Review of the Water Allocation Plan for the Eastern Mount Lofty Ranges

May 2024

LANDSCAPE SOUTH AUSTRALIA HILLS AND FLEURIEU

Report prepared by the Hills and Fleurieu Landscape Board, in collaboration with the Department for Environment and Water and the Murraylands and Riverland Landscape Board.

Government of South Australia

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Review of the

Water Allocation Plan for the Eastern Mount Lofty Ranges

How to navigate this document

This report summarises the work undertaken throughout 2022-2023 for the comprehensive 10-year review of the Eastern Mount Lofty Ranges (EMLR) Water Allocation Plan (WAP).

Part One of this report addresses the legislative requirements for the comprehensive WAP review, including an assessment of the success of the plan and whether it remains appropriate moving forward.

Part Two of this report details the technical investigations underpinning the review, including; status of water resources, ecosystems and allocation and use. Findings from community and stakeholder engagement are also detailed here.

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Abbreviations

BCG	Biological Condition Gradient
BoM	Bureau of Meteorology
CMCM	Contemporary Macroinvertebrate Condition Model
CRP	Current Recommended Practice
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEW	Department of Environment and Water
DEWNR	Department of Environment, Water and Natural Resources
EMLR	Eastern Mount Lofty Ranges
EWPs	Environmental Water Provisions
EWR	Environmental Water Requirements
F4F	Flows for the Future
GIS	Geographic Information System
HFLB	Hills and Fleurieu Landscape Board
IPCC	Intergovernmental Panel on Climate Change
LFRs	Low Flow Releases
LiDAR	Light Detection and Ranging
NARCliM	New South Wales and Australian Regional Climate Modelling
MDBA	Murray Darling Basin Authority
MERI	Monitoring, Evaluation, Reporting and Improvement
PDI	Planning Development and Infrastructure
PIRSA	Department of Primary Industries and Regions
PWRA	Prescribed Water Resources Area
SAFPA	South Australian Forest Products Association
SARDI	South Australian Research and Development Institute
SDLAM	Sustainable Diversion Limit Adjustment Mechanism
SWMZ	Surface Water Management Zone
S&D	Stock and Domestic
UWMZ	Underground Water Management Zones
WAP	Water Allocation Plan
WMLR	Western Mount Lofty Ranges
WRP	Water Resource Plan

Definitions

Allocation: The total volume of water allocated to licence holders each year. Also 'water allocation'. Allocation figures listed in Table 5 are given for the nine EMLR catchments. Where a surface water allocation is associated with a dam, the allocation volume is not necessarily the total volume of the dam,.

Amendment: In the context of this report, refers to a Water Allocation Plan (WAP) amendment process which follows the comprehensive review of a WAP and involves the development of new WAP policies.

Aquifer: An underground layer of rock or sediment that holds water and allows water to percolate through.

Catchment: The area of land determined by topographic features within which rainfall contributes to runoff at a particular point. For example, the Bremer River Catchment encompasses all the land area that contributes surface water runoff to the Bremer River.

Environmental water provisions: The EMLR WAP defines environmental water provisions to mean *'those parts of environmental water requirements that can be met at any given time. This is what can be provided at that time with consideration of existing users' rights, social and economic impacts'*.

Environmental water requirements: The Landscape SA Act defines environmental water requirements as '*those water requirements that must be met in order to sustain the ecological values of ecosystems that depend on the water resource, including their processes and biodiversity, at a low level of risk*'.

Existing user allocation process: The process for issuing licences to existing users, independent to the process of developing the WAP.

Existing user: In the EMLR, an existing user means, subject to subsection (11) of the Landscape Act, a person:

- who took water from the resource at any time during the establishment period; or
- who did not take any water during that period but who needs water for a development, project or undertaking to which he or she was legally committed or in respect of which he or she had, in the opinion of the Minister, committed significant financial or other resources during the establishment period;

Extraction limit (also, 'take limit', 'WAP limit', 'sustainable extraction limit'): The limit set out in the WAP for a sustainable level of annual take from surface water and groundwater resources, set at the management zone level.

Flow regime: The flow regime the character of the timing and amount of flow in streams and wetlands, and has the basic components; magnitude, frequency, duration and timing.

Forestry: In this context means tree plantations grown or maintained for commercial purposes. The figures listed within the 'Forestry' column in Table 5 refer to the estimated water use volumes calculated for commercial forestry across the PWRA at the time of developing the EMLR WAP. Commercial forests are not irrigated, but are significant users of water through their interception of surface water run-off and absorption of groundwater. The figures in Table 5 reflect only the surface water usage element.

Groundwater level: The distance from the natural ground surface to the underground water surface.

Groundwater management zone (GWMZ): a defined zone for the purpose of underground water management, based on the predominant type of aquifer.

Groundwater resources: Water occurring naturally below ground level in aquifers, or water pumped, diverted or released into a well for storage underground.

High demand zone: Zones where the volumes of total allowable use, which includes estimated volumes of non-licensed water use and the total volume of water allocations exceeds the WAP limits for the zone.

Licenced water uses: Require an allocation and includes irrigation of pastures or crops, industry use (eg mining), intensive animal raising and public water supply from reservoirs.

Macroinvertebrate: Aquatic 'waterbugs' that you can see without using a microscope that live part or all of their lives in water - such as yabbies, dragonfly larvae or native shrimp.

Metered water use: Some water uses are required to be metered, including all licenced groundwater use and a small proportion of licenced surface water use (from dams or watercourse pumping). Water used for non-licenced purposes is not required to be metered, and estimates are used instead.

Millennium drought ('the drought'): The drought across south east Australia from 1997 to 2009, which devastated communities, industries and the environment.

Non-licenced water uses: Do not require an allocation and includes water used for stock and domestic purposes and water that is naturally intercepted by forestry plantations (not via direct irrigation).

Resource capacity: In general, the total amount of water available to meet all water demands, including consumptive use and the needs of the environment, on a long-term average annual basis. For the EMLR Plan, it has been determined as the long-term mean annual volume or rate of water inflow to a water resource that is expected to occur in the current landscape in the absence of water resource development. The resource capacity for surface water and watercourse water combined is equivalent to the mean annual adjusted runoff. The resource capacity for underground water is the mean annual recharge volume (or input via throughflow for aquifers with no/minimal current rainfall recharge).

Review: in this context, refers to a WAP review, or comprehensive review as defined in section 54 the Landscape South Australia Act 2019.

Stock and domestic: The taking of water for watering stock (stock that are not subject to intensive farming) and/or domestic purposes (e.g. watering less than 0.4 hectare of garden, not used commercially). The figures shown in Table 5 for stock and domestic use were calculated by identifying the number of stock and domestic dams, estimating total dam storage volumes and establishing standard assumed use from all stock and domestic dams to be 30% of total dam volume. Estimates for stock and domestic use from watercourses are not defined in the EMLR WAP, and not included in Table 5.

Sub-catchment: An intermediary spatial scale used when managing or referring to surface water resources. A sub-catchment is smaller than a catchment, larger than a surface water management zone (SWMZ).

Surface water management zone (SWMZ): The finest scale of management adopted by the WAP for the purposes of establishing rules and limits. Surface water management zones have been developed on the basis of reach types: the confluence of reach types (with the exception of headwaters) has generally been used to define each surface water management zone.

Surface water resources: Water flowing over land after having fallen as rain and the water flowing in watercourses or held in dams and reservoirs is defined as a surface water resource.

Total allowable use: The maximum volume that could be used by all licence holders in a given year (including SA Water), plus the estimated figures for stock and domestic and forestry surface water use. This number remains constant in all years, because it reflects maximum allowable use and not actual use.

Total estimated use 2021-2022: The summed total of; metered use for 2021-2022 by those licence holders with meters installed, plus 'assumed use' by licence holders who do not have a meter, plus the standard estimated figures for non-licenced uses (stock and domestic and forestry uses). The only change to yearly 'total estimated use' from 'total allowable use' is the metered usage of those licence holders who are metered.

Water affecting activity (WAA): These are activities that can have adverse impacts on the health and condition of water resources, catchment hydrology, water users and ecosystems that depend on water resources. These water resources include watercourses, lakes or dams, floodplains, groundwater, springs, wetlands, waterholes and catchment landscapes. The relevant authority for a WAA could be the Landscape Board, or the Minister.

Water dependent ecosystems (WDE): Those parts of the environment, the species composition and natural ecological processes, that are determined by the permanent or temporary presence of flowing or standing water, above or below ground. The in-stream areas of rivers, riparian vegetation, springs, wetlands, floodplains, estuaries, lakes and aquifer ecosystems are all water-dependent ecosystems.

Executive Summary

The Water Allocation Plan (WAP) for the Eastern Mount Lofty Ranges (EMLR) Prescribed Water Resources Area (PWRA) was adopted in 2013 and provides rules for the management of watercourse water, surface water and groundwater resources. The *Landscape South Australia Act 2019* (the Act) requires a landscape board to review a WAP on a comprehensive basis at least once every ten years. This review began in 2022 and is supported by a range of technical investigations, alongside broad reaching community and stakeholder engagement.

The review of the WMLR WAP sought to answer two key questions;

Key question 1: Has the WAP been successful in achieving the outcomes it set out to achieve?

Key question 2: Does the WAP remain appropriate going forward or does it require amendment?

In answering these two key questions, the review largely takes the current WAP policies (and their underpinning information, approaches, etc.) as they stand, in order to assess whether they were effective and whether they remain appropriate. Where amendments are found to be required, it is during the amendment process, rather than this review process, that alternative policies and approaches are explored in full.

The WAP is a key component of the water planning arrangements for the Mount Lofty Ranges. These arrangements have been largely successful in:

- halting uncontrolled expansion of dam development and surface and groundwater take,
- introducing a water licensing system, and
- regulating water affecting activities.

However, the level of achievement relating to the health of water dependent ecosystems has fallen well short of the outcomes sought to be achieved.

The review has found that amendments to the WAP policies are required to address gaps and limitations and to bring the science, policy and implementation approaches in line with contemporary information and community expectations. The principles of the WAP and the outcomes sought to be achieved through those principles depended upon the full implementation of supporting programs, which have not been implemented to the levels anticipated. Considerable amendments to the current plan are required to address the disconnect between the WAP policies themselves, the outcomes sought and the implementation of supporting programs.

The challenges relating to the management of surface water resources are far more complex and contentious than those relating to the management of groundwater resources.

The volume of total allowable use (allocations and non-licensed use estimates, combined) exceeds the WAP extraction limits for 55% of surface water zones and 22% of groundwater zones across the EMLR and there has not been a subsequent process to align allocations with extraction limits. The estimated volumes of use by non-licensed purposes (commercial forestry, stock and domestic use) also contribute to zones exceeding WAP extraction limits.

The surface water extraction limits in the WAP are currently set at 20% of resource capacity, which assumed the full implementation of low flow releases. South Australian and Commonwealth government funding was secured to implement low flow releases in the EMLR through the Flows for the Future Program. Through this dedicated funding and resourcing, a total of 349 sites in the EMLR have been treated to pass low flows. While progress continues to be made, the level of implementation to date is below that anticipated by the WAP, limiting the full achievement of stated environmental objectives.

Modelling undertaken for development of the 2013 EMLR WAP showed that without implementing low flow releases, surface water extraction limits would need to be four times less (5% of resource capacity) to meet equivalent environmental objectives.

The stated environmental objectives of the EMLR WAP were developed using a combination of monitoring data and modelling approaches that drew upon information current at the time of developing the WAP. This review has recognised opportunities for the stated environmental objectives, monitoring processes and methods used for evaluating condition and trend to be improved through new information and insights that are now available.

The review was supported by investigations undertaken to understand the status and condition of the resources, with key findings highlighted below:

- Detailed analysis of long-term annual, seasonal and monthly rainfall totals across the Mount Lofty Ranges highlights that the 1971-2006 baseline climate period adopted by the WAP no longer remains appropriate.
- Spring season rainfall has seen the greatest impact (predominantly in October) when comparing pre-Millennium drought years (1900-1996) to post-drought years (2009-2022). For example, post-drought median spring rainfall reduced by 26% in Macclesfield, compared to the pre-drought period.
- Since the onset of the drought, streamflow patterns have been altered to varying extents in both the EMLR catchments investigated. These changes in flow patterns were also observed between the WAP development and post-WAP development periods.
- Ecological monitoring data shows a clear picture of declining trends in native fish populations and macroinvertebrate communities and provides evidence that the environmental objectives set out in the WAP have not been achieved.
- Long-term trends in groundwater (aquifer) levels for six zones with the highest metered use showed aquifer levels to be generally stable. Salinity levels were stable for most wells, though three zones (Angas Kanmantoo, Currency Limestone and Angas Bremer Limestone) showed increasing salinity trends that require ongoing monitoring.

In addition to the above findings, the engagement undertaken with local community members and stakeholder bodies identified a number of areas where future efforts will need to be focussed, including; clear identification of environmental objectives (outcomes) through a process of community engagement, the basis for calculating environmental water requirements and low flow releases, management of non-licensed stock and domestic water use and commercial forestry water use, support for current licence holders through any changes to their entitlements and exploring how future policies can adapt to climate change and year-to-year variability.

The lands and waters of the EMLR PWRA includes parts of the traditional Country of the Kaurna, Peramangk, Ngarrindjeri and First Peoples of the River Murray and Mallee nations. First Nations representatives expressed that any future amendment should enable First Nations people to participate fully in water planning and management processes, including First Nation representation in future advisory groups.

The engagement and investigations of the review have informed 'Focus Areas' that are required to develop new information, policies and approaches throughout the WAP amendment process and these are described in Section 4 of this report.

One of the most significant areas in which the current plan was found to require amendment is in relation to climate change. Amendment of the plan will need to consider sustainable extraction limits in the context of changing rainfall and run-off patterns, and updating policies to enable adaptive management of water resources in the future.

The EMLR PWRA forms part of the Murray-Darling Basin in South Australia and as a result state water planning and management arrangements must be consistent with the requirements of the Water Act 2007(Cth) and the Basin Plan 2012. The EMLR PWRA together with the Marne Saunders PWRA are captured within the EMLR Water Resource Plan. Any future amendments to the WAP and subsequent amendments to the Water Resource Plan will consider the requirements of the Basin Plan in the context of the findings of the Basin Plan Review scheduled for completion in 2026.

1 Introduction

1.1 The WAP area

The Eastern Mount Lofty Ranges (EMLR) Prescribed Water Resources Area (PWRA) is located around 50 km to the east of Adelaide and occupies an area of 2,845 km^2. The area incorporates the eastern slopes of the Mount Lofty Ranges and the Murray Plains and lies within the Murray-Darling Basin. Due to this, the PWRA can be divided into two topographically distinct regions – the west is characterised by steep hills and valleys, while the eastern side comprises flat plains and localised rises stretching out towards the River Murray.

The PWRA extends from the Milendella Creek catchment in the north to Currency Creek catchment in the south and contains sixteen surface water catchments, which have been grouped into nine major catchments for the purposes of this report. Eleven of the catchments have watercourses that drain from the eastern slopes of the Mount Lofty Ranges to the River Murray and Lake Alexandrina, with the Bremer River, Angas River, and Finniss Rivers being the larger watercourses. There are also a number of catchments that have streams that rise in the ranges but do not persist and contribute little water into the River Murray.

The nine major catchments of the Eastern Mount Lofty PWRA for the purposes of this report are:

- Angas River catchment
- Bremer River catchment
- Central Plains catchments
- Currency and Deep Creek catchment
- Finniss River catchment
- Northern catchments
- Reedy Creek catchment
- Southern Plains catchment
- Tookayerta catchment.

A number of different aquifers containing underground water occur within the PWRA. These include fractured rock aquifers (Adelaidean and Kanmantoo Group rocks) where water is stored and moves through joints and fractures in rock, as well as sedimentary aquifers in Permian Sand deposits located in some valleys around Mount Compass and Ashbourne. The Murray Group Limestone aquifer occurs in the eastern part of the PWRA within the Currency Creek, Langhorne Creek and Milang areas.

Figure 1, overleaf, displays the EMLR PWRA and the boundaries of surface water catchment areas, alongside major townships and rivers.

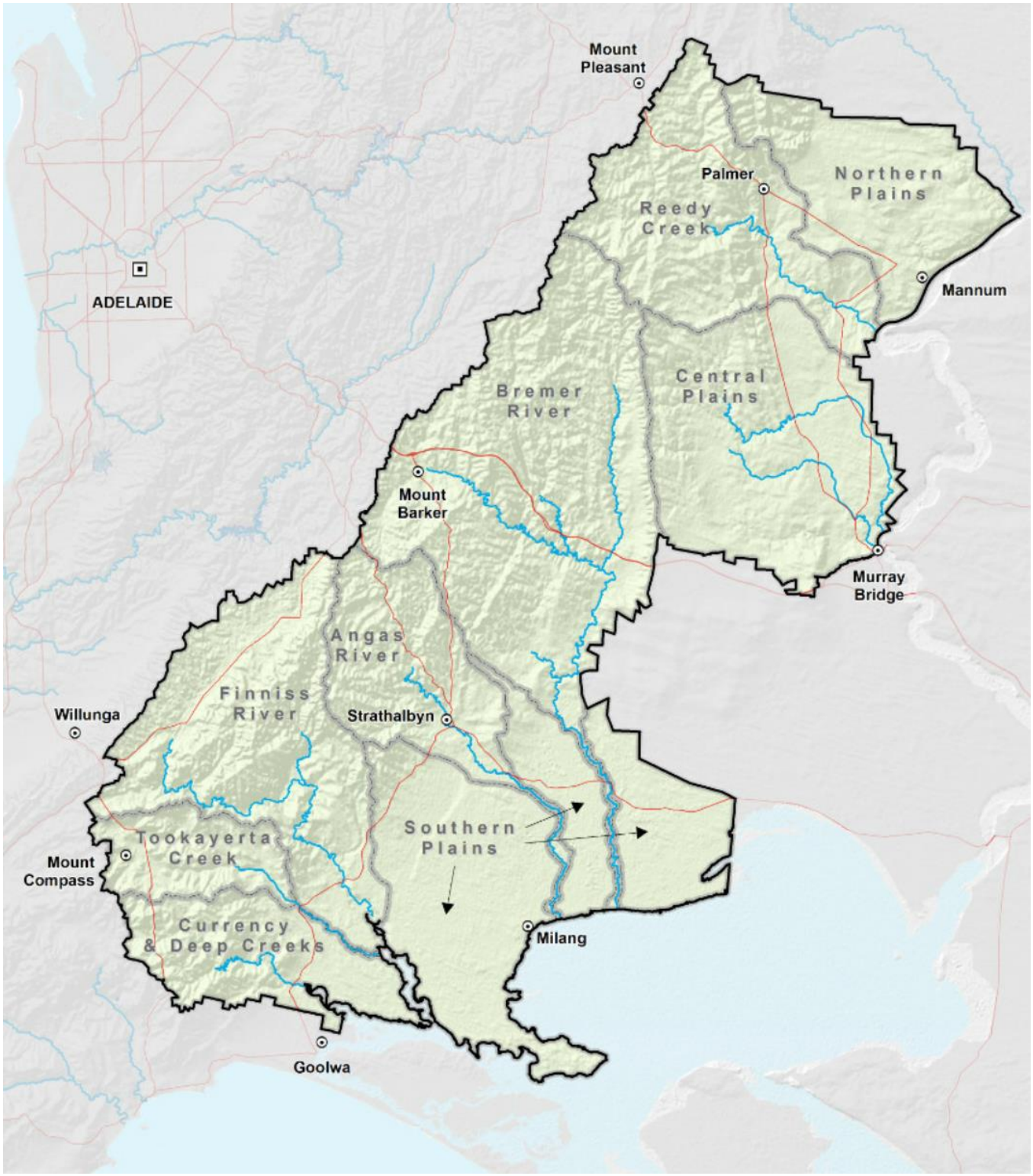

Figure 1 Eastern Mount Lofty Ranges (EMLR) Prescribed Water Resources Area (PWRA) and its catchment areas

1.2 Legislative context

Sections 54(1) and 54(2) of the *Landscape South Australia Act 2019* (the Act) requires that a landscape board must review a WAP on a comprehensive basis at least once every ten years. This document summarises the comprehensive review of the *Water Allocation Plan for the Eastern Mount Lofty Ranges Prescribed Water Resources Area,* adopted in 2013.

Under s. 54(2) the purpose of a comprehensive review is to:

(a) provide a review of—

(i) the principles reflected in the plan; and(ii) the success of the plan after taking into account the outcomes sought to be achieved by the water allocation plan; and

(b) provide an assessment of whether the water allocation plan remains appropriate or requires amendment.

(c) assess or address any other matter prescribed by the regulations.

Section 54 also provides that in undertaking a review, boards are to undertake such consultation as it determines to be reasonable, taking into account any regulations made pursuant to s. 54(5) or guidelines specified by the Minister pursuant to s. 54(4). While no such regulations or guidelines have been developed, general guidelines (DEW 2022) in relation to how landscape boards should engage with the community have been issued by the Minister, and consultation conducted for this review had regard to those guidelines.

