual models, hypotheses and response variables relevant to the Campaspe River'.

http://www.ewater.com.au/uploads/files/VEFMAP_Campaspe-River.pdf

The development of wetland conceptual models for the semi-arid zone (2009) Price and Gawne.

https://www.mdba.gov.au/sites/default/files/pubs/413-MDBA_Report1_46pp_lowres%20latest%20version%203.12.09.pdf

Framework for evaluating aquatic ecosystem connectivity (2012) Queensland Wetlands Program.

<http://wetlandinfo.ehp.qld.gov.au/resources/static/pdf/ecology/connectivity/qwp-connectivity-project-22-2-13.pdf>

Macquarie Marshes Ramsar site: ecological character description (2012) NSW Office of Environment and Heritage. Chapter 6 conceptual models

<http://www.environment.nsw.gov.au/resources/water/120517MMECDPt3.pdf>

Paroo River Wetlands Ramsar site: ecological character description (2010) NSW Department of Environment, Climate Change and Water. Section 3.4 'A conceptual model'.

<http://www.environment.nsw.gov.au/resources/water/10213parooriverecd.pdf>

General:

eWater tool for creating conceptual models

<http://toolkit.ewater.com.au/Tools/Concept>

Queensland wetland info website:

<http://wetlandinfo.ehp.qld.gov.au/wetlands/management/>

Walking the landscape: A whole-of-system framework for understanding and mapping environmental processes and values (2012) Queensland Department of Environment and Heritage Protection.

<http://wetlandinfo.ehp.qld.gov.au/resources/static/pdf/ecology/connectivity/walking-the-landscape-15-02-13.pdf>