For the purpose of section 54 of The Act, the Hills and Fleurieu Landscape Board (the board) recognises its role as the *designated entity* in holding primary responsibility for the review of the WAP. It is further recognised that the work involved in preparing, implementing, reviewing and amending water allocation plans is underpinned by the collaborative efforts of the Government of South Australia's Department of Environment and Water (DEW) Water Science, Environmental Science, Data and Information, Water Policy, Water Licensing teams and relevant Landscape Boards who have a share of the prescribed areas.

Under the Commonwealth Water Act 2007 (Water Act) the Basin Plan is the overarching plan for water management in the Murray-Darling Basin, including the Eastern Mount Lofty Ranges. Under the Basin Plan, the Murray-Darling Basin has been divided into a number of water resource plan areas, each of which must have a water resource plan that is to be accredited under the Water Act as compliant with the Basin Plan. The Eastern Mount Lofty Ranges is within one of these water resource plan areas.

The Water Resource Plan (WRP) for the Eastern Mount Lofty Ranges[1] commenced on 16 November 2019 and documents the water management arrangements that are in place in the EMLR to ensure Basin Plan compliance. The WAP is the key legislative instrument accredited as part of the WRP that fulfils these management arrangements. Any amendments made to the WAP as a consequence of this review will require South Australia to submit an amended WRP to the Murray Darling Basin Authority (MDBA) for consideration for accreditation by the Australian Government Minister as being consistent with the Basin Plan.

Under the Water Act the MDBA is required to review the Basin Plan every 10 years. The next review is scheduled for completion in 2026 and will be focused on four key themes: climate change, sustainable water

[1] For more information on the WRP for the EMLR, visit https://www.mdba.gov.au/publications-and-data/publications/eastern-mount-lofty-ranges-water-resource-plan

limits, First Nations, and regulatory design. The findings of the review may result in changes to the requirements of WRPs and this will be considered throughout the WAP and WRP amendment process.

1.3 Background of the WAP

The WAP is a major component of the water planning arrangements for the Mount Lofty Ranges. These arrangements formally commenced in 2003 with the publication of Notices of Intent to Prescribe, and Notices of Prohibition. These arrangements have been successful in:

- Halting uncontrolled expansion of dam development and water take,
- Introducing a water licensing system, and
- Regulating water affecting activities.

These reforms were designed to:

- Protect water users from the impacts of additional upstream development and over-extraction of groundwater, and establish tradable rights to access water.
- Secure a portion of available water to maintain the health of water dependent ecosystems through halting further development to reduce the risk of further ecological degradation.

When the WAP was adopted in 2013, it was part of a significant transition from unregulated water use, to a regulated system with water licences and allocation limits. During this transition, water licences were issued to existing water users through a separate but parallel process to developing the WAP. The allocation volumes on each licence were based on calculations for theoretical enterprise requirements[2], so that allocation volumes were roughly equivalent to existing (estimated) volumes of use. In many areas of the EMLR the allocation volumes granted exceed the sustainable extraction limits set out in the WAP, and there has not been a subsequent process to align allocations with extraction limits. The estimated volumes of use by non-licensed purposes (commercial forestry, stock and domestic use) also contribute to zones exceeding WAP extraction limits.

The Act allows the Minister to reserve 'excess' water[3]. Normally excess water would be available for allocation to new users. However as a precautionary measure it was decided that it was desirable to have a higher level of confidence in the sustainability of the WAP limits before releasing unallocated water. For surface water, the uncertainty was related to the participation rate and timeframe needed to secure low flow releases[4] (LFRs) from 'in-scope'[5] farm dams and watercourse diversions. In relation to groundwater it provided time to develop

[2] Theoretical enterprise requirements were calculated based on the type and size of the enterprise (i.e. 10 hectares of grapevines) and applying a megalitre per hectare volume using the internationally recognised Food and Agricultural Organisation (FAO) methodology. The prescribed area was divided into climate zones to recognise differences in crop water needs.

[3] After allocations have been granted to existing users, excess water is the remaining un-allocated portion below the WAP limit. Excess water does not exist for all zones.

[4] LFRs underpin the extraction limits set out in the WAP and were found through earlier investigations to enable a sustainable balance across the water needs of environments, communities and industries. See section 5.2.1 for more details on low flow releases.

[5] 'In-scope' sites for the passing of low flow releases are defined as all licensed dams (regardless of size), all non-licensed dams over 5ML in size and all licensed watercourse diversions (1100 sites in total). Of these sites 607 have been identified as strategic in-scope sites which are prioritised by the F4F program as these have the greatest potential to return low flows.

a higher level of confidence in WAP limits once several years of data from metering of licenced use was available. Consequently all 'excess' water was reserved.

The WAP contains provisions that enables the Minister (in practice, the delegate) to refuse certain types of applications (including the construction of new dam capacity) if there is a reservation in place. The Medium Term Arrangements, a policy guideline developed by then Department for Environment, Water and Natural Resources (DEWNR) in 2014, sets out the circumstances in which applications are to be refused pursuant to the reservation rules.

1.4 Review Approach

The *Guideline for Review of Water Allocation Plans – A risk based approach* (DEW 2022a, unpublished) summarises that the purpose of the comprehensive review process is to answer two key questions:

Key question 1: Has the WAP (including its principles) been successful in achieving the outcomes it set out to achieve?

Key question 2: Does the WAP remain appropriate going forward or does it require amendment?

Taking into account the challenges and learnings throughout the implementation of the WAP, as well as more recent development of best-practice water management approaches[6], there was compelling justification for the amendment of the WAP at the outset of the review process. The early acknowledgement of the need to amend the WAP enabled efforts during the 2023 review to directly contribute to an effective amendment process, which would follow on from the review and take many years with its own consultation.

The overarching objective of the review was to evaluate the effectiveness of the WAP, its policies, and supporting programs, to identify the focus areas for the amendment. Furthermore, the following considerations were critical in shaping the review approach:

- The engagement program was designed to build community trust and understanding in the science, policy and social drivers informing the WAP and allow time for listening. A specific objective was to understand community and industry experiences with current policy and build community capacity to participate during the amendment process.
- Community engagement was implemented using a 'broad reach' approach so that many perspectives from communities, industries and stakeholders could be heard.
- Early targeted engagement conversations identified gaps in scientific understanding. Information about the trend and condition of the water resources was required to answer fundamental questions and inform broader discussions during community engagement.
- To avoid a prolonged amendment process, work commenced as soon as possible on the science and other inputs which can be reasonably anticipated as required (or those identified during the course of the review).

The EMLR and Western Mount Lofty Ranges (WMLR) WAPs were reviewed in parallel as they were both due for the legislated 10 year review at the same time, and are both presently within the care and control of the Hills and Fleurieu Landscape Board. Because the reviews of these two plans were undertaken concurrently, many of the investigations undertaken to support the reviews include data and information for both regions.

[6] An example is the 'unbundling' of the water licensing system in the MDBA to allow the conversion of one property right to a bundle of separate instruments.

Part One

- Success of the WAP in achieving its objectives
- Appropriateness of the WAP going forward
- Amendment Focus Areas

2 Success of the WAP in achieving its objectives

Summary

The review of the WAPs success and deficiencies has considered the outcomes sought to be achieved, the WAP principles themselves and the supporting programs intended to support the achievement of stated outcomes. In order to evaluate success and deficiencies, the stated outcomes, principles and programs are taken as they stand. It is during a subsequent amendment process that changes to these would be considered, rather than as part of this review.

Acknowledging that prior to the prescription of the EMLR PWRA, the use of water resources in the area was largely unregulated, it can be seen that the set of reforms that included the development of the WAP has achieved much. However, the level of achievement relating to the health of water dependent ecosystems has fallen well short of the outcomes sought to be achieved.

The principles of the WAP and the outcomes sought to be achieved through those principles depended upon the full implementation of supporting programs. The implementation of those supporting programs is below the level anticipated by the WAP and this has led to the stated environmental objectives not being fully achieved.

In relation to **surface water**, flow targets have not been met and the ecological health of watercourses continues to decline. The key implementation factors that have led to the decline are:

- the process of issuing allocations to existing users resulted in total allowable use volumes that exceed WAP extraction limits for many management zones,
- the program to manage high demand zones did not progress to the point of reducing allocations so that they aligned to WAP extraction limits,
- the WAP extraction limits for surface water were set at 25% of total resource capacity and assumed the full implementation of low flow releases in order for that extraction limit to be sustainable.
- the level of implementation of low flow releases to date is below that required by the WAP in order to meet stated ecological objectives. South Australian and Commonwealth Government funding was secured to implement low flow releases in the EMLR through the Flows for the Future Program. Through this dedicated funding and resourcing, a total of 349 sites in the EMLR have been treated to pass low flows.

Groundwater resources are generally in good health, and in nearly all management zones actual use is below the full allocation volumes. However, in many zones the allocation volumes significantly exceed the sustainable limits set by the WAP. This creates a future risk as the current rules allow use to expand to full allocation.

2.1 Introduction

It is a requirement of the Act to review the success of a WAP against the outcomes it sought to achieve and to provide a review of the principles reflected in the WAP. In addition to the outcomes and principles of the WAP itself, consideration has also been given to the supporting programs that were intended to enable implementation of the WAP.

This chapter focusses on the review of the WAP's success in achieving the stated outcomes. Appendix 1 of this report provides further details of the review of WAP principles and the supporting programs.

To assess the success and deficiencies of the WAP in achieving the stated outcomes, this chapter draws upon the following:

Technical Assessment of the Achievement of Current WAP Objectives.

The Objectives Assessment process assembled a panel of people with experience in the operation of the EMLR and WMLR WAPs and with expertise in ecology, hydrology, hydrogeology, licensing, administration of water affecting activities, policy, and water planning. Participants included officers from DEW, Hills and Fleurieu Landscape Board (HFLB) and neighbouring Landscape Boards. The process included two half-day workshops, with participants preparing input between the workshops. The panel systematically assessed the success in achieving the current objectives of the EMLR and WMLR WAPs.

Feedback from DEW Licensing and LHF officers on the operation of WAP principles.

Input was sought from officers who work daily with the WAP principles, in order to identify any operational issues, or perverse outcomes from the administration of WAP principles,

DEW technical reports.

Knowledge of the condition and trend of the water resources is underpinned by long term monitoring. A range of reports to analyse the long term monitoring data and results were commissioned for this review. The following reports supplemented the Technical Assessment of WAP Objectives, and have informed this review:

- *Impacts of changing rainfall patterns on the hydrology of the Mt Lofty Ranges* (DEW 2024a)
- *Hydro-ecological investigations to inform Water Allocation Plan reviews of the Eastern and Western Mount Lofty Ranges Prescribed Water Resource Areas (DEW, 2024b)*
- *Hills and Fleurieu Landscape Region PWRA ecological condition assessment 2022* (DEW 2024c)
- *Eastern Mount Lofty Ranges Prescribed Water Resources Area - Groundwater resource assessment* (DEW 2024d)

Community and stakeholder engagement.

The engagement process consisted of multiple activities to gather diverse perspectives from a range of community and stakeholder groups about their experiences of WAP policy implementation over the last ten years. The feedback contributed to the evaluation of the WAP's effectiveness and informed the development of future 'Focus Areas'.

2.2 Review of outcomes

The outcomes that the WAP seeks to achieve are set out in the Act and in the objectives of the WAP. There are 54 objectives or objective-like statements in the WAP. There is a degree of overlap in many of the objectives, with some being more specific and others higher level. The following two overarching objectives summarise the overall intent:

- Maintain and where possible restore water-dependent ecosystems by providing their water needs.
- Minimise impacts of taking and using water on the environment, prescribed water resources, other water resources and water users.

To guide the review of outcomes, the overarching objectives described above have been distilled into the following key components: the environment, consumptive water use, social water values and First Nations values. The components are interdependent and in combination they provide indications of the successes or deficiencies of the WAP. An analysis of each component is provided below.

2.2.1 Water for the environment

Successes

- The WAP together with the regulatory arrangements (prescription of the resource, licensing, Water Affecting Activity rules) and supporting programs (Medium Term Arrangements) have halted the expansion of dam development[7] and placed an upper limit on water take. The change has mitigated further risk of ecological degradation to the environment, noting that the interception of flows by dams is recognised as a key source of impact from water resource development on water dependent ecosystems (SAMDB, 2019).
- The WAP identifies a balance between environmental and consumptive water needs by setting out Environmental Water Provisions (EWPs) which underpin the stated surface water extraction limits. While implementation to deliver EWPs has been incomplete, the existence of EWPs and extraction limits has provided an important framework for the implementation that has occurred (licensing, Low Flow Releases (LFRs), Medium Term Arrangements). The collective impact has been that a portion of the surface water resource is available for maintaining the health of water dependent ecosystems.
- DEW modelling shows that the level of implementation that has been achieved to date has decreased the overall level of risk to environmental objectives compared to pre-WAP development, when the effects of climate are excluded from the modelled scenarios (DEW, 2024b).
- Setting groundwater allocation limits coupled with the introduction of licensing have provided a framework for protecting groundwater dependent ecosystems (such as wetlands) and processes (such as baseflows in watercourses) from the risk of over use.

[7] No net increase to dam volumes have been approved whilst the reservation and Medium Term Arrangements have been in place. However, the board is aware that a number of dams have been illegally constructed since these rules have been in place and further investigations of those instances are underway.

- The regulation of Water Affecting Activities, including those relating to dam construction or modification, works in watercourses and construction of bores, has allowed for environmental risks to be mitigated at the individual activity scale.
- Monitoring programs undertaken throughout the WAP implementation period have enabled tracking of surface water flows, groundwater levels and salinity and ecological health.

Deficiencies

- The ecosystem condition assessment (DEW, 2024c – discussed in Section 5.3) shows that water dependent ecosystem conditions are generally in decline. At a number of fish monitoring sites there are species which were once recorded but have disappeared during the life of the monitoring program.
- DEW modelling shows that if the WAP had been fully implemented, the level of risk to environmental objectives would have been lower than with the current level of implementation for modelled scenarios (DEW, 2024b – discussed in Section 2.3).
- Implementation of low flow releases (LFRs) has been progressed in the EMLR under the Flows for the Future (F4F) program. To date, LFRs are occurring at 349 sites across the Angas, Bremer, Currency Creek and Finniss Catchments. The level of implementation is below that anticipated by the WAP, which undermines the full achievement of the stated environmental objectives (discussed further in Section 5.2.1).
- The current regulatory arrangements are not able to restrict the take of water for stock and domestic purposes from significant environmental assets (such as pumping from permanent pool refuges).
- The WAP and its supporting programs have not addressed high demand zones. Currently, total allowable use[8] exceeds the limits set in the WAP for 55% of surface water zones and 22% of groundwater zones.
- In groundwater zones where allocation is above the WAP limit, actual (metered) use is below or only slightly above the limit. This means that currently the risk of aquifer degradation is low. However licensees are permitted to take their full allocation and the WAP does not contain a mechanism to limit future increases in use to within the limits, creating the potential for future risks to groundwater resources.
- While there has been considerable monitoring of the resources and ecosystems across the region, a formal Monitoring, Evaluation, Reporting and Improvement (MERI) plan was never developed to support the WAP, and this would have enabled strategic improvements to the existing monitoring programs. It is recognised that more data collection is needed to address gaps and improve representation for some parts of the region. Furthermore, funding of long term monitoring is vulnerable to short-term budgetary constraints, or the conclusion of programs, particularly elements of monitoring and analysis that have been funded through the F4F program.

Discussion

The WAP, regulatory arrangements and supporting programs have established a framework which places limits on further development and within which implementation programs have been able to operate. The level of implementation of supporting programs has resulted in some reduction of risk to water dependent

[8] Total allowable use is the combined total of full allocation volumes held by licencee's, estimated use by non-licensed stock and domestic users and estimated non-licensed forestry use.

ecosystems. However the degree to which these programs have been implemented is still well short of the level anticipated by the WAP. The health of water dependent ecosystems has generally continued to decline to the point where many are not only failing to meet the stated ecological targets and objectives, but showing significant declines since WAP adoption.

Consequently the WAP, taken in context with the associated supporting programs, has not fully succeeded in relation to the environmental outcomes that it sought to achieve on a whole of PWRA or whole of catchment scale.

2.2.2 Water for consumptive use (licenced and non-licenced)

Successes

- The process for issuing licences to existing users, where allocation volumes were based on theoretical enterprise requirements, meant that the introduction of controls did not require a decrease in the current levels of water use at that time.
- The introduction of the water licensing system created a tradeable property right which created an asset for licensees and enabled trade of water.
- The WAP provides a level of protection to existing surface water licensees from inappropriate upstream development.
- The WAP provides a level of security to existing groundwater users by setting a limit on the volume of groundwater that may be extracted and a level of protection from interference caused by new wells being located too close to existing wells.

Deficiencies

- The WAP's trade and transfer rules are difficult to interpret and assess, based on the feedback from water licensees and the DEW Water Licencing Branch. The difficulties create a barrier to trade and impede the operation of a market which was intended to allow water demands to be met within the overall extraction limits.
- The Medium Term Arrangements were maintained throughout the WAP implementation period which prevented any allocation of new water or expansion of dam capacity within zones that are not fully allocated.
- There have been a small number of reports to the board and DEW Water Licensing Branch that some licence holders have not been able to access their full entitlements (largely from watercourse or surface water resources).

Discussion

The WAP, taken in context with the associated supporting programs, has been largely successful in relation to the consumptive use outcomes that it sought to achieve, notwithstanding the deficiencies identified.

2.2.3 Water supporting social values

While WAP policies recognised that there needed to be a balance between environmental, social and economic needs, there were few if any policies specifically related to social values. Social values related to water planning tend to be closely linked to economic or environmental factors.

Economic factors that relate to social values include the employment and local economic activity generated by enterprises that rely on consumptive use of water. This in turn generates business for secondary enterprises that supply goods and services to water reliant enterprises and their employees, and leads to thriving local towns.

Environmental factors that relate to social values include the amenity value of natural habitats, and the host of ecological services which function environments provide.

Both the development of the WAP and the conduct of this review included extensive engagement with local communities.

Social values have been implicitly considered through the community engagement, and the linkages between social values and economic and environmental factors discussed above. However, recognising that it is a specific requirement of the Act for the balance of policies in a WAP to consider social needs, the WAP amendment process may choose to consider whether it is appropriate to explicitly consider social values.

2.2.4 First Nations Objectives

When adopted in 2013, the WAP did not contain any explicit objectives addressing First Nations water values. A subsequent process was undertaken to amend the WAP and a revised version was adopted in 2018 which included acknowledgment of First Nations water interests and a set of 'Aboriginal cultural objectives'. These objectives have largely not been progressed since their inclusion to the WAP in 2018 and this has been recognised as an area which needs to be addressed. Further information about First Nations engagement and feedback is provided in section 9**.**

2.3 Hydro-ecological modelling findings

DEW's Surface Water Science Team undertook hydrological modelling (DEW, 2024b) of various climate and WAP implementation scenarios to assess the effectiveness of:

I. policies and principles for surface water that underpin the environmental objectives of the WAPs i.e., what is expected to have happened if the WAPs were implemented as intended?

II. the actual implementation of the policies in meeting the WAP's environmental objectives i.e., what has happened given how the WAPs have been implemented?

The modelling was applied to three catchments which represent a range of climates, landscapes and extent of water policy implementation across the Eastern and Western Mount Lofty Ranges. The catchments are the Bremer in the EMLR, the Carrickalinga in the WMLR Fleurieu peninsula, and two sub-catchments of the Onkaparinga in the central hills area of the WMLR.

Overall, the modelling investigations found:

- The current extent of implementation of the key WAP rules decreases the overall level of risk to environmental objectives (i.e. likely improved environmental outcome) compared to pre-WAP

development, when the effects of climate are excluded. However, this improvement is not sufficient to meet the catchment-scale flow objectives that underpin the WAP's environmental objectives.

- The climate experienced since the WAPs were developed has variable effects on the pattern of flow and hence on the level of risk to environmental objectives, increasing the risk for the majority of surface water management zones, but decreasing the risk for some zones.
- The combined effect of the current level of implementation and climate results in a small increase in the overall level of risk to environmental objectives since WAP development (i.e. likely poorer environmental outcome). For some zones, the benefits of current implementation are offset by negative effects of the climate experienced since WAP development on the pattern of flow.
- Full implementation of the key WAP rules would further reduce the level of risk to environmental objectives, compared to the current extent of implementation.
- However, the climate experienced since WAP development means that full implementation of the key WAP rules would not be as effective as intended in meeting the flow objective for 2 of the 3 modelled catchments.

These findings support a decision to amend the WAPs, in order to allow them to be more effective in meeting their environmental objectives for surface water, under the current and likely future climate. The findings also support the need for new environmental objectives to be determined so that they better reflect the current and likely future climate.

2.4 Conclusion

Acknowledging that prior to the prescription of the EMLR PWRA, the use of water resources in the area was largely unregulated, it can be seen that the set of reforms that included the development of the WAP has achieved much. However, the level of achievement relating to the health of water dependent ecosystems has fallen well short of the outcomes sought to be achieved. The principles of the WAP and the outcomes sought to be achieved through those principles, depended upon the full implementation of supporting programs. Namely, the delivery of LFRs and addressing high demand zones where total allowable use exceeds the WAP extraction limits. The implementation of those supporting programs is below the level anticipated by the WAP and this has led to the stated environmental objectives not being achieved.

With the adoption of the WAP, there was a decision made to adopt the plan before:

- the development of a broad outline of how implementation would proceed, and
- commitments by the relevant agencies to that implementation – neither in principle, nor with commitment to resourcing.

The WAP relied on an ambitious implementation program for its policies to be successfully implemented. Had it been clear prior to the adoption of the WAP that the full implementation program would not be undertaken, then there would have been an opportunity to develop a different set of policies. That different set of policies would have required some difficult conversations about reducing the level of water take and adjusting targets for environmental sustainability.

Consequently it is recommended that the board adopts as a guiding principle for the WAP amendment process that:

- *Greater improvement can be achieved through a plan with an agreed implementation pathway, than to pursue an aspirational plan is not able to be implemented.*
- *The adoption of the WAPs must be accompanied by (and contingent upon) an implementation plan that is formally supported (including commitment to resourcing) by agencies responsible for implementation.*

The degree to which the WAP has fallen short in achieving its surface water objectives, and the obstacles to implementing the ambitious approach set out in the current WAP, means that the amendment process will need to consider the WAP policies, the outcomes sought and the supporting programs in their entirety in order to achieve any improvement in the way that surface water is managed in the Eastern Mount Lofty Ranges.

3 Appropriateness of the WAP going forward

The 2023 review of the WAP has found that it is not appropriate in its present form to effectively manage the water resources of the area going forward.

Amendments to the WAP policies are required to address gaps and limitations and to bring the science, policy and implementation approaches in line with contemporary information and community expectations. The principles of the WAP and the outcomes sought to be achieved through those principles depended upon the full implementation of supporting programs, which have not been implemented to the levels anticipated. Considerable amendments to the current plan are required to address the disconnect between the WAP policies themselves, the outcomes sought and the implementation of supporting programs.

Without an amendment taking place, the declining ecological conditions observed across the region are likely to continue, and the impacts of climate change would introduce new risks to the environment, people and industries that depend on the regions water resources.

Section 4 outlines a wide range of areas requiring further investigation, in order to understand how the current policies could be amended to better manage the regions water resources. There are two particular aspects which are discussed here:

- the effects of a changing climate, and
- changes to State Legislation[9] and national reviews of water policy which recognise the need for greater inclusion of First Nations values and interests in water planning[10].

[9] The objects of the Landscape SA Act 2019 include a number of new (compared to previous NRM Act) objects that relate to recognising First Nations interests in natural resources management. For example, s. 7(3)(a).
[10] Nationally, this includes the Productivity Commissions national water reform 2020 and also within its 2023 implementation review of the MDBP.

3.1 Climate change

The WAP acknowledges that changing climatic conditions may have potential impacts, the extent of which will have the potential to pose significant challenges in future for water resources and how they are managed. As acknowledged in section 1.6.3 of the WAP, the information and projections available at the time it was being drafted were not able to be applied to great specificity and could not be directly incorporated into the policies. It was envisaged that improvements to the understanding of climate change and the future impacts upon water resource management would be incorporated into future review and amendment of the WAP. Additionally, the WAP highlighted the importance of ongoing ecological and water resource monitoring in order to identify climate-driven trends and inform future management strategies.

The historical practice of using the 'longest available hydrological data sets' in developing rainfall-runoff relationships, quantifying resource capacities, defining environmentally sensitive flow regimes and establishing sustainable extraction limits requires careful consideration. While long-term future climate is expected to be highly variable, modelling using climate projections for the MLR, similar to the work undertaken for the Barossa PWRA (DEW, 2022 and DEW, 2023), is likely to provide further insight into whether the near-future climate is expected to be similar to recent-past climate (DEW, 2024a).

DEW has developed the *Guide to Climate Projections for Risk Assessment and Planning in South Australia 2022*, which provides dynamically downscaled projections for South Australia from the NARCliM 1.5 regional modelling project. The purpose of the guide is to provide information about the changes in climate likely to occur and to provide guidance on the use of climate projections for risk assessment and planning. The guide will be updated in 2024 with new regional-scale model data from the NARCliM 2.0 project, which will include new emissions scenarios that were developed as part of the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report.

3.2 First Nations

Since the development of the WAP social expectations and policy contexts have changed at the state and National level regarding the representation of First Nations peoples and their values within water planning and policy. For example, recognition of 'the spiritual, social, customary and economic significance of landscapes, and especially natural resources, to Aboriginal people' (s. 7(3)(a)) now appears within the LSA Act, replacing the NRM Act 2004 current at the time of adopting the WAP.

Since the WAP was adopted, there has been some progress nationally to recognise First Nations people and actions that realise First Nations' objectives in water management and planning policy. These are briefly described below:

- The recent Basin Plan Implementation Review 2023 (Productivity Commission 2023) includes reforms to strengthen the roles of Aboriginal and Torres Strait Islander people and states that a 'core objective of the Water Act and the Basin Plan is to enshrine and give prominence to First Nations' rights and interests'.
- The recommendations from The National Water Reform 2020 (Productivity Commission 2021) include the co-design of a First Nation people's interests in water and involvement in water management with specific improvements to cultural outcomes and access to water for economic development.
- The 2021 National Agreement on Closing the Gap target 15 has a commitment to the target 'People maintain a distinctive cultural, spiritual, physical and economic relationship with their land and waters'.

Section 9 of this report discusses these points of progress in more detail, as well as highlighting the opportunities for further progress to be made, in partnership with the First Nations peoples of the EMLR region.

4 Amendment Focus Areas

The review has identified a number of areas requiring specific attention in the amendment process to develop new information, policies and approaches to improve the WAP. These are collectively referred to as the 'Focus Areas' for amendment, and are listed in Table 1.

As the amendment progresses and new information becomes available, it is likely that additional Focus Areas will be identified, or that changes to those listed below will be made. Notwithstanding, the list below will help to direct and prioritise action.

The relative level of priority is indicated alongside each of the Focus Areas listed in Table 1. These prioritisations are informed by the 'amendment program logic', illustrated in Figure 2, below.

Figure 2 illustrates the key components or steps (numbered 1-4) of amending the WAP and developing new policies. Whilst there is some flexibility to the design of an amendment process and the order in which particular questions are answered, there are also inherent dependencies where some questions must be answered first before it is possible to answer the next. A number of the Focus Areas listed below are relatively independent of other aspects, and are able to be progressed as discrete projects.

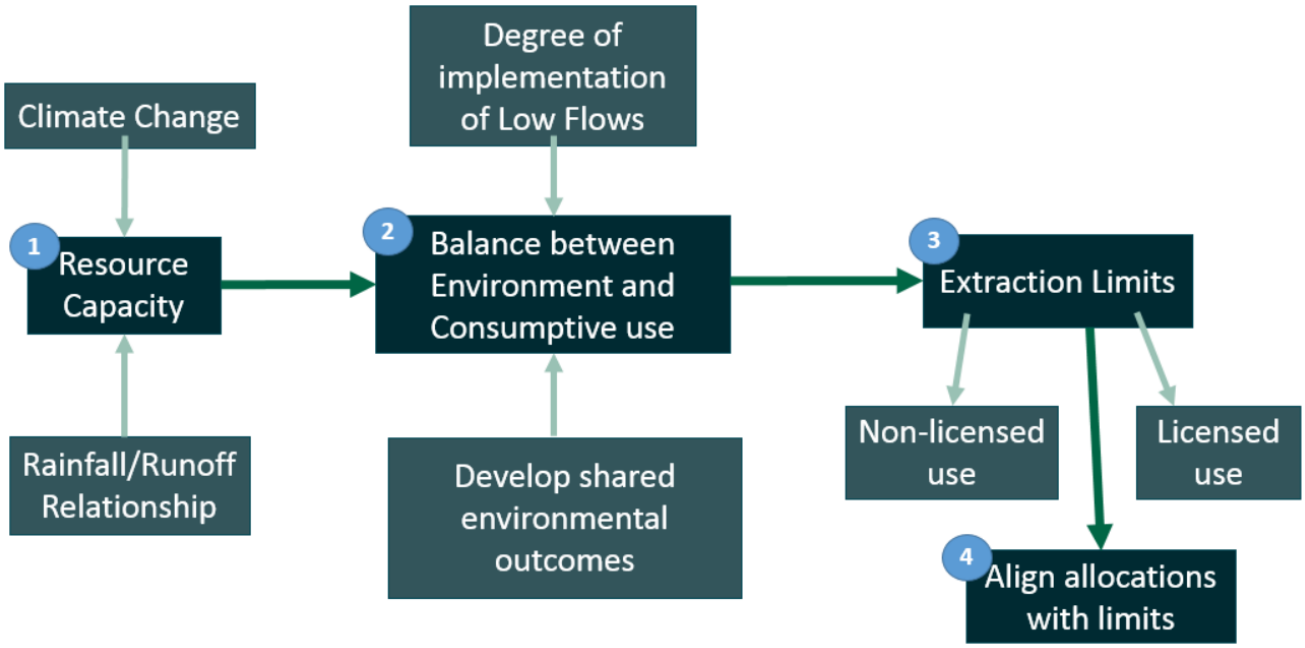

Figure 2 Program logic underpinning the prioritisation of Amendment Focus Areas.

Table 1 Focus Areas and prioritisation for EMLR WAP Amendment.

Priority	Focus Area
1. Development of new ***resource capacity*** figures	Selecting a more appropriate climate period to serve as the 'baseline'.
	Incorporating future climate change projections for the region.
	Updating information on changes to land uses, land cover and land management practices which influence water movement across the land (rainfall/runoff relationship). Including: • Large-scale revegetation projects • Expansion/ contraction to horticultural or viticultural plantings • New data or methods to improve existing estimates for commercial forestry water use • Regenerative farming uptake (changes to water absorption by soils) • Urban developments (i.e. housing estates) completed since
	Undertake GIS analysis to identify changes to dam sizes and water holding capacities, including instances of illegal dam construction and enlargement. Update catchment models to reflect additional dam capacity identified.
	Explore alternative methods for estimating the capacity of existing dams (for example, using LiDAR) to improve accuracy of data.
	Undertake updates to catchment models to incorporate the most recent data on land use/ land cover and other factors affecting rainfall / runoff relationships and groundwater recharge.
2. Find a new **balance** between all water needs	Develop options and targets for future levels of low flow implementation, including the exploration of new methods and approaches and supportive actions to complement low flow implementation. Community and stakeholder engagement will be an important part of this process.
	Use contemporary climate data and projections for future climate conditions to determine new environmental outcomes and environmental water requirements for water dependent ecosystems across the region.
	Investigate opportunities to align water allocation planning with the State Water Security Statement and related water security programs.
	Work with First Nations bodies to develop cultural water aspirations and determine policies that support First Nations' water interests.
	Develop better estimates for contemporary stock and domestic use of surface and groundwater resources across the region. In particular, identify methods for quantifying non-licensed watercourse extractions.
	Undertake an assessment of future demand upon prescribed water resources by non-licenced water users (stock and domestic, commercial forestry).

Priority	Focus Area
	Undertake an assessment of contemporary and future water demands from commercial sectors, including agriculture. The WAP relies on data current up to 2009.
	Include consideration for the provision of Critical Human Water Needs as part of developing a new balance across all needs.
	Incorporate any relevant aspects that may arise from the 2026 Basin Plan Review, and ensure consistency between the EMLR WAP and EMLR Water Resource Plan.
3. Calculate new **extraction limits** for management zones	Using the information gathered from 'part 2' determine new extraction limits that are environmentally, economically, socially and culturally sustainable.
	Strategies for reducing non-licensed water demand will likely need to be explored, depending on the findings of 'part 2'.
	Strategies for reducing licensed water demand will also likely need to be explored, depending on the findings of 'part 2'.
	Although outside of the direct control of the WAP, broader water management strategies and actions will support this stage of the WAP amendment. Including: • Exploring opportunities to improve water efficiency and other climate-ready adaptations • Undertaking water security planning for water-stressed areas of the region. Similar to existing strategies for Barossa and McLaren Vale. • Explore opportunities for alternative water supplies to reduce pressure on native surface and groundwater resources. I.e. recycled wastewater. • Working with industry bodies and other agencies to improve the support available for land managers facing water challenges now and into the future.
4. **Align allocations** to new extraction limits	Explore options with community and stakeholders for aligning allocation volumes to new extraction limits
5. Specific **policy improvements** for amended WAP	Explore opportunities to improve the regulation of non-licensed water use (forestry, stock and domestic) where this could help to achieve the outcomes of the new plan.
	Consider the need in the amended WAP for 'high intensity use zone' rules relating to groundwater, which have been difficult to administer previously.
	Improve the Water Affecting Activity policies, guidelines and Current Recommended Practice (CRP) documents to better support future assessments.
	Reduce the current complexity of trade and transfer rules, including through improved decision support, information systems or rule simplifications where appropriate.

Priority	Focus Area
	Develop mechanisms and policies to improve the level of protection for significant environmental assets, including permanent pool refuges in watercourses.
	Explore policy pathways for the consideration of habitat restoration projects looking to access carbon credits (presently these projects fall within the definition of 'commercial forestry').
	Explore options for greater flexibility year-to-year, in relation to allocations and other water-taking policies. Additionally, exploring adaptive management pathways and trigger mechanisms that allow for decisions to be made in response to climate variability, climate extremes and other changing conditions.
	Improve monitoring programs (surface water, ecological, groundwater salinity monitoring) to address data gaps and allow for greater spatial representation in trend analysis. Develop Monitoring, Evaluation, Reporting and Improvement (MERI) Plan to support the outcomes of the new WAP and allows for continual adaptations and improvements.
	Investigate opportunities to improve linkages between the WAP and the *Planning Development and Infrastructure Act 2019 and PDI Regulations 2019* to ensure there is strategic alignment in how water resources are managed. Including, to protect prescribed water resources from housing developments not proposed to be connected to reticulated mains water supply.

Part Two

Status of resources

Allocation and use

Economic context

Community and Stakeholder Engagement

First Nations Engagement

5 Status of resources

As part of the 2023 EMLR WAP Review a range of investigations have been undertaken to collate key data from monitoring programs and other sources and provide an understanding of the overall status of resources and important trends. This section provides a summary of the key findings from the analyses of long-term rainfall, streamflow, groundwater and ecological monitoring data.

The information in this section forms part of the evidence base drawn upon in Part One to evaluate how effective the WAP has been in sustainably managing the region's water resources, and whether it remains appropriate.

5.1 Status of surface water resources

Summary

Rainfall records from 24 BoM stations across the Mount Lofty Ranges as a whole indicate a declining trend in long-term (1900-2022) annual rainfall in large parts of the region, particularly since the onset (1997) of the Millennium drought.

Seasonal and monthly rainfall records highlight shifting climatic conditions to those anticipated by the EMLR WAP, which adopts 1971-2006 as the baseline climate period.

Spring rainfall has seen the greatest impact (predominantly in October) across all stations investigated, with median spring rainfall reducing by as much as 26% in Macclesfield for the post-drought period. See Table 2

Winter rainfall has generally remained stable (or increased in some cases), Autumn rainfall decreased during the drought but is showing signs of recovery in the post-drought period and Summer rainfall has shown some increase, particularly in the lower elevation sections (plains) of the Bremer Catchment during the last few decades.

Median seasonal streamflows for spring have reduced substantially in both the Finniss (45%) and Bremer (33%) sub-catchments when comparing WAP development (1974-2006) to Post WAP-development (2007-2022) years. See Table *3*

Overall, the analysis provides evidence of alteration of flow regimes since the start of the Millennium drought and during post-WAP development period in the sub-catchments investigated.

The continued use of the 1971-2006 baseline period is expected to result in an overestimation of the resource capacity, and would ignore the fact that the climate, along with rainfall-runoff responses of catchments and their flow regime is changing.

Data collected from rainfall and streamflow monitoring sites across the PWRA were analysed to understand the overall status of the region's surface water resources and trends over time. Rainfall is the key driver for surface water availability, whilst streamflow (measured at monitoring stations along watercourses) provide insight to the rainfall-runoff relationship and overall ecosystem health.

Of the many rainfall and streamflow monitoring stations across the EMLR region, a subset with good quality long-term data were chosen for the investigations discussed here. Sites that were installed more recently will provide the same valuable data in years to come, and improve spatial representation.

A detailed investigation was undertaken for five surface water catchments across the Eastern and Western Mount Lofty Ranges, with two of those catchments being located within the EMLR – Bremer River and Finniss River Catchments. The full details of this investigation can be read in the report; *Rainfall, streamflow and their relationship trends in the Mount Lofty Ranges* (DEW 2024a).

The investigation compared observed data at different time scales (decadal, annual, seasonal, monthly and daily) for different climate and planning comparison periods, listed below;

- WAP development (1974-2006)[11]
- Post-WAP development (2007-2022)
- Pre-drought (1900-1996)
- Drought (1997-2008)
- Post-drought (2009-2022)

The purpose of the investigation was to inform the review of the WAPs by:

- Identifying if rainfall, streamflow and their relationship ('rainfall-runoff response') patterns changed during the Millennium drought ('drought') (1997-2008), and if they have recovered to pre-drought conditions (pre-1996) during post-drought (2009-2022) period; and
- Identifying if streamflow volumes and overall flow patterns during the post-WAP development period (2007-2022) were different from those used to develop the WAP (1974-2006)

5.1.1 Summary of rainfall findings

Rainfall records from 24 Bureau of Meteorology (BoM) stations across both the WMLR and EMLR regions were analysed using various statistical methods to investigate long-term trends, periodic shifts within long-term data and the impacts of the drought on rainfall totals and seasonality. Key findings for the entire Mount Lofty Ranges region are provided below, followed by further EMLR catchment-specific findings.

Whole of Mount Lofty Ranges Summary

The combined results of the analyses provide evidence of a declining trend in long-term annual rainfall in large parts of the region, particularly since the onset of the Millennium drought. This is largely due to a possible downward shift in spring season rainfall (predominantly in October) and to a lesser degree in autumn rainfall (in April), with spring rainfall yet to recover to pre-drought conditions (see Table 2) and autumn rainfall showing signs of recovery since the drought period. Winter season rainfall has generally recovered to pre-drought conditions across the stations investigated. A long-term decline and/or a negative shift in spring and autumn rainfall was not observed at some stations, and these stations are located predominantly in the lower elevation sections of the Bremer catchment.

Bremer Catchment

Rainfall sites analysed - Mount Barker, Langhorne Creek, Kanmantoo, Harrogate, Callington and Nairne.
Key findings - Recovery of annual rainfall to pre-drought conditions was observed in the majority of stations, with both post-drought and post-WAP development periods showing rainfall to be equivalent to or greater than the pre-drought and WAP development periods, respectively. However, the data shows a positive shift of rainfall towards the winter and summer months at some stations in the catchment, suggesting that the high

[11] The EMLR WAP adopted a baseline climate period of 1971-2006 whilst the WMLR WAP (developed at the same time) adopted a baseline climate period of 1974-2006. The 1974-2006 period is adopted for the purposes of this study as the *WAP development* period.

rainfall period has compressed to the winter months at the expense of spring and autumn rainfall. A long-term decline and/or a negative shift in spring and autumn rainfall was not observed at the stations located in the lower elevation sections of the catchment.

Finniss Catchment

Rainfall sites analysed – Meadows and Macclesfield. Given that the Meadows site is located in the wettest part of the Finniss catchment, sites located in drier parts of neighbouring catchments were also investigated. The Macclesfield site in the neighbouring Angas River catchment was chosen as a comparison site for Meadows.

Key findings - Rainfall at Meadows showed indications that rainfall had not recovered in the post-drought period, suggesting a negative shift occurred in median rainfall from pre-drought conditions. In contrast, the comparison station at Macclesfield indicated a recovery in median annual rainfall – although for both cases the rainfall distribution tended towards a greater proportion of below average rainfall events. Under WAP-related periods, both stations again showed a significant greater proportion of below average rainfall events in the post-WAP development period.

Table 2 below, displays spring rainfall data for the three EMLR catchments, across the drought-related comparison periods.

Table 2 Median spring rainfall for drought related periods for sites across the EMLR PWRA.

Station name		Period median			Change from Pre-drought median				**Post-drought recovery status**
		Pre-	**Drought**	**Post-**	**Drought**		**Post-**		
Unit:		mm	mm	mm	mm	%	mm	%	
MT BARKER	Bremer	190	174	166	-16	-8%	-24	-13%	Yet to recover
NAIRNE	Bremer	169	141	143	-28	-17%	-26	-15%	Partially recovered
HARROGATE	Bremer	145	146	125	1	1%	-20	-14%	Yet to recover
KANMANTOO	Bremer	122	113	107	-9	-7%	-15	-12%	Yet to recover
LANGHORNE CK	Bremer	97	93	94	-4	-4%	-3	-3%	Partially recovered
CALLINGTON	Bremer	97	91	92	-6	-6%	-5	-5%	Partially recovered
MACCLES-FIELD	Angas	189	149	140	-40	-21%	-49	-26%	Yet to recover
MEADOWS	Finniss	211	201	178	-10	-5%	-33	-16%	Yet to recover

5.1.2 Summary of streamflow findings

The analysis included streamflow records for the period 1974 to 2022 for five gauging stations representing sub-catchments of the EMLR and WMLR regions. For the EMLR region, two gauging stations in the Finniss River and Bremer River catchments were analysed and key results are summarised below.

Streamflow recovery (*Comparison of drought and WAP-development related periodic medians*): Comparison of flows between the three drought-related periods provides valuable insight into the extent of streamflow recovery, given the changes to rainfall experienced since the start of the drought. During the post-drought period (since 2009):

(a) Annual streamflow volumes increased in both sub-catchments but were still lower than in the pre-drought period (considered a 'Partial recovery'). The annual increase is consistent with the increase, either 'Partial' or 'Full' recovery, in winter flows in all sub-catchments.

(b) Autumn experienced the lowest seasonal flows in both sub-catchments ('yet to recover').

(c) Spring season flows have 'Partially recovered' in both sub-catchments.

When comparing the two WAP development periods, a consistent statistic was that spring season median flows were lower in the post-WAP development period.

This comparison is shown below in Table *3* for the two EMLR sub-catchments:

Table 3 Median seasonal streamflow (ML) for EMLR sites across WAP development and Post WAP-development periods.

Season	WAP development (1974-2006)	Post WAP-development (2007-2022)	Change (WAP dev to post-dev) (ML)	Change (WAP dev to post-dev) (%)
		Finniss River, Yundi (A4260504)		
Summer	102	96	-6	-6%
Autumn	531	220	-311	-59%
Winter	13480	11983	-1498	-11%
Spring	5966	3272	-2694	-45%
		Bremer River near Hartley (A4260533)		
Summer	-*	-	-	-
Autumn	-	-	-	-
Winter	4909	5284	374	8%
Spring	3701	2495	-1206	-33%

* *Data not present due to incomplete records*

5.1.3 Rainfall-runoff response

Results of rainfall-runoff response analysis show that there is evidence to suggest that the underlying rainfall-runoff response of Meadows Creek sub-catchment in the Finniss River have potentially changed (or shifted) in the period since the Millennium drought. In the case of the Bremer sub-catchment, while there are indications of a shift during the drought period, the results are inconclusive due to the incompleteness of the streamflow records during the post-drought period.

It is uncertain whether this observed change (or negative shift) is permanent or temporary-and-prolonged. This non-stationarity in observed rainfall-runoff response may be caused by multiple drivers, not all of which are the result of climate change. And, for changes attributed to climate change, future trends may not continue at the same rate or in the same manner as historical trends (DCCEEW, 2023).

5.1.4 Implications for the WAP

Seasonality, average number of flowing days per year, and the low, medium and high flow ranges are some of the key metrics that characterise the flow regime of a catchment. These are also some of the key hydrological metrics used in defining and evaluating environmental water requirements (EWR) metrics in the WAP. This

investigation provides evidence of alteration of flow regimes since the start of the Millennium drought and during post-WAP development period in the sub-catchments investigated.

The continued use of a rainfall-runoff relationship developed from long-term (including pre-drought) hydrological data to underpin the WAP is expected to result in an overestimation of the resource capacity. In addition, this would ignore the fact that the climate, along with rainfall-runoff response of catchments and their flow regime, is changing.

The hydrological models used in the development of the WAP were generally calibrated to streamflow records for the period 1971 – 2006, with one rainfall-runoff relationship developed for the entire period used in deriving resource capacities in the WAP. Given the shift in rainfall-runoff identified since the start of the drought in this investigation for some of the sub-catchments, recalibration of the models to include recent streamflow data is recommended for future use of the models, including while amending the WAP. To evaluate the impacts of future climate on rainfall-runoff response, the recalibrated models would have to be run with climate projection data sets.

Investigation using a larger sample of lower elevation rainfall stations across the EMLR is required to verify if the impacts of climate change and/or the drought on rainfall are primarily felt in the higher elevation sections of the EMLR. Further investigations into the weather systems that influence long-term rainfall patterns and the Millennium drought interface with those weather systems is recommended for effective future investigations and water planning in the region.

5.2 Environmental objectives set by the WAP

Summary

- Section 5.3 presents ecological monitoring data alongside an assessment of ecological conditions relative to the ecological objectives set out by the EMLR WAP.
- For context, this section outlines what environmental objectives were set out in the WAP, and the process behind the setting of these objectives.

Under the Act a water allocation plan must include an assessment of the quantity and quality of water needed by the ecosystems that depend on the water resource and the times at which, or the periods during which, those ecosystems will need that water [s. 53(1)(a)(i)]. A WAP must also include a statement of the environmental outcomes expected to be delivered on account of the provision of environmental water under the plan [s. 53(1)(b)(iii)].

Section 2 of the WAP outlines the process taken to define the needs of water dependent ecosystems, the objectives to be met and the indicators and metrics to be used for assessing achievement of objectives[12]. The process for defining ecological targets is briefly outlined below, as it is important context to how ecosystems are tracking against the WAP targets, discussed in Section 5.3;

[12] Section 2 of the WAP draws upon a suite of investigations documented within Vanlaarhoven and van der Wielen 2009, Vanlaarhoven and van der Wielen 2012, and Vanlaarhoven 2012.

1. An overall environmental objective was set '*to maintain and/or restore self-sustaining populations of aquatic and riparian flora and fauna which are resilient in times of drought*'. This was underpinned by two ecological targets, 1) Moderate to good macroinvertebrate community condition, and 2) successful recruitment of Mountain Galaxias and Southern Pygmy Perch in seven out of ten years.
2. To achieve the objective, it was determined that the flow regime of the rivers of the EMLR needed to be maintained within acceptable bounds around the 'natural'[13] flow regime.
3. The flow regime was broken down into a series of ecologically relevant flow metrics (called the Environmental Water Requirement (EWR) metrics) that empirically characterised the different parts of the flow regime under the 'natural' scenario. For each metric, the level of deviation allowable before adverse ecological outcomes were expected was identified, allowing an assessment of 'passing' or 'failing' for each metric (i.e. a reduction in the number of flowing days per year by 20% or more from 'natural' was considered to fail).
4. Hydro-ecological modelling was undertaken to link the number of passing metrics with the observed ecological condition for fish and macroinvertebrates (assessed against the targets) which allowed the establishment of an overall rate of 85% of metrics passing required to maintain an acceptable level of risk to the achievement of the ecological objectives.

The flow objective of meeting 85% of the EWR metrics was used to set key water management rules underpinning the EMLR WAP, with various management scenarios tested in order to determine which could achieve the required number of passing EWR metrics.

The result of modelling different options for water take rules and other settings found that an environmentally sustainable take limit that could met the flow objective was 20% of the surface water total resource capacity, with 'low flows' (see Section 5.2.1 for more detail) passed by in-scope dams and watercourse diversions. The full implementation of the sustainable take limit and the requirement to pass low flows was expected to meet the flow objective, and allow the overall environmental objective to be met.

5.2.1 Low Flow Releases (LFRs)

Low flows are a small proportion of all flow events. They are critical to the health of waterways, especially in the lead up to and following the main rainfall periods where most flows are received.

At the beginning of the flow season when rivers commence to flow, dams capture incoming flows until they fill entirely and then spill (overflow). This significantly delays the delivery of water to downstream reaches, rivers and streams that have been dry over summer. For many aquatic species of the EMLR, the duration of flow is considered to be the master driver of overall health, breeding success and ongoing survival. Therefore, shortening the flow season has a significant impact on the health of water dependent ecosystems.

The work underpinning the WAP found that the risk to environmental objectives could be significantly reduced by having all in-scope sites[14] undertake LFRs, and this would also allow for a higher sustainable extraction limit (20% of resource capacity).

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[13] The 'natural' flow regime was defined as the flow regime with the impacts of dams and watercourse diversions removed. This does not represent a pre-European flow regime as the impacts of vegetation clearance, urban impacts and forestry are still included.

[14] In-scope sites for the passing of low flows are defined as licensed dams (regardless of size), all non-licensed dams over 5ML in size and all licensed watercourse diversions (1100 sites in total). Of these sites 607 have

In 2016 the Flows for the Future (F4F) program commenced working with landholders in the EMLR to find ways to pass low flows from dams and watercourse diversions. The program began as a State Priority Project jointly funded by the Commonwealth and South Australian Governments and is now funded by the Commonwealth government as a Sustainable Diversion Limit Adjustment Mechanism project. Through significant investment and dedicated efforts by the F4F program, a total of 422 sites have been treated to deliver LFRs, including in the neighbouring Marne Saunders catchment to the north of the EMLR region.

In the EMLR alone, LFRs are being passed at 349 sites across the Angas, Bremer, Currency Creek and Finniss Catchments. Of these sites, 154 comprise treatments to farm dams (via low flow bypasses and other devices) and 195 of these sites comprising treatments to watercourse diversions. Alongside the current default low flow device, a bypass device, the Flows for the Future program is investing in the development of alternative methods for flow releases, in response to community feedback.

Although there are multiple independent modelling processes that have identified the benefits of low flow releases across the Mt. Lofty Ranges, an on-ground assessment of real world outcomes is yet to be undertaken. An assessment of the outcomes of low flow releases is planned as part of the F4F Program[15] and requires suitable levels of implementation of LFRs and sufficient time post implementation for benefits to be realised. To date, some monitoring sites downstream of LFRs have shown ecological improvement, however, the full assessment with a longer time series of data across more sites is still needed to assess the downstream benefits.

Overall, the F4F program has enabled important progress to be made in the implementation of LFRs, however, the level of implementation to date is below that anticipated by the EMLR WAP, constricting the ability for the stated environmental objectives to be achieved. Low flows must be passed at all in-scope sites to provide a flow regime that allows the environmental water requirements stated in the WAP to be met. Further consideration of future implementation options will be required for the amended WAP.

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been identified as strategic in-scope sites which are prioritised by the F4F program as these have the greatest potential to return low flows.

[15] This assessment will incorporate data collected under the Securing Low Flows program in the WMLR.

5.3 Status of water dependent ecosystems

Summary

- Across the EMLR there is a clear trend of declining ecological condition, relative to the targets set in the WAP and discussed in Section 5.2.
- The EMLR has 59 sites that are regularly monitored to assess native fish populations, with data given here for sampling events between 2012-2021.
- Of these 59 sites, 41% showed a decreasing trend in fish community condition, 33% were classed as stable, and 26% were classed as having an increasing trend in fish community condition.
- Across the Mount Lofty Rangers as a whole 84.8% of the 303 sampling events where Mountain Galaxias were caught were at a 'high' or worse level of risk of not meeting the WAP targets for recruitment (successful breeding).
- In the EMLR there are six sites where Mountain Galaxias were found previously, but have not been captured since 2018.
- The WAP sets a target of 'moderate or better community condition' for macroinvertebrates (waterbugs). At the most recent year of sampling, 81% of sites across the Mount Lofty Ranges as a whole were considered to fail that target.

The WAP sets out environmental objectives that if met, are designed to keep ecosystems at an acceptable level of risk. Ongoing ecological monitoring focuses on two primary metrics, the community condition and distribution of native fish populations and the community condition and distribution of macroinvertebrates (waterbugs) to provide a picture of overall ecosystem health.

To inform this review and provide an understanding of the current condition of aquatic ecosystems across the region, DEW's Ecology Team prepared an ecological condition assessment for the WMLR and EMLR prescribed areas. This report is publicly available, and is published as the *Hills and Fleurieu Landscape Region PWRA ecological condition assessment 2022*, (DEW 2024c). The report draws upon data sourced from multiple programs and projects in order to provide an overarching assessment of trend and condition in native fish and macroinvertebrate communities, for both the WMLR and EMLR PWRAs. In some places, data from the neighbouring Marne Saunders and Barossa PWRAs were also considered in order to provide additional spatial context.

5.3.1 Native fish – condition and trend

Fish community condition information and recruitment information for the EMLR and Marne Saunders was sourced from Aquasave. The Aquasave condition model is based around recruitment (0+ years) and survivor (2+ years) numbers as well as overall community diversity.

Data is provided here for 59 sites across the EMLR that have been regularly sampled by monitoring teams between 2012-2021 to assess condition of habitat and the condition of all native fish species caught, with sites given a score rating between zero (fish community not present) to nine (excellent condition).

At the most recent year of sampling, 31 sites (52%) were classed as poor, 25 sites (42%) classed as moderate and four (6%) as good. (Figure 3, left-hand side). A total of four sites were dry in 2021, one more than previous years.

The four 'good condition' sites were located in the upper Angas, upper Finniss and the terminal wetland of Tookayerta Creek. The poor and moderate sites were spread evenly across reach types but not across catchments. The catchments to the north showed consistently lower condition scores to those in the south.

All 59 sites had been sampled five times or more and could be assessed for trend over time[16].

Of these, 24 sites were classed as having a decreasing trend (41%), 20 were classed as stable (33%), and 16 were classed as having an increasing trend (26%). Eight of the stable sites showed no variation in condition score across the monitoring window and received a 'stable' score by default. As seen in Figure 3, below, the sites found to have improving trends in fish condition are mostly located in the southern half of the EMLR. It is worth noting that data collection for the trend assessment commences within or just following the drought, and so improving trends are not entirely unexpected and could instead be described as 'recovery' trends.

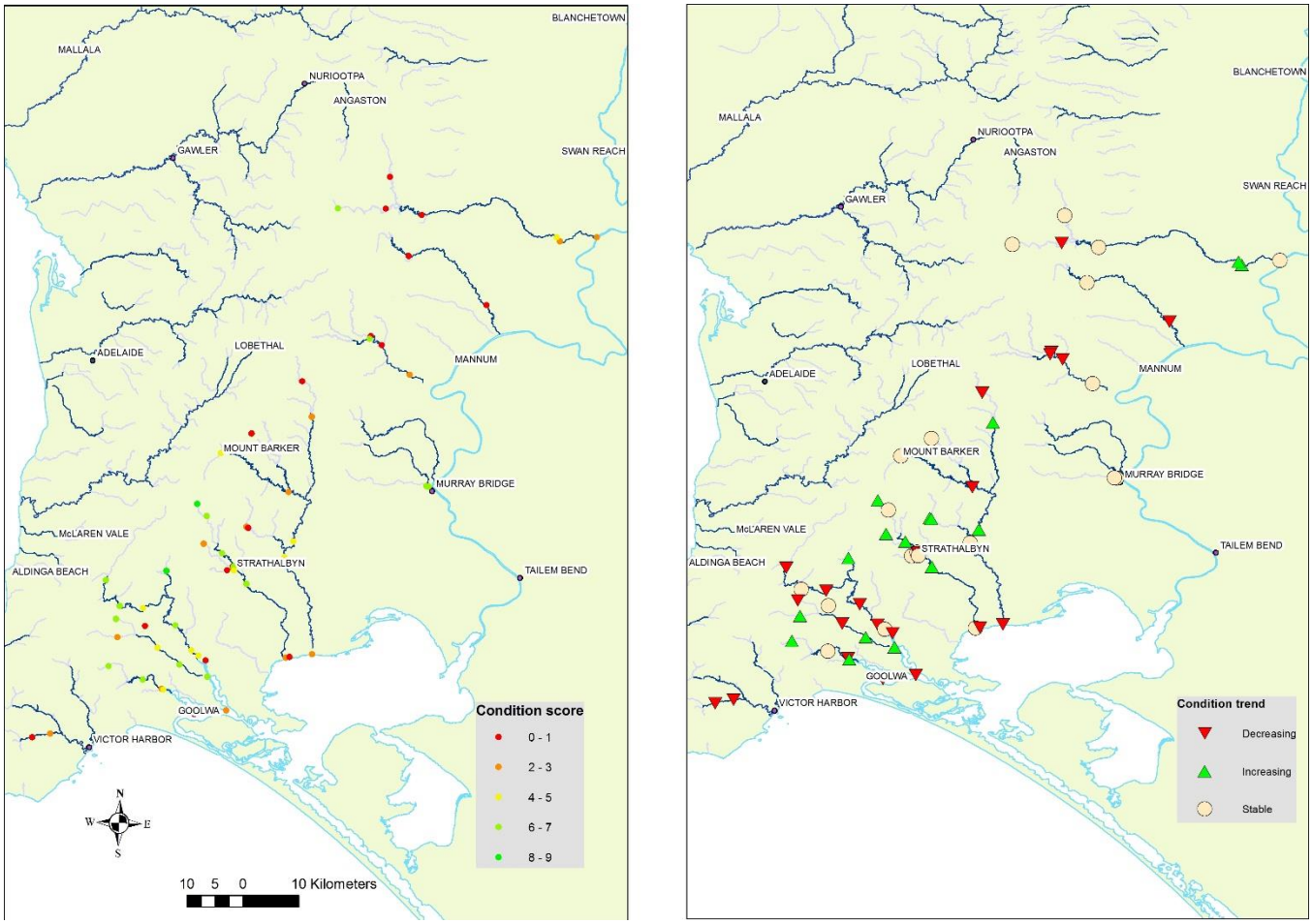

Figure 3 Map of the fish community condition score across the EMLR and Marne Saunders (left) and the trend in condition for sites visited five or more times (right) (DEW 2024c).

[16] The methodology used to characterise the likelihood of trend within the data was in accordance with the IPCC likelihood categories.

In addition to the ecological targets for overall fish community condition, the WAP sets recruitment (or, successful breeding) targets for two indicator species of native fish to provide an overall picture of waterway health, with one of these - the Mountain Galaxias[17] – reported on here.

For the sites where Mountain Galaxias were present the number of young fish caught is recorded as a measure of how successfully they are breeding at that site, which is then compared to the WAP targets. Between 2012 and 2021 there were a total of 303 sampling events where Mountain Galaxias were present and assessed against the WAP targets.

From 303 sampling events there was a total of 257 (84.8%) that were at a high or worse level of risk of not meeting the WAP targets. Out of the 303 sampling events there were 115 (38%) which showed no recruitment at all at the time of monitoring. Three or more years with no recruitment is assumed to place Galaxias at extreme risk of a localized extinction event.

The trend assessment showed only a few sites getting better, all in the EMLR. There are two main possibilities for this increasing condition. The first is that populations are recovering from the drought. The trend analysis starts in 2012 when populations were likely still suppressed from the drought so increasing trends could more accurately be described as recovery trends. The second is that, due to the location of the sites showing increasing trends, the implementation of the F4F Program is having some impacts for those sites where LFRs are being passed upstream. This second possibility would need further investigation to validate.

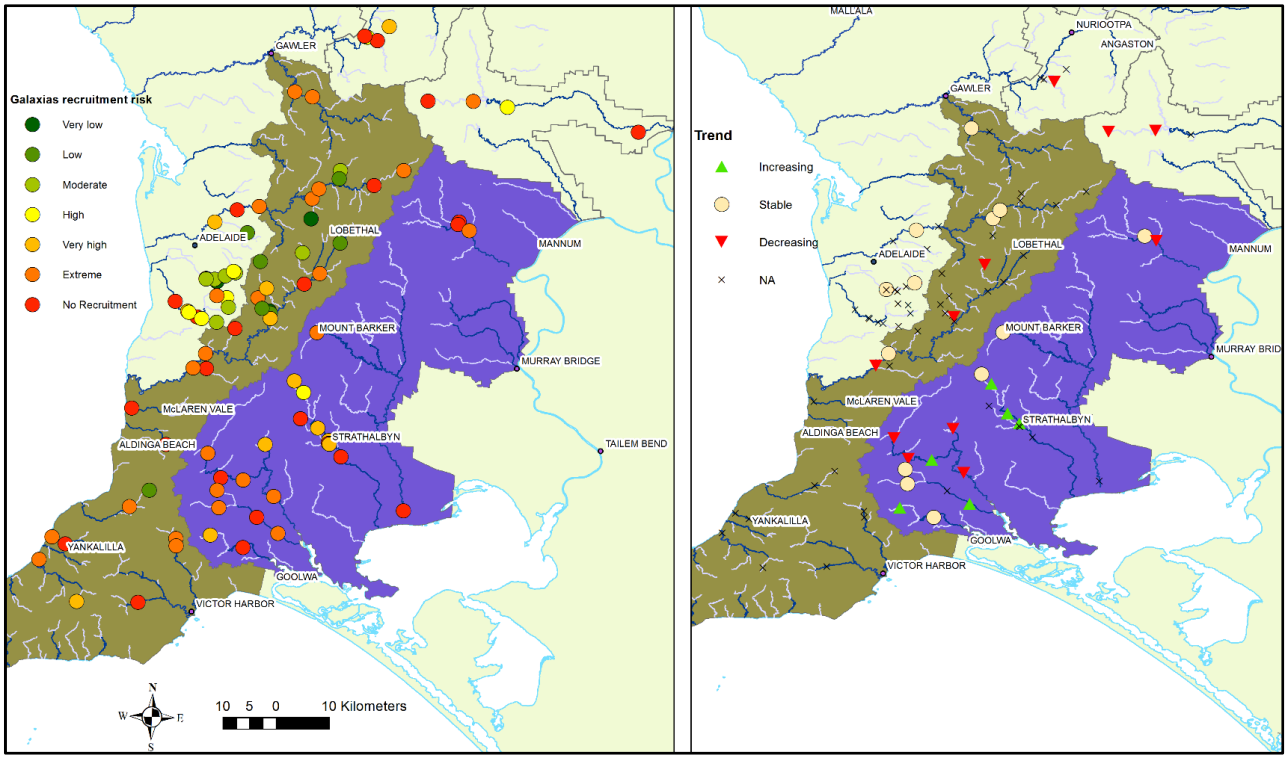

Figure 4 Risk to the Mountain/Obscure Galaxias population based on the level of recruitment the last time Mountain/Obscure Galaxias population were caught at the site and the trend in the recruitment levels of Mountain/Obscure Galaxias population between 2012 and 2021 for all sites that had Mountain/Obscure Galaxias population recorded during the assessment period (DEW, 2024c).

[17] The Mountain Galaxias is a good indicator species because they can be found in a wide range of habitat types and are relatively short lived (around three years).

5.3.2 Macroinvertebrates (water bugs) – condition and trend

Macroinvertebrates, also referred to as water bugs, include creatures such as yabbies, native shrimp and insect larvae (such as the mayfly or dragonfly). The abundance and species richness of waterbugs found at a particular site is an excellent indicator of waterway health, with some waterbugs being very tolerant and others being more sensitive to changing conditions.

There were a total of 609 macroinvertebrate samples collected from 50 sites between 2016 and 2022 used for the combined assessment of condition and trend for both the WMLR and EMLR (DEW, 2023). This data was sourced from the BioBlitz Program (267 samples), the F4F Program (174 samples) and the Securing Low Flows Program[18] (168 samples).

The data collected from each site and sampling event from 2016 to 2022 was given a Contemporary Macroinvertebrate Condition Model (CMCM) score[19] between one (very poor) to six (excellent). The average CMCM condition score across all samples assessed was 2.64, compared to an average condition score of 2.57 for the most recent year of sampling alone.

The condition scores show a general south to north gradient with sites in the south generally showing higher condition that those in the north. The exception to this appears to be the headwaters of the Bremer River which generally show fair condition when compared to the mid reaches or to the Angas River to the south.

The WAP sets a target of 'moderate or better community condition' for macroinvertebrates, which is considered to be achieved if a site scores a CMCM score of three (fair) or greater. At the most recent year of sampling (limited to 2019-2022), 40 (81%) of sites failed to meet this target, whilst 10 (19%) of sites were considered to pass the target. The CMCM score given to sites in their most recent year of sampling is shown on the left-hand-side of Figure 55, below, with a pink halo appearing for sites which passed the WAP target.

Trend over time was assessed for 25 sites that had been visited five or more times, shown in the map on the right hand side of Figure 5. Of the 25 sites assessed for trend, 11 (44%) showed some form of decreasing trend, eight (32%) showed a stable result and six (24%) sites showed an increasing trend in condition over time.

[18] Samples gathered through the Securing Low Flows Program are from sites located in the WMLR only.
[19] The CMCM scoring takes into consideration multiple 'attributes' relating to macroinvertebrate community condition and habitat condition to arrive at an overall score for each site.

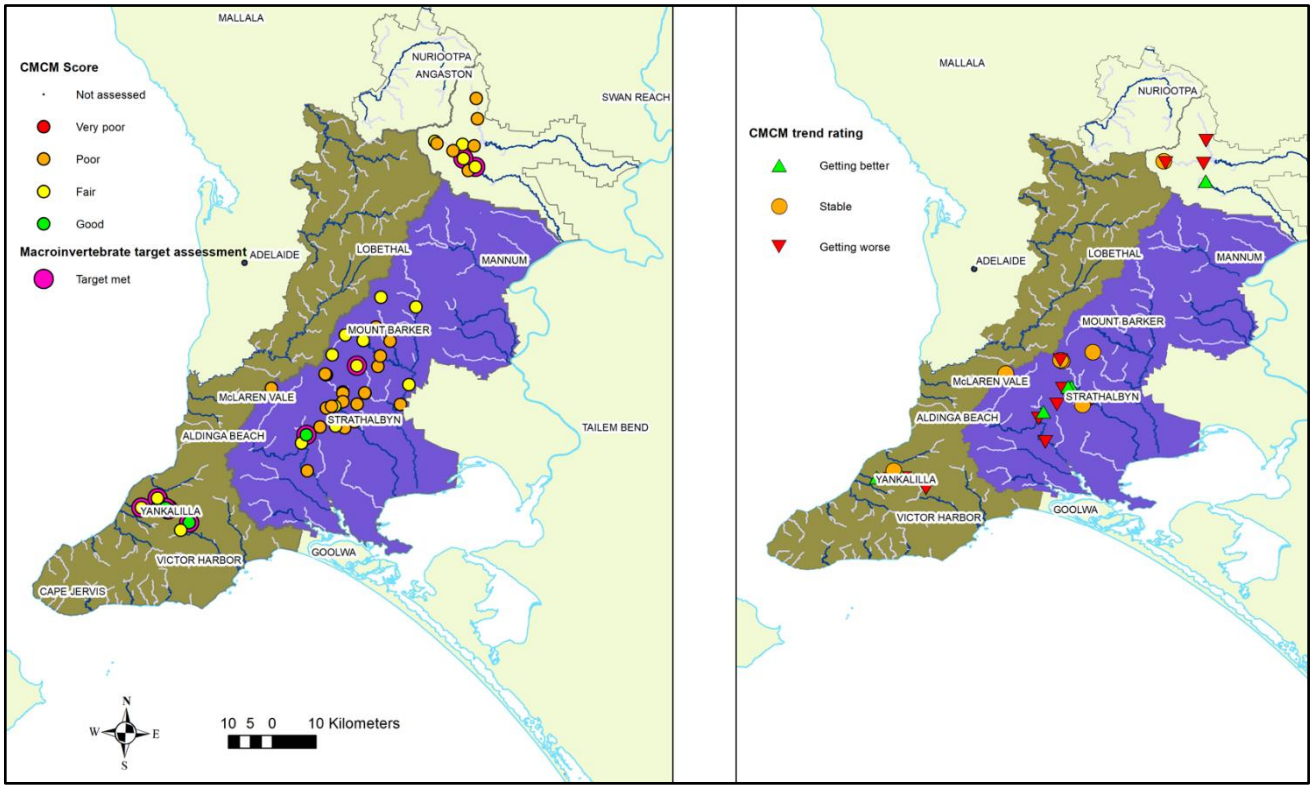

Figure 5 Macroinvertebrate community condition for the most recent sampled year (left) and the trend in community condition across all years of sampling (right). Sites where the condition target has been met are haloed in pink on the left hand map (DEW 2024c).

5.4 Status of groundwater resources

Summary

- A detailed assessment was undertaken for long-term trends in aquifer water levels and salinity levels for six underground water management zones (UWMZs) with the greatest level of demand.
- A declining trend in aquifer water levels was evident for many zones between the mid 1990's to 2010, corresponding with the lower rainfall received during the Millennium drought.
- From 2010 onwards, recorded aquifer levels generally recover and stabilise across most observation wells assessed.
- Salinity monitoring also highlighted the impact of drier drought years, though salinity levels are generally seen to stabilise for three of the zones assessed.
- In the remaining three zones (Angas Kanmantoo, Currency Limestone and Angas Bremer Limestone), some wells showed increasing salinity trends.

A state-wide network of observation wells ('obs wells') allow for ongoing monitoring of groundwater levels and salinity trends so that any potential risks can be identified. The groundwater monitoring network is focussed on areas with higher demand for groundwater.

There are 16 underground water management zones (UWMZs) across the EMLR. To inform the 2023 EMLR WAP Review, DEW's Groundwater Science Unit undertook a detailed assessment of six underground water management zones (UWMZs) which had the following attributes;

- Allocation volumes in excess of the extraction limit.
- Metered extraction levels approaching or exceeding the extraction limit[20].
- Adequate monitoring data.

These six zones are shown on Figure 66, on the following page. The assessment used the longest term data available for each of the six zones, where 1975 is the earliest starting year for a zone and 2005 is the more recent starting year for a zone. Multiple data points (typically three-four observation wells) were used to assess trends in each zone. The full report is publicly available as the: *Eastern Mount Lofty Ranges Prescribed Water Resources Area - Groundwater Resource Assessment*, DEW 2024d.

For many of the zones assessed, a declining trend in aquifer water levels was evident between the mid 1990s to 2010, after which time recorded levels generally recover and stabilise. Salinity levels were also observed to worsen during the dry years of the Millennium drought. For most zones assessed in the EMLR, salinity levels have generally stabilised since the drought. This trend reflects a period of lower rainfall and greater irrigation experienced during the Millennium drought. Underground water level monitoring for most aquifers highlights a close relationship between rainfall and recharge, though the degree of connection varies across the different aquifer formations with some being more reactive and others muted.

Overall, the assessment by DEW found long-term trends in groundwater levels across all six higher demand UWMZs in the EMLR to be stable. Salinity levels were generally stable across three zones (Bremer Adelaidean,

[20] Although these zones had levels of metered extraction 'approaching' the respective zone limit, they are each well within those limits.

Tookayerta Permian, Finniss Permian) and increasing trends were found within parts of the other three zones (Angas Kanmantoo, Currency Limestone and Angas Bremer Limestone).

An example is displayed on the following page for the Currency Limestone zone. Figure 7 displays the recorded groundwater levels at three observation wells from 2004 to 2023, and Figure 8 displays the salinity levels recorded for six observation wells.

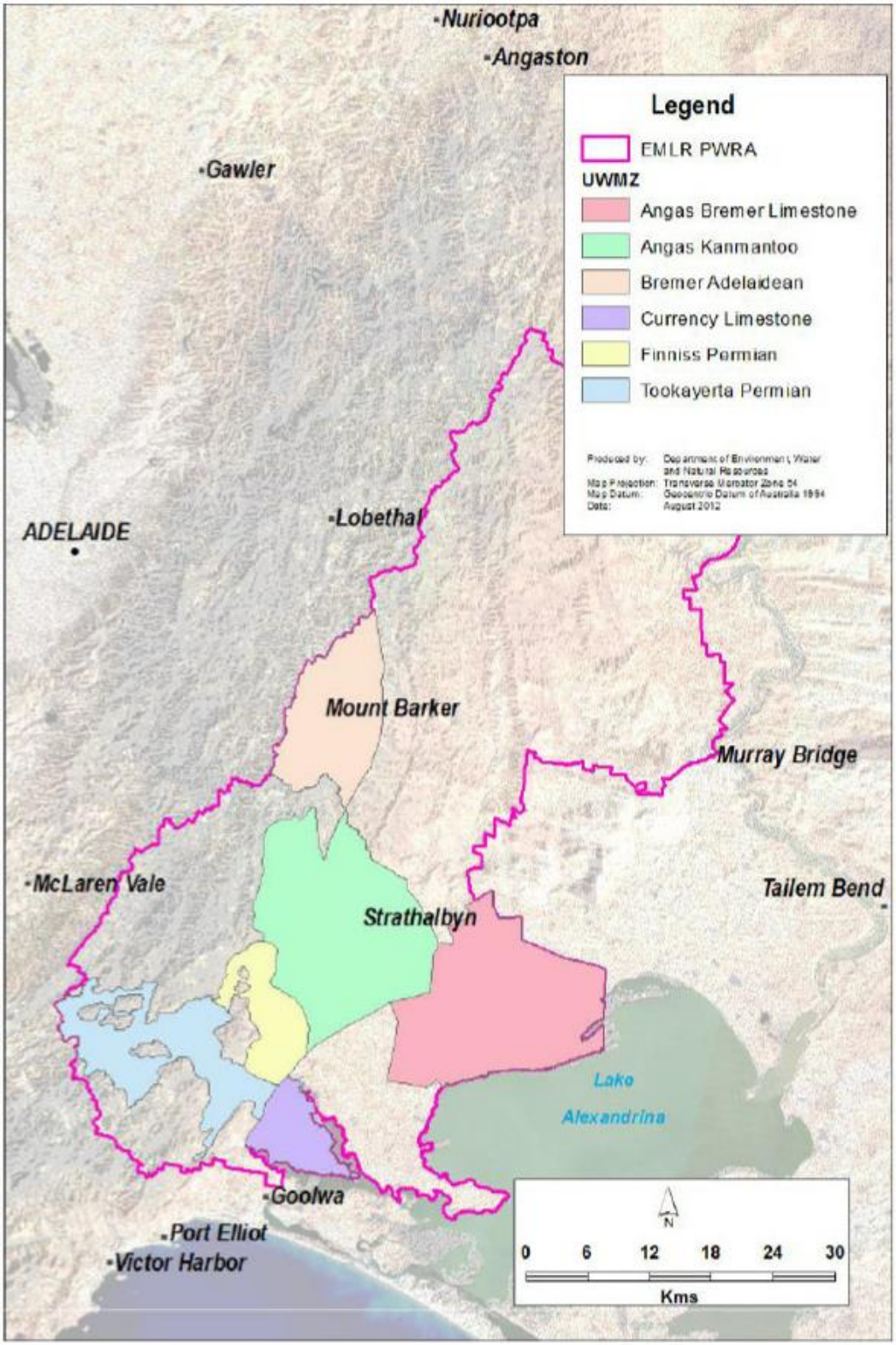

Figure 6 Map showing the six UWMZs in the EMLR that had a detailed assessment conducted.

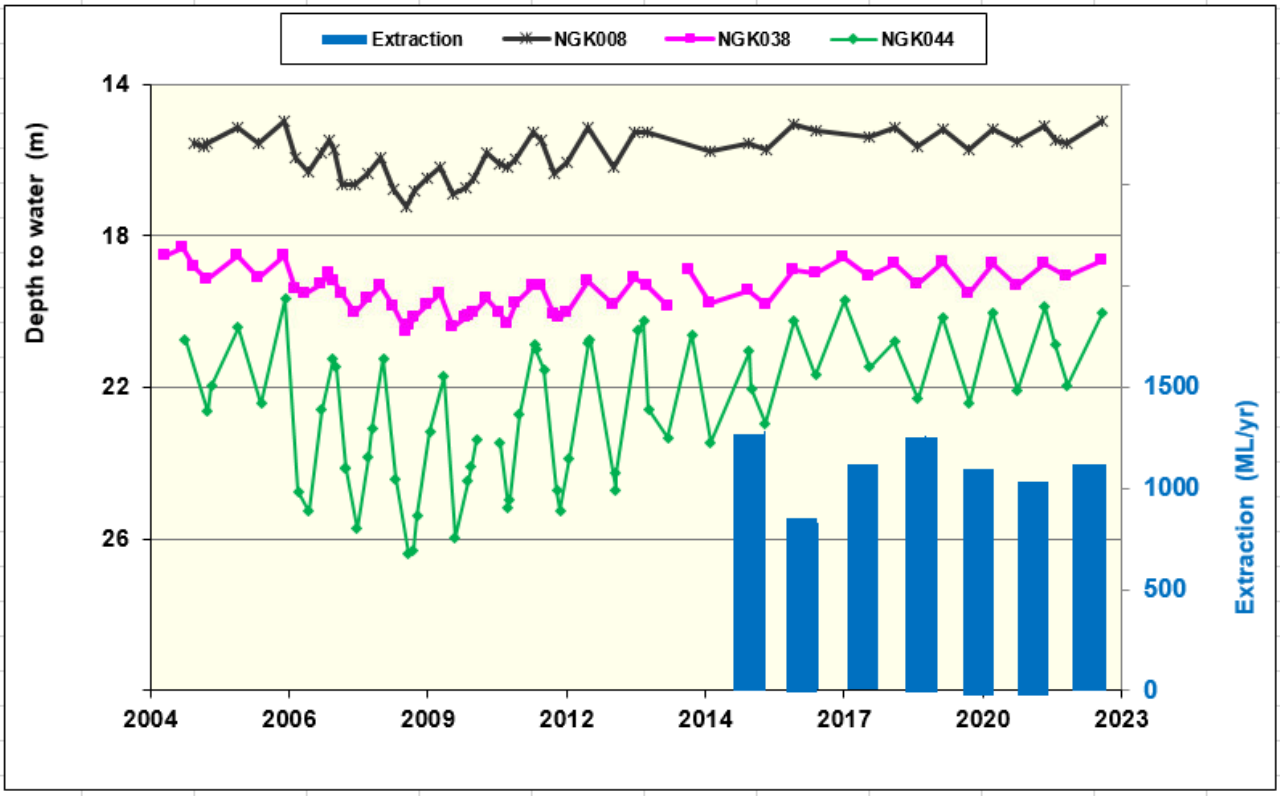

Figure 7 Groundwater levels for Currency Limestone UWMZ.

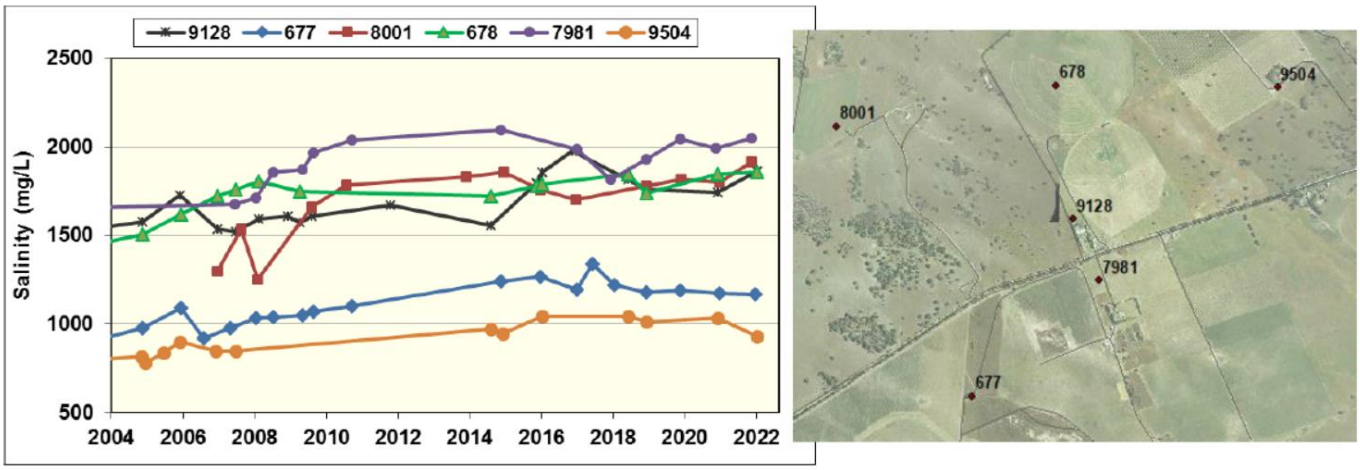

Figure 8 Salinity levels recorded in the Currency Limestone UWMZ, where extraction is highest.

6 Allocation and use of water resources

6.1 Surface water

Summary

- The WAP defined a *sustainable extraction limit* for surface water resources to be 20% of total resource capacity at the surface water management zone (SWMZ) scale.
- The original modelling underpinning the WAP found that the 20% limit was only sustainable if low flows were passed by all in-scope dams and watercourse diversions.
- Without passing low flows, the 2013 EMLR WAP states the extraction limit would need to be four times less (5% of resource capacity) to maintain ecosystems at the same level of risk.
- Allocation volumes issued to surface water licence holders did not directly take into account the 20% limit set by the WAP, and were instead based on existing levels of use.
- In four of the nine EMLR catchments, 'total allowable use' volumes exceed the 20% take limit set in the WAP.
- It is difficult to precisely measure licensed and non-licensed water use because many water sources remain unmetered. Deemed use estimates provide a surrogate measure.
- Of the 8,140 dams in EMLR, 61% are very small (less than 1ML) and these collectively hold 11% of all dam volume. Compared to the 1.3% of large dams (over 25ML in size) that hold a 29% share of all dam volume.
- As of 2023, a total of 349 sites have been treated to pass low flow releases. For the Angas, Bremer and Finniss catchments, there are a minimum of 607 identified strategic sites that require low flow releases to meet defined ecological outcomes for the catchments.

The allocation and use data presented in this section has been collated as part of a 'stocktake' project for water demand and use in the Mount Lofty Ranges (van der Wielen, 2023). Unless otherwise stated, the data is current up to the 2021-2022 water use year. The data presented here may have small differences to similar data in other reports, such as water resource assessments prepared by DEW or reporting for Water Act compliance purposes. The reasons for data discrepancies include; accessing source data at different times, inclusion or exclusion of different types of data (i.e. 'deemed licence use' compared to metered licence use), or different assumptions made when analysing or collating data. Despite these differences this data is considered fit for purpose for informing this review. It is important to note than an exceedance of an extraction limit set in the WAP does not necessarily correlate to non-compliance with Basin Plan Sustainable Diversion Limits.

The nine catchment areas of the EMLR (shown in Figure 9) are further divided into Surface Water Management Zones (SWMZs) which are the scale at which rules and limits are set.

Figure 9 Map of the surface water management zones (SWMZs) of the EMLR.

A breakdown of allocation and use figures compared to the extraction limit (or, take limit) for each of the catchments across the EMLR PWRA is provided in Table 5, on page 45, with definitions for key terms in the glossary on page 9. The figures provided include allocation volumes issued to licence holders, estimated volumes of non-licensed water use (for stock and domestic and commercial forestry), estimated evaporation losses, 'total allowable use' that combines all forms of use, and 'total estimated use' for the 2021-2022 water use year which draws on available metering data and estimated figures. A summary of the key points from Table 5 is given below:

- Of the nine catchments, four have 'total allowable use' volumes which exceed the 20% take limit set in the WAP, with volumes equating to 101%-170% of respective catchment limits.

- There is very little surface water use by commercial forestry in most catchments, equating to 3% or less of most catchment take limits.
- Commercial forestry, associated with the Kuitpo plantation, is a significant user of surface waters in the Finniss River Catchment, where estimated use by forestry is 31% of the take limit and greater than the volume allocated to licence holders.
- In the drier catchments to the north of the EMLR (Reedy Creek, Northern, Central and Southern Plains) there is very little surface water allocated for licensed purposes (irrigation etc.) and the greater proportion of surface water demand comes from stock and domestic purposes.
- Estimated surface water loss to evaporation is counted directly against take limits in the EMLR, and we can see in Table 5 (third column from right) that evaporation is a significant component of all demand in many of the catchments.
- Comparing 'total allowable use' of catchments to the 5% limit shows that all are well in excess of this limit - for all but two catchments that volume is more than double the 5% take limit (see Table 4 below).

Table 4 Comparison of total allowable use in each catchment to the 20% and 5% take limits, with total allowable use expressed as a % of those limits.

Catchment	Total allowable use (ML)	Compared to 20% take limit	Compared to 5% take limit
Angas River	2,657	158%	632%
Bremer River	5,412	151%	604%
Currency and Deep Creeks	1,279	66%	264%
Finniss River	6,082	76%	303%
Reedy Creek	518	43%	174%
Tookayerta	3,326	72%	288%
Northern Plains	75	68%	273%
Central Plains	174	141%	566%
Southern Plains	490	170%	681%

Table 5 Volumes of allocation and use for surface water for 2021-22, summed for each catchment in the EMLR PWRA.

Catchment	No. licences	Measure	20% Take limit	Allocations	Stock and domestic	Forestry	Evaporation	Total allowable use	Est. total use (2021-22)
Angas River	73	Volume (ML)	1,682	1,643	523	0	491	2,657	1,719
		as % limit		98%	31%	0%	29%	158%	102%
Bremer River	128	Volume (ML)	3,583	3,221	1,127	51	1,012	5,412	3,628
		as % limit		90%	31%	1%	28%	151%	101%
Currency and Deep Creeks	36	Volume (ML)	1,932	650	309	28	292	1,279	24,184
		as % limit		34%	16%	1%	15%	66%	52%
Finniss River	140	Volume (ML)	8,021	1,969	964	2,512	637	6,082	5,396
		as % limit		25%	12%	31%	8%	76%	67%
Reedy Creek	9	Volume (ML)	1,192	30	240	33	215	518	513
		as % limit		3%	20%	3%	18%	43%	43%
Tookayerta	78	Volume (ML)	4,620	2,452	185	556	132	3,326	1,825
		as % limit		53%	4%	12%	3%	72%	40%
Northern Plains	0	Volume (ML)	110	-	33	-	42	75	75
		as % limit		0%	30%	0%	38%	68%	68%
Central Plains	2	Volume (ML)	123	32	57	1	84	174	167
		as % limit		26%	47%	0%	68%	141%	136%
Southern Plains	2	Volume (ML)	288	14	198	1	277	490	490
		as % limit		5%	69%	0%	96%	170%	170%
Total EMLR	473	Volume (ML)	21,551	10,044	3,637	3,182	3,183	20,046	14,855
		as % limit		47%	17%	15%	15%	93%	69%

Important notes about the data in Table 5:

- A large proportion of surface water licence holders in the EMLR are not metered. Estimates have been developed to provide 'assumed use' figures for those who are not metered, and these figures stay the same each year. These estimates could be much higher or much lower than the 'actual use' by individual licence holders each year.
- Similarly, estimates were developed as part of the 2013 EMLR WAP for volumes of non-licenced surface water use by stock and domestic purposes and commercial forestry, as well as for the estimated losses to evaporation. These estimates are based on information current to 2005.
- Extraction from watercourses for stock and domestic purposes is not included in the estimates given in Table 5, and the EMLR WAP is also silent on estimates for what this use may equate to across the PWRA.
- Figure 1010 is provided below to help highlight the spatial distribution of surface water management zones where 'total allowable use' exceeds the 20% extraction limit set in the EMLR WAP. The figure illustrates that although some catchment areas are not in excess of limits as a whole, they do contain zones where total allowable use exceeds take limits.

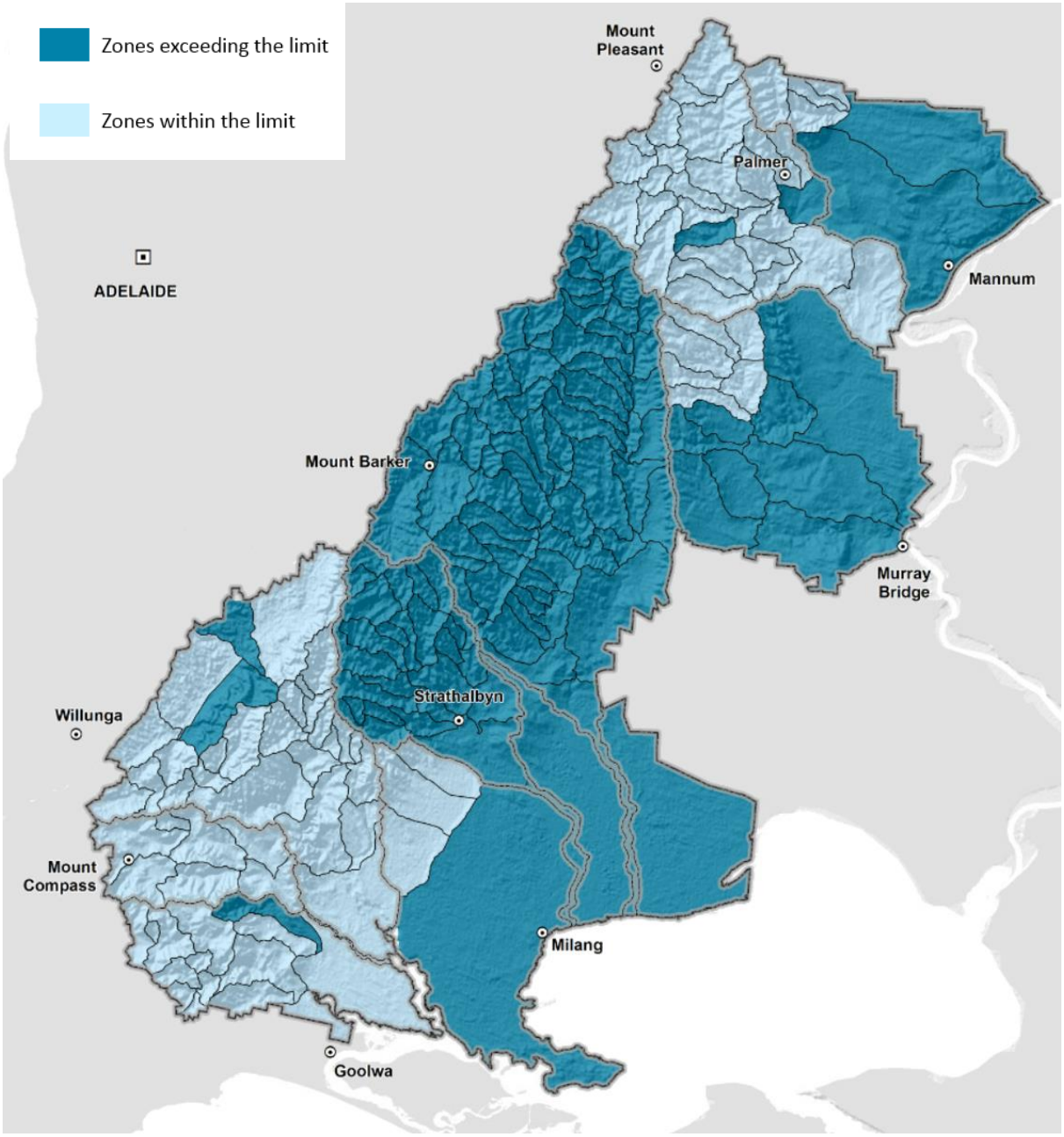

Figure 10 Map showing the spatial distribution of SWMZs where 'total allowable use' exceeds the 20% extraction limit set in the WAP.

6.1.1 Farm dams

Collectively, farm dams have a significant impact upon water dependent ecosystems, because they reduce the net amount of water available to downstream environments and alter the timing and duration of flows in watercourses. At the beginning of the flow season, in autumn, dams capture all flows until they fill entirely and then spill (overflow). This significantly delays when water reaches rivers or streams that have been dry over summer. For many aquatic species, breeding success depends on the length of the flow season (the period over which water is present). These impacts also have the potential to affect the security of surface water supply to downstream dams and watercourse extractions.

A breakdown of key dam statistics for the EMLR PWRA is provided below, collated from data current up to the 2021 to 2022 water use year:

- There are 8,140 farm dams across the EMLR, having an estimated total volume of 18,821 ML.
- 94% of farm dams are used for stock and domestic purposes and 6% are used for irrigation.
- 60% of all dams in the EMLR are stock and domestic dams less than 1 ML in size.
- 91% (*n*=7,443) of all EMLR dams are 5ML or less in size and these hold 7,245 ML, or a 38% share of all dam volume.
- 1.3% (*n*=112) of all EMLR dams are 25ML or greater in size and these hold 5,591 ML, or a 29% share of all volume.
- 11.8% of all dams (n=962) were anticipated by the WAP to pass low flows, in order for the current surface water extraction limit to be sustainable.
- As of 2023, a total of 154 dams have had low flow bypass devices installed, and a further 195 sites are passing low flows through watercourse diversions.
- For the Angas, Bremer and Finniss catchments, there are a minimum of 607 strategic sites identified that require low flow releases to meet defined ecological outcomes for the catchments.

The volume of water held in farm dams is not evenly distributed across the EMLR PWRA. Mapping of farm dam densities helps to understand the spatial distribution of volumes held, and where areas of greatest concentration exist. Figure 11 on the following page displays farm dam densities for each surface water management zones, expressed as the volume of dams (ML) per square kilometre.

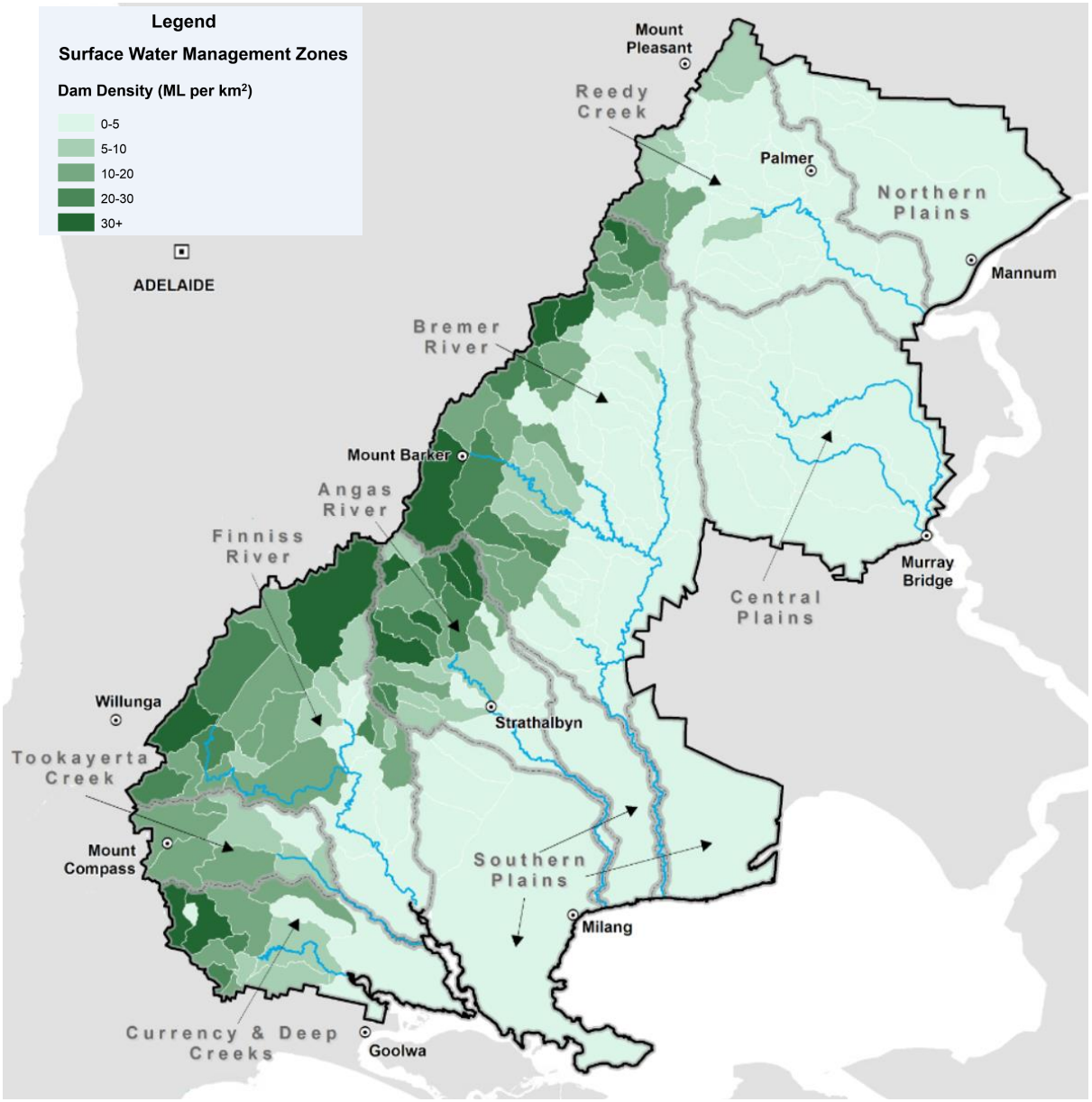

Figure 11 Farm dam density in the EMLR PWRA.

6.2 Groundwater

Summary

- Of the 616 groundwater licences held across the EMLR, about 420 licences (68%) did not have any metered extraction, or used less than 20% of their allocation for the 2021-2022 water use year.
- Of the 16 UWMZs, 4 have allocation volumes which exceed the extraction limits set in the WAP, by at least 135% and up to 338%.
- Total allocation volumes exceed the zone extraction limit set by the EMLR WAP in 4 of the 16 zones, and for 2 of these (Tookayerta Permian and Currency Limestone) the actual metered use in recent years exceeded the zone extraction limit.
- In all zones (including those that are over-allocated), the combined metered use volumes by licence holders are below the extraction limits, and far less than the full allocation volumes at the zone scales.
- Estimated use by non-licensed purposes represents a smaller contribution towards total demand on groundwater resources compared to volumes allocated to licenced purposes.
- The estimated groundwater use by forestry in the Finniss and Tookayerta GWMZ groups equates to 11% and 7% of the respective take limits.
- Estimates for non-licensed groundwater use by stock and domestic forestry purposes were calculated using information current at the time of developing the 2013 EMLR WAP and are likely to require updates so they are reflective of current conditions.

The allocation and use data presented in this section has been collated as part of a 'stocktake' project for water demand and use in the Mount Lofty Ranges (van der Wielen, 2023 unpublished). Unless otherwise stated, the data is current up to the 2021-2022 water use year. The data presented here may have small differences to similar data in other reports, such as water resource assessments prepared by DEW or reporting for Basin Plan purposes. The reasons for data discrepancies include; accessing source data at different times, inclusion or exclusion of different types of data (i.e. 'deemed licence use' compared to metered licence use), or different assumptions made when analysing or collating data. Despite these differences this data is considered fit for purpose for informing this review. It is important to note than an exceedance of an extraction limit set in the WAP does not necessarily correlate to non-compliance with Basin Plan Sustainable Diversion Limits.

The EMLR PWRA is divided into underground water management zones (UWMZs) to enable the rules and limits of the water allocation plan to be set at a local scale. Data in this section is presented for a grouping of 16 UWMZs[21], which are shown in Figure 12 below. The boundaries of the UWMZs are based on the underlying

[21] The WAP defines a total of 27 individual UWMZs, listed in Table 1.5 of the WAP. For the purposes of this report, a simplified grouping of 16 zones has been adopted. For example, the WAP lists four Finniss Kanmantoo UWMZs, but these are grouped as one zone here. Additionally, there are four UWMZs in the WAP relating to the Quaternary aquifer, which is too saline for any extractive purpose, and subsequently is not reported on here.

aquifer type, for example, Adelaidean or Kanmantoo Group fractured rock aquifers, Permian Sands, Murray Group Limestone, and the intersecting surface water catchment boundaries (SAMDB NRM Board, 2019).

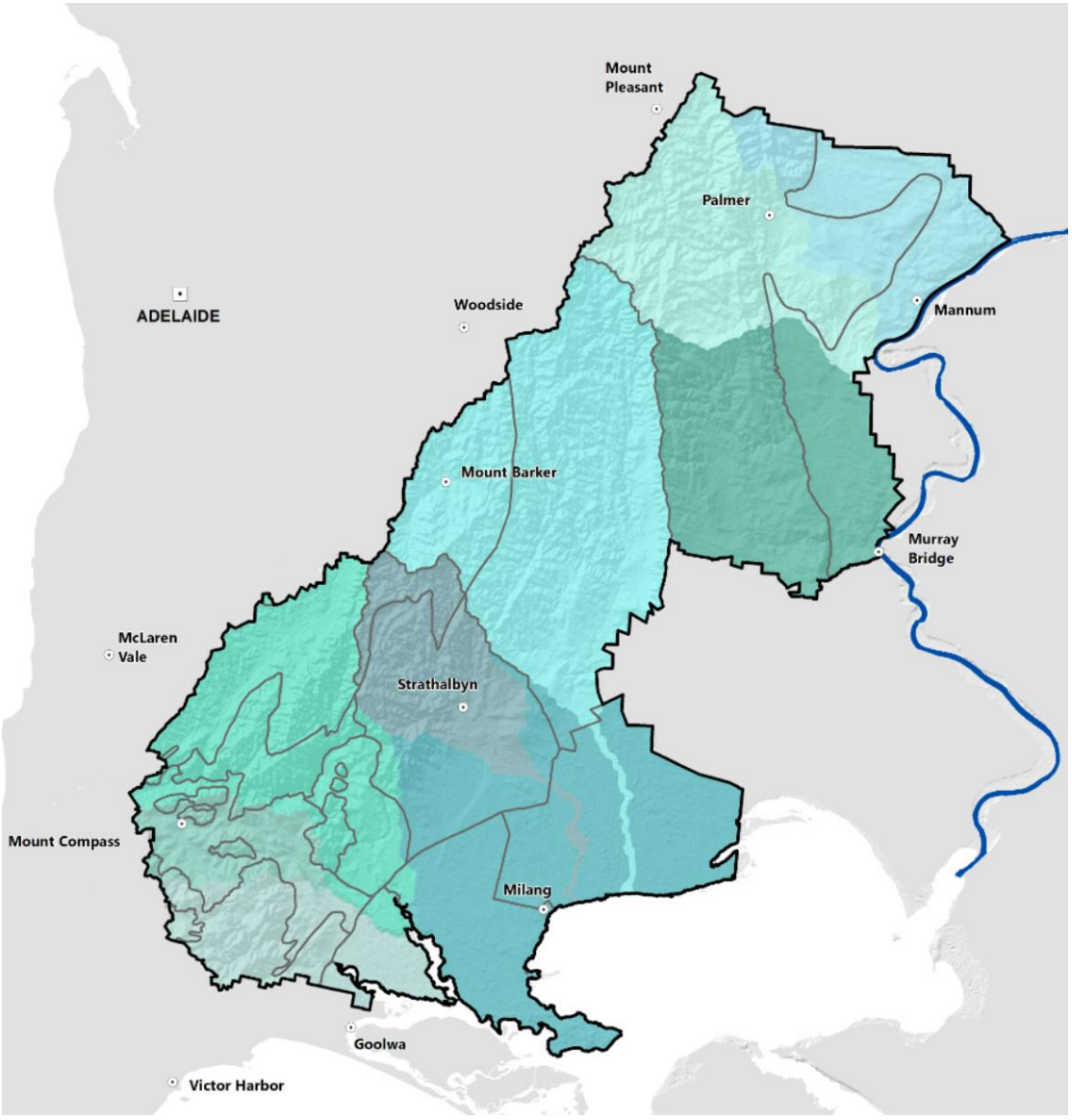

Figure 12: The 16 grouped underground water management zones (UWMZs) of the EMLR, shown with light grey boundary outlines. The overlying catchment areas are shown with blue and green shading.

6.2.1 Licensed groundwater use

Across the EMLR PWRA there are a total of 616 groundwater licences with a total volume of 31,660 ML in allocations. The volume of groundwater extraction by licence holders is not evenly distributed across the UWMZs of the EMLR. Figure 13 presents a 3D visualisation of the spatial distribution of metered extraction in the 2021-2022 water use year (red vertical columns) across the region. Only licensed groundwater extraction is metered, and so the volumes extracted for non-licensed purposes (forestry, stock and domestic) are not reflected here in Figure 13. The boundaries of UWMZs are shown in dark blue outline. Discussion on the estimated use of groundwater by non-licensed purposes is given in Section 6.2.2.

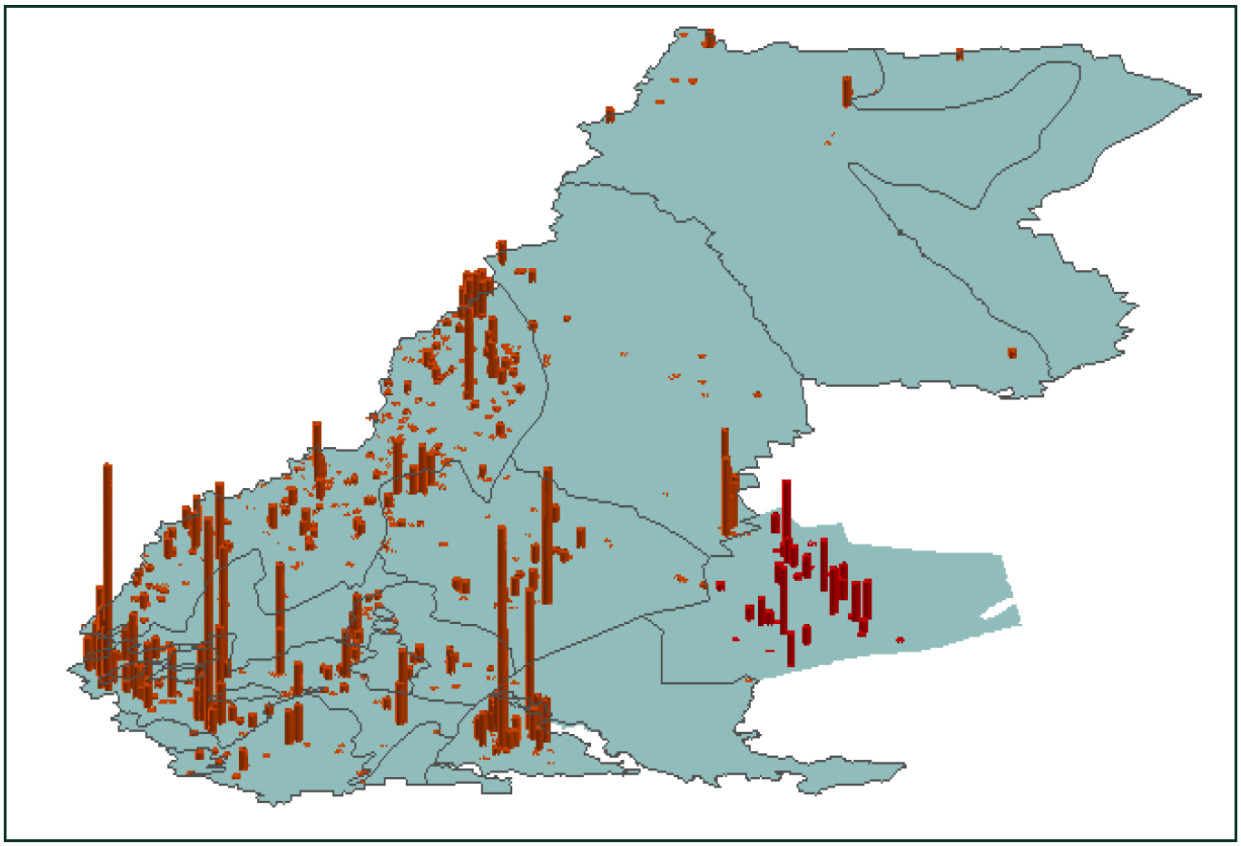

Figure 13 Map representing spatial distribution of metered extraction in the 2021-2022 water use year (red columns) across the region.

Analysis of metered extraction as a percentage of the individual licenced allocations for the EMLR PWRA in 2020-21 found that many groundwater licences are presently not being used, or have limited use. Of the 616 licences, about 420 licences (68%) do not have any metered extraction, or used less than 20% of their allocation for the 2021-2022 water use year.

Total allocation volumes exceed the zone extraction limit set by the EMLR WAP in four of the 16 zones, and for two of these (Tookayerta Permian and Currency Limestone) the actual metered use in recent years exceeded the zone extraction limit. The relationship between zone extraction limit, allocation volumes and metered use for the Tookayerta Permian UWMZ is presented in Figure 14. It is clear from Figure 14 that although metered use exceeds the extraction limit in recent years, it is well below the full allocation volume. In recent years for two zones (Tookayerta Permian and Currency Limestone) can also be seen to exceed the zone extraction limits.

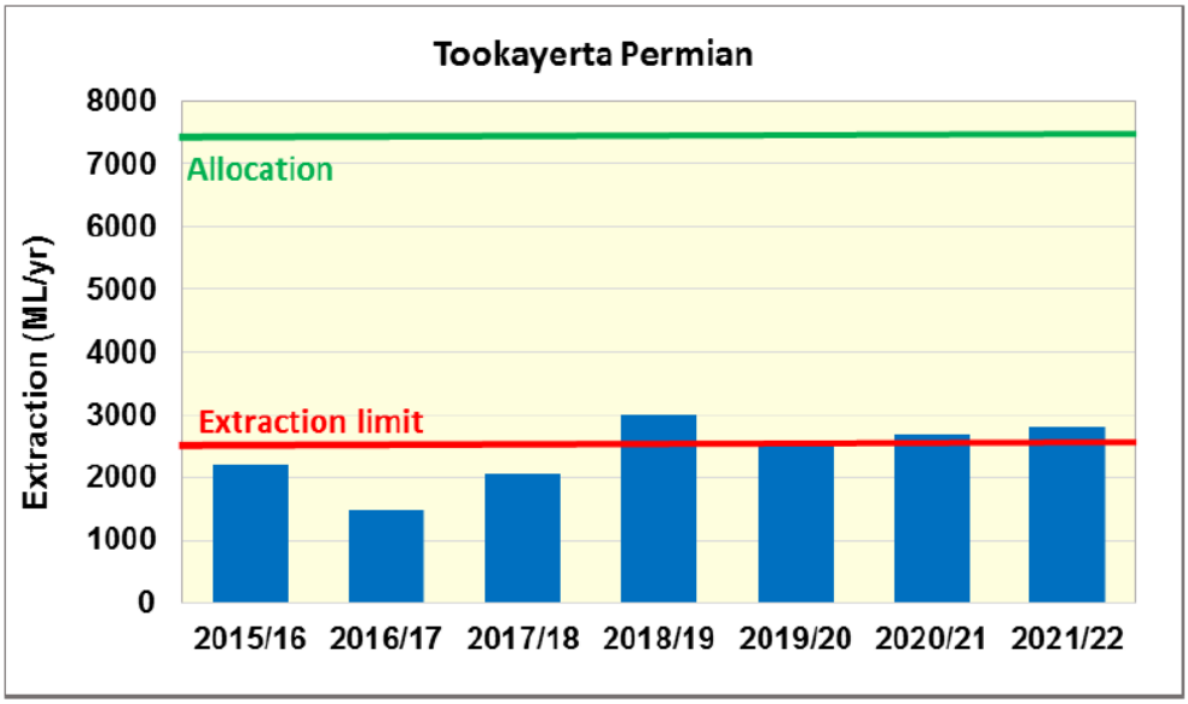

Figure 14 Zone extraction limit, total allocation volume and metered use for the Tookayerta Permian UWMZ (DEW, 2023).

Table 6, overleaf, presents the metered use data for each UWMZ in the EMLR PWRA for the 2021-22 water year together with total groundwater allocation volumes and the zone extraction limit. In four of the UWMZs (shaded in red in Table 6), levels of allocation are higher than the extraction limits set in the water allocation plan for that zone, with all four zones having significant levels of over-allocation where the volume of allocations is at least 135% of the extraction limit, and up to 338%.

Table 6 EMLR groundwater extraction limits, allocation volumes and metered use for 2021-2022.

UWMZ	Extraction limit	Volume allocated	% of extraction limit	Metered Use	% of extraction limit
Angas Adelaidean	1,621	710	44	55	4
Angas Kanmantoo	1,817	3,419	188	815	48
Bremer Adelaidean	4,237	5,730	135	1,080	26
Bremer Kanmantoo	3,460	2,131	62	570	17
Finniss Adelaidean	5,509	4,502	82	780	17
Tookayerta Permian	2,843	7,673	269	2,805	111
Finniss Permian	2,300	1,652	72	244	10
Currency Limestone	1,000	3,378	338	1,110	113
Currency Permian	338	249	74	13	4
Currency Kanmantoo	1,182	765	65	152	9
Finniss Kanmantoo	3,179	617	19	97	3
Tookayerta Kanmantoo	269	146	54	3	1
Northern Limestone	274	63	23	13	6
Northern Kanmantoo	7,008	557	8	113	2
Sandergrove Limestone	3,000	66	2	0	0
Angas Bremer Limestone	6,576	6,516	99	1,470	22
Total	**45,333**	**31,660**	**70**	**9,320**	**21**

6.2.2 Non-licenced groundwater use

The use of groundwater for stock and domestic purposes and for commercial forestry does not require a licence in the EMLR PWRA and these forms of use are also not metered. Estimates were developed for the volumes of groundwater used by these non-licenced forms of demand at the time of developing the current WAP.

Section 1.7 of the 2013 EMLR WAP provides an assessment of current and future water demands, including estimates for water use by licensed and non-licensed purposes. The total estimated volume given in the WAP for stock drinking water requirements in the EMLR is 2,551 ML/year, with 480 ML/y sourced from groundwater.

In the EMLR, residences located outside of townships supplied by the SA Water mains network[22] generally use a combination of rainwater tanks, domestic bores and dams for home and garden use. The SAMDB NRM Board used data for existing numbers of residences outside of the SA Water network, as well as population

[22] The townships of Mount Compass, Meadows and Macclesfield are not connected to SA Water mains and are instead supplied through a combination of private water supply schemes or through a local groundwater licence held by SA Water (Mount Compass). These supplies all require a water licence to be held by the supply party, so are not included here as non-licensed domestic supply.

growth projections for the region over 2011-2021. The resulting estimated demand for groundwater by domestic purposes given in the EMLR WAP is 297 ML per year.

Commercial forestry plantations are estimated in the 2013 EMLR WAP to comprise a total area of 3,893 ha. Forestry plantations present a demand on groundwater resources in two main ways; they intercept surface water runoff, reducing the volume of recharge to aquifers, and in areas of shallow groundwater storage the root systems directly extract groundwater from aquifers. Methods for calculating volumes of groundwater use by commercial forestry were developed as part of the 2013 EMLR WAP, and involve the application of a ML/ha/year figure for either hardwood or softwood plantations.

A breakdown of estimated groundwater use by stock and domestic and commercial forestry is given in Table 7 on the following page. Figures are provided for each UWMZ 'group' (refer to Figure 12 for their spatial boundaries) and the volumes allocated to licence holders are provided for comparison. Percentage figures are given to illustrate what proportion each use category represents against the overall take limit for each UWMZ group area.

From Table 7 it is clear that:

- For most UWMZ groups, the estimated volumes of stock and domestic groundwater use equate to 4% or less of the respective take limits and represent a far smaller proportion of overall groundwater demand, compared to the volumes allocated to licence holders.
- For most UWMZ groups, there is no groundwater use by forestry.
- The estimated groundwater use by forestry in the Finniss and Tookayerta UWMZ groups equates to 11% and 7% of the respective take limits.

The estimates developed for stock and domestic and commercial forestry groundwater use are based on information and methodologies current at the time of developing the 2013 EMLR WAP. In order to have up-to-date figures of non-licensed use, more recent data should be incorporated into new estimates.

Table 7 Estimated volumes of groundwater use 2021-22 by non-licensed purposes compared to licensed allocation volumes. Volumes also expressed as % of the take limit for each UWMZ group.

UWMZ Group	Measure	Take Limit	Stock and domestic	Forestry	Allocations
Angas Bremer PWA	Volume (ML)	6,826	76	0	6,507
	as % limit		1%	0%	95%
Angas UWMZs	Volume (ML)	3,438	137	1	4,176
	as % limit		4%	0%	121%
Bremer UWMZs	Volume (ML)	7,697	163	27	4,176
	as % limit		2%	0%	103%
Currency and Deep Creek UWMZs	Volume (ML)	2,835	34	7	4,393
	as % limit		1%	0%	155%
Finniss UWMZs	Volume (ML)	10,988	123	1,217	6,755
	as % limit		1%	11%	61%
Tookayerta UWMZs	Volume (ML)	3,112	98	214	7,764
	as % limit		3%	7%	249%
Northern UWMZs	Volume (ML)	7,282	134	17	619
	as % limit		2%	0%	9%
Southern Plains UWMZs	Volume (ML)	3,155	12	0	66
	as % limit		0%	0%	2%

7 Economic context

Summary

- In the EMLR, the two main industry sectors where water is an essential input ([agriculture, forestry, fishing], and mining) provide $869 million in economic output and provide 2,600 jobs.
- Irrigated agriculture accounted for 68% of the economic value directly generated by water use.
- Data availability limited the analysis of economic context and it may be useful to consider re-introducing a simplified annual water use return process.

A water allocation plan needs to balance environmental, consumptive, social and cultural needs for water, therefore it is important to understand the economic context. The board engaged Aither, a company experienced in economic analysis of water resources, to undertake a project titled *Economic significance of water resources in the Mount Lofty Ranges*. The scope of this project was to quantify the direct and indirect value of water for consumptive use across the two Mount Lofty Ranges prescribed water resource areas. The scope included the McLaren Vale Prescribed Groundwater Area and the 'watercourses across the plains' that are part of the Western Mount Lofty WAP region; Gawler River, Little Para River, River Torrens, and Onkaparinga River.

7.1 Results

Quantifying the economic significance of water use across different types of consumptive use (e.g. public water supply, irrigated agriculture or mining) is challenging as the degree to which the economic activity generated arises from water use is quite variable. The methodology adopted was to use 'gross margin' multiplied by the volume of water use. Gross margin is the gross financial return to an enterprise. For the purpose of the analysis in this report, a gross margin is defined as annual farm income (revenue) less variable costs. This figure is much less than the total income generated by the activity, so it is not a measure of the economic size of the activity but is a more appropriate way to compare relative significance of different types of use.

Table 8 presents the relative economic significance measured by gross margin of water split across each region. Excluding economic output supported by public water supply, irrigated agriculture accounted for 68% of the economic value directly generated by water use.

Table 8 Economic significance, measured as gross margin of water, split across regions ($million/annum).

$2022/23 (millions)	Stock and Domestic	Forestry	Irrigated agriculture*	Industrial	Mining	Total
EMLR	0.78	0.37	9.61	1.99	1.35	**14.1**

7.2 Wider Economic Benefits

- The two regions (EMLR and WMLR) generate an estimated $20.5 billion per year in total income across all types of economic activity and industry sectors (not just water supported industries), which represents 7.7 per cent of the total income generated across South Australia.
- The productive capacity of the agricultural sector and the flow on jobs this creates in the manufacturing sector and the wealth it brings to both the region and more broadly across the State is substantial.
- Whilst the mining sector does not contribute many jobs, its contribution to the construction industry across the region is significant, due to the important feedstocks (via many small-scale quarrying operations) it provides for this industry to operate.
- There are significant flow on effects from these three major water essential industries that provide economic stimulus via output and employment to many other sectors of the regional economy including construction, electricity, gas, water and waste services, accommodation and food services, retail trade, transport, postal and warehousing, and the professional, scientific and technical services sectors.

Table 9 shows the economic output and number of jobs provided for the two main industry sectors where water is an essential input.

Table 9 The main industry sectors that use water as an essential input, and their outputs.

	Mining		Agriculture, forestry & fishing		Total	
Region	Output ($m)	Jobs	Output ($m)	Jobs	Output ($m)	Jobs
EMLR	149	189	720	2,379	869	2,568

7.3 Data Availability

Data availability limited the analysis of economic context and it may be useful to consider re-introducing a simplified annual water use return process.

8 Engagement

This section provides information on the engagement undertaken during the EMLR WAP review process and feedback received, with more information provided in Appendix 2.

A joint engagement process was undertaken for the EMLR and WMLR WAP reviews to better facilitate conversations about the challenges and opportunities facing the two WAPs. It was recognised that many individuals and organisations hold interests and views spanning both regions, supporting the use of a joint process. Feedback summarised below is generally reflective of combined EMLR and WMLR views, however, there are some particular matters relating to specific regions within the EMLR, and these are highlighted below.

Summary

Six forms of engagement were undertaken during the review.

- Local leaders discussions; **7** meetings
- Survey; **485** responses
- Drop-in sessions; **131** people attended **6** sessions
- Agency engagement; **8** agency meetings
- Formal submissions; **11** formal submissions from individuals and organisations
- Targeted stakeholder discussions; **15** meetings

The key topics raised across all forms of engagement are listed below, with a range of perspectives and views heard on each of these topics:

- Low flows
- Stock and domestic
- Concern about allocation cuts
- Ecosystem health
- Climate change
- Changing land use in region
- Information transparency and accessibility formation transparency/accessibility
- Water trading and transfer rules
- Water efficiency
- Water security
- Water quality
- Fire water
- First Nations water needs
- Forestry
- Angas Bremer PWA focussed topics

8.1 Engagement approach

Engagement undertaken in the review used a 'broad reach' approach that allowed us to hear from a wide range of stakeholders and community members, with emphasis placed upon creating opportunities for in-depth conversations. The selected engagement approach supported the overarching objective of the evaluation phase (Figure 15) by providing valuable insights into how the ten years of EMLR WAP policy implementation has been perceived, whether the policies are seen to be effective or not, and what the primary challenges, limitations and opportunities have been for the community. The discussions had during the evaluation phase played an additional role of informing the priorities and the approaches to be considered in the subsequent amendment process.

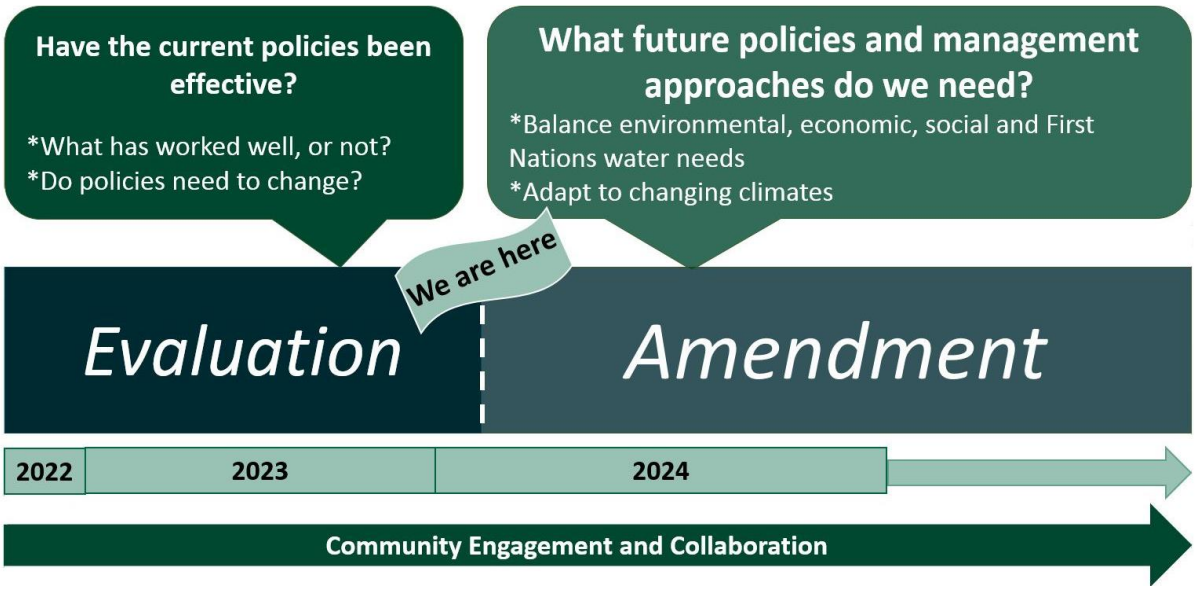

Figure 15 MLR WAP Evaluations and Amendment diagram highlighting the role of the two phases.

The feedback received from each of our core engagement activities is outlined below. A separate process has been undertaken for First Nations engagement (see Section 9).

8.2 Summary of stakeholder and community views

Table 10 Summary table of topics and key points from all engagement activities (including drop-in sessions, formal submissions, surveys, targeted stakeholder discussions, local leader discussions and agency engagement).

Topic	Key points raised during engagement
Low flows	• Discussion on low flows was one of the most commonly raised topics across all the engagement. • There were mixed views expressed, some in support and others concerned. • Concerns surrounding low flows included; - Risks to water security. - Costs and maintenance involved. • Supporting points included; - Addresses the impact of farm dams and supports ecosystem health. - Passing low flows could maintain allocations at a higher volume.
Stock and domestic	• Similar to the low flows topic, discussion on stock and domestic water use was commonly raised across all the engagement. • Mixed views were expressed, including; o Some felt stock and domestic use should be licensed, and others felt it is a 'right' that should not be licensed. o Concern that 'stock and domestic' includes large dams • More information needed about the volume of stock and domestic water use, some felt metering should be considered.

Allocation (usage and cuts)	• There was large concern heard over the potential for allocation cuts, namely from licence holders and industry groups. • By contrast, allocation reductions were seen by some as necessary on the basis of fish monitoring results. • Questions raised about management options for over-allocated/ high demand zones. • Many people use much less than their full allocation volume. Not necessarily the volumes being used by people, but the full allocation volumes, that present a risk. • Allocations need to be evidence based and based on the most locally relevant data possible, and not based on generalised data.
Ecosystem health	• Community members and environmental groups raised that more priority should be given to the health of the environment in future WAP policies. • Without a healthy environment, you can't have a good economy.
Climate change	• Concern about how climate change will affect the water resource into the future. • Climate change resilience and readiness is the responsibility of the government. • The WAP should be reviewed more than every 10 years to keep up with the changing climate. • An adaptive system that responds to yearly fluctuations and a changing climate should replace the current use of a 'set number' for allocations.

Changing land use in the region	• Land uses are changing across the region and this may affect the water resources in different ways.
	• Some pastoralists and graziers have switched to deeper rooted species that retain more water in the soil and reduce surface run-off.
	• Higher intensity water using industries such as potato growing, dairy and some horticulture were observed to be less prevalent now than previous years.
	• There was a strong desire for more information about the impacts of these changes to water resources. For example;
	  o Is overall water use lower in some areas now?
	  o Is surface runoff reduced at landscape scale?
	  o Is there more water available in some areas?
	  o Is there a lower risk of depletion to water resources?

Buy-backs	• Buy-backs should be considered for wholly or partly unused allocations to address over-allocated zones. • Some felt buy-backs were necessary so that any reduction to allocations were fair for licence holders.
Information accessibility	• Many raised the importance of making it as easy as possible to access information and support. • The information about status and trends shared during the engagement was generally well received. • Information about the status and trends of water resources should be readily available on an ongoing basis.

Trade and transfer rules	• There were opposing views on the current trade and transfer rules: ○ Current rules are too restrictive and limit the ability for licence holders to successfully undertake trades or transfers. The current limitations are seen to reduce the value of water. • The current restrictions should not be eased, as it presents risks to the resource and the environment.
Water for economy	• Some landholders and business owners highlighted existing difficulties in covering all costs and growing expenses, with water related costs just one of many. • Suggested that annual levy fees should be based on water usage, rather than a fixed amount based on full allocation volume. • Frustrations raised about the present 'blanket ban' on new dam capacity for all parts of the region. Seen as a limitation on economic growth for farms. • Calls for 'case-by-case' consideration of additional dam capacity, particularly for areas that have not exceeded zone limits.
Water efficiency	• Water efficiency needs to be better promoted, or even made a requirement of future policies. • Market access and other financial incentives could be explored, to improve motivation.
Water security	• Water security concerns were raised across industry groups, environmental groups, and community members. The concerns varied, but largely spoke to uncertainty about the future. • Some landholders raised that the water held in dams is not just for one year but for multiple years, and this is important to farm planning for multiple seasons ahead. • A specific concern was raised by those in the Mount Compass township, where residences rely on local groundwater resources instead of reticulated mains water supply. Residences supplied groundwater through the private water supplier expressed concerns about cost, aquifer health and water quality.
Water quality	• Water quality was raised throughout the engagement and was a particularly common topic through responses to the survey. • Water quality felt to be very important and needs more consideration than in the current WAP to protect water resources from pollution and contamination.
Fire risk	• Some landholders raised the importance of having access to water for firefighting purposes.
First Nations	• The concept of First Nations water values was not well understood across many groups engaged with.
Forestry	• The current WAP prevents the expansion of commercial forestry plantations and this was acknowledged by industry representatives to present a barrier to industry growth.

	• Another limitation raised by organisations and individuals is that the current definition of *commercial forestry* applies to carbon plantings and poses a barrier to establishing carbon sequestration projects. • Some members of the community felt that the same water licensing requirements should be applied to commercial forestry as for other water using industries.
Angas Bremer PWA	Groups and individuals engaged with in the Angas Bremer Prescribed Wells Area (PWA) raised a number of regionally-specific questions and points, including: • There is currently a revegetation requirement within the WAP (principle 28, p. 142) for 2 ha of non-irrigated revegetation to occur for every 100 ML of allocation usage, within *relevant land* the Angas Bremer region. - Investigations were requested to determine the ongoing need for this policy in the next EMLR WAP, especially given it is not audited currently. • Ongoing need for monitoring wells across the Angas Bremer PWA region. • Irrigators who pump water from the Angas or Bremer Rivers reported salinity levels to be increasing, impacting their water security. Calls were made for ongoing monitoring and investigation into what is contributing to the increased salinity levels.

9 First Nations

The lands and waters of the Eastern Mount Lofty Ranges Prescribed Water Resources Area (EMLR PWRA) includes parts of the traditional Country of the Kaurna, Peramangk, Ngarrindjeri and First Peoples of the River Murray and Mallee Nations. The map provided in Appendix 3 shows only the Native Title areas in the EMLR area. Cultural areas are recognised but not indicated on the map.

9.1 Background

The term 'First Nations' is used throughout this document to refer to Aboriginal, Indigenous or Aboriginal and Torres Strait Islander peoples. The preference for the term First Nations was established during the engagement at 'roundtable' meetings. It is acknowledged that there are many different preferences in how Aboriginal or Indigenous people like to be referred to.

9.2 Legislative and policy context for the EMLR

Since the current EMLR was adopted, there has been some progress nationally to recognise First Nations people and actions that realise First Nations' objectives in water management and planning policy.

The EMLR WAP is covered by the EMLR Water Resource Plan (WRP) which is one of SA's three Murray Darling Basin Plan (Basin Plan) compliant WRPs. Any amendments to the current WAP will need to be compliant with Basin Plan requirements. The recent Basin Plan Implementation Review 2023 (Productivity Commission 2023) includes reforms to strengthen the roles of Aboriginal and Torres Strait Islander people and states that a 'core objective of the Water Act and the Basin Plan is to enshrine and give prominence to First Nations' rights and interests'.

WRPs are the mechanism to deliver the objectives and must identify First Nation cultural objectives and outcomes based on the values of First Nations people and uses in relation to managing water. The EMLR WRP included First Nation representation in the preparation and implementation of the plan with particular regard to their views about cultural flows.

In addition, the recommendations from The National Water Reform 2020 (Productivity Commission 2021) include the co-design of a First Nation people's interests in water and involvement in water management with specific improvements to cultural outcomes and access to water for economic development. Water plans are identified as an existing framework for "clear, measurable and well-informed cultural outcomes in water plans, and monitoring and reporting arrangements that promote accountability and foster learning about what works should also be put in place" (Productivity Commission 2021, p121).

Furthermore the 2021 National Agreement on Closing the Gap target 15 has a commitment to the target 'People maintain a distinctive cultural, spiritual, physical and economic relationship with their land and waters'.

9.3 First Nations objectives assessment

In 2019, in order to be consistent with Basin Plan requirements, amendments were made to the current EMLR WAP to set out First Nation interests in the EMLR water resources. As part of those amendments, a number of 'Aboriginal cultural objectives' developed by First Nations were added to the WAP (see Appendix 3). The Aboriginal cultural objectives articulate a policy direction to fulfil the aspirations of First Nation people in relation to water resources. First Nations people have participated in water planning and assessment through regular environmental monitoring activities such as Bioblitzes and Grass Roots Grants. For the most part however, First Nations people have been peripheral to the efforts to progress the WAP towards addressing the cultural objectives. Consequently, the WAP will not achieve the interests as set out in the objectives.

The Review has highlighted how the WAP integrates First Nations interests, as expressed by the Aboriginal cultural objectives as a key focus area. The requirement for a WAP to balance First Nations cultural objectives for example, with the economic, social and environmental principles hasn't been fully integrated in the drafting of the principles for the sustainable taking and use of water.

9.4 Engagement

First Nations Engagement for the review process included:

- An invitation to participate in the review. Each nation was contacted directly and invited to participate in the review via their appropriate registered Prescribed Body Corporate or representative body. All First Nation groups with interests in the water resources of the EMLR WAP region will have the opportunity to engage in activities to further develop their interests during any amendments. To date, Ngarrindjeri and First Peoples of the River Murray and Mallee nations would like to participate in developing co-design methods to integrate First Nations interests in the WAP through strategic and practical activities, and
- Three 'roundtable' meetings were held on 22 June 2023, 26 July 2023 and 14 September 2023. The meetings were attended by representatives of Kaurna, Peramangk and Ngarrindjeri nations and organised in collaboration with South Australian government agencies to discuss the First Nation interests in water across the Greater Adelaide region.

9.5 Findings

First Peoples have a connection to water which values generations of cultural, spiritual and customary knowledge. This connection is enduring despite the disruption and impacts caused by colonisation.

A formal assessment by First Nations people of the performance of the WAP against the First Nations cultural objectives was not achieved during the review. The key findings draw on the consistent views held by First Nations people concerning water and the deep cultural, spiritual, environmental, social and economic significance it holds for them. The engagement process with First Nations groups is emergent therefore for the purposes of this document, the findings are aggregated. However, it is acknowledged that First Nations' water needs differ between groups and regions due to a complex web of socio economic and cultural factors. The nation-specific and localised preferences will be explored as appropriate during any amendments.

The EMLR WAP is not appropriate and requires amendment due to the following observations and priorities expressed by First Nations representatives. The WAP should contain mechanisms to:

- Re-introduce cultural flows. Leverage cultural flow synergies with environmental flows to enable multiple benefits including cultural water maintenance.
- Facilitate First Nations peoples' access to water sources for the purposes of practising and sustaining culture and learning more about Country.
- Assist processes for First Nations peoples to implement water planning, management and evaluation processes that assess multiple scientific and cultural indicators. For example, implement adaptive management regimes that can integrate cultural water with additional measurable objectives to optimise holistic outcomes.
- Integrate First Nation representation in future advisory groups
- Enable First Nations people to participate fully in water planning and management processes.
- Support First Nations to increase control of water entitlements.
- Require all staff working with First Nations people to fulfil cultural competency training.

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11 Appendix 1 - Success of the WAP in achieving its objectives

The review of the WAPs success focussed on three aspects:

- The stated outcomes
- The supporting programs
- The policies themselves

The findings related to the first point (stated outcomes) are outlined in Section 2.1 of the main report body. The findings relating to the remaining two points (the supporting programs, the policies themselves) are given here in Appendix 1.

11.1 Review of supporting programs

Water allocation plans operate within a context of supporting programs which collectively constitute the water management arrangements. When reviewing the success of a WAP in achieving its stated outcomes, it is important to examine both the policies within the WAP, and the implementation of supporting programs that were intended to enable the stated outcomes of the WAP to be achieved. The key supporting programs are discussed below.

Issuing of allocations to existing users

After a water resource is prescribed, one of the main processes is to issue water licences to existing water users. The process of determining what allocation volumes are to be granted to existing users is independent to the WAP itself, and consequently WAP policies relating to new allocations do not apply to existing users. In the EMLR, allocations were granted to existing users on the basis of calculations for theoretical enterprise requirements. This has resulted in over-allocation in a large number of management zones.

Low flow releases

The surface water extraction limits in the WAP are set at 20% of resource capacity and these limits assumed full implementation of low flow releases. In the EMLR the delivery of LFRs has been progressed through the F4F program.

To date, LFRs are occurring at 349 sites across the Angas, Bremer, Currency Creek and Finniss Catchments, including 154 low flow devices and 195 watercourse diversions. Despite the progress made through dedicated efforts and funding, the level of implementation is below that anticipated by the WAP, which limits the achievement of the stated environmental objectives.

Modelling undertaken during WAP development showed that achieving the same level of ecological sustainability without implementing low flow releases would require surface water extraction limits to be set at 5% of resource capacity (four times lower than the present limits). The limited degree of LFR implementation means that for most surface water management zones, the current extraction limits are four times greater than the level considered sustainable by the WAP.

Managing high demand

High demand zones are those where the volume of total allowable use exceeds the extraction limits set out in the WAP. Strategies were developed to address the issue of high demand at the time of WAP adoption. The stated strategy included increasing the frequency of monitoring within high demand zones, to review the

monitoring data and determine the risk to the resource with current levels of use, and if necessary consider reductions to allocations.

- Total allowable use in 107 out of 194 (55%) EMLR surface water zones exceeds WAP limits.
- Total allowable use in 6 out of 27 (22%) EMLR groundwater zones exceeds WAP limits.

No reductions have been implemented.

The combined impact of not managing high demand zones and lower than anticipated levels of low flow implementation has resulted in a situation where in many surface water management zones, not only is the WAP extraction limit four times greater than what is considered sustainable, but total allowable use also exceeds that limit.

Reservation of excess water / Medium Term Arrangements

The outcome of the reservation placed on excess water has been that allocation volumes have not increased beyond that issued to existing users, and legally constructed dam capacity has not increased. These arrangements have limited the ability for some landholders and business owners to expand operations or establish new developments reliant upon access to prescribed water resources. However, it should be noted that in many zones there are significant volumes of allocation that are owned by licence holders but are unused, with the water trading market (discussed below) intended to allow needs to be met within the overall limits. It should also be noted that in relation to surface water, the reservation together with the Medium Term Arrangements has prevented the situation created by limited implementation of LFRs from being further exacerbated.

Licensing

The water licensing system limits the volume of water extracted from water resources for licensable purposes by ensuring that the volume of water used by individual licensees does not exceed their allocated volume. The DEW Water Licensing Branch also administers permanent and temporary transfers of allocations within the rules set out in the WAP. The review has found that the licensing system is operating consistent with the WAP rules and the Act.

Implementation of water affecting activities policies

The assessment of permits for water affecting activities (WAA), such as for construction or modification of dams, construction of structures that affect a watercourse (e.g. culverts and bridges), and drilling of wells, is shared between DEW and landscape boards and utilises the principles set out in the WAP, as well as the WAA Control Policy. This program is operating consistent with WAP rules and the Act.

Monitoring

While there are a number of improvements identified for future monitoring priorities and approaches, the level of information able to be provided for this review demonstrates that considerable monitoring has been undertaken over the WAP implementation period. During the Technical Assessment of WAP Objectives workshops it was noted that a formal monitoring, evaluation review and improvement (MERI) plan had not been developed to support WAP implementation and that there was not a clear line of sight between WAP objectives and monitoring undertaken to date.

11.2 Review of principles in the WAP

The rules, or 'principles' of the WAP are set out in four chapters; allocations, transfers, permits (for water affecting activities), and monitoring. These four chapter groupings are used as the sub-headings for this section. At the Technical Assessment of WAP Objectives workshops, discussion was structured around each chapter. Further feedback on the operation of the principles was received from DEW and HF assessment

officers who work with the principles on a daily basis. The following summary outlines the key outcomes of the review of WAP principles.

Allocations

The reservation and Medium Term Arrangements prohibited the allocation of any 'spare' water from those zones where spare water existed, once allocations were granted through the existing user process. While no applications for new allocations were assessed, transfer applications must also satisfy the allocation principles in the WAP in order to protect the zone into which the allocation is being transferred. Only very small numbers of transfer applications have been received during the WAP implementation period, so the principles have not been well tested across a broad range of situations, however, feedback from DEW Water Licensing Branch confirmed no concerns with these principles.

Transfers

Transfer principles in the WAP have been effective in protecting resources from the impacts of inappropriate transfer (and trade) of allocations. Feedback received from community members during the engagement highlighted that the transfer principles are complex and it is difficult for water users to know whether a proposal is likely to be approved. Feedback from DEW Water Licensing Branch also confirmed these principles are technically difficult to assess and advise upon. It has been suggested that the complexity of the transfer principles are an impediment to trade, and more information and support is needed for those wanting to undertake transfers or trades.

Permits for Water Affecting Activities

The review found that the principles have largely been working well, but there is a need to examine;

Forestry Principles:

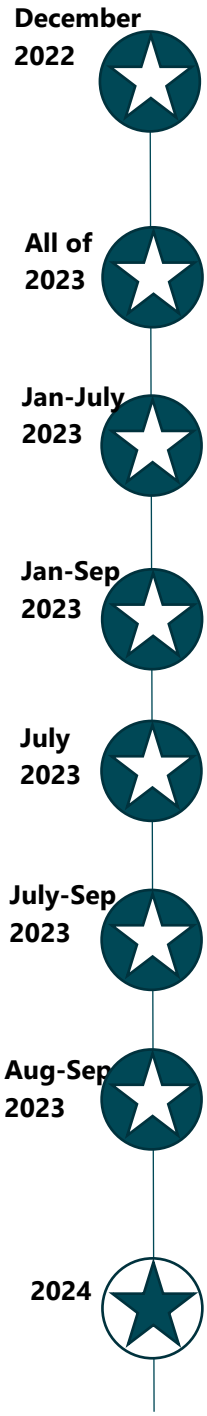
- The reservation and Medium Term Arrangements have prevented the expansion of new forestry plantings (not including replacement plantings) during the WAP implementation period. An expanded carbon credit scheme and better market conditions for forest products has resulted in pressure to expand the area of forestry plantings within the prescribed area.
- Forestry intercepts substantial volumes of surface water and groundwater and consequently needs to be accounted for in the management of water resources. Any expansion of forestry will reduce water availability for the environment and other consumptive uses, which is why it is carefully considered as part of the existing permitting process.
- The definition of forestry in the Act includes plantings which intend to claim carbon credits. Consequently, this currently limits revegetation projects for biodiversity purposes that also intend to claim carbon credits.

Monitoring

Aquatic ecosystem health relies less on the annual volume of flow and more on the pattern of that flow throughout the year. The development of flow metrics within the WAP has enabled the flow regime to be assessed. However, it is complex and a proposed simpler set of measures are in development. A MERI plan was never comprehensively developed to support the implementation of the WAP. However, routine monitoring of surface and groundwater resources and ecological condition by DEW and Landscape Board (and previously NRM Board) programs has resulted in good data sets.

12 Appendix 2. Community and Stakeholder Engagement

Timeline of key engagement activities:



December 2022

First Notification
Notified community and stakeholders that the MLR WAPs are being reviewed throughout 2023, with brief information on the process, where to find more information and how to get involved. Letters and emails to all licencee's and stakeholder groups.

All of 2023

Ongoing media and comms
Media releases to Local Councils, newspapers and Facebook posts, with the aim to inform the community that the WAP reviews were occurring, and promoting the drop-in sessions and

Jan-July 2023

Local Leader discussions
Met with persons involved in original WAP development to understand perspectives/concerns and shape review approach and amendment focus areas, as well as to inform our engagement

Jan-Sep 2023

Targeted stakeholder discussions
In-person and online discussions with identified key industry bodies, community groups, and other stakeholder groups. Presentations/attendance by DEW Science teams at some discussions.

July 2023

Second Notification
Provided further information (FAQs/Catchment Summaries) and dates + locations of Drop-In Sessions. Opening of online survey/submissions.

July-Sep 2023

Survey
Hardcopy surveys posted to all licence holders, and available at all in-person events. Online survey promoted through media.

Aug-Sep 2023

Drop-in sessions
In-person sessions held in town halls across the region, using open plan display format and broad timing (2-7pm). Community members could also book a one-on-one discussion with a staff member if they wanted a more in-depth conversation.

2024

Planned: Third Notification
A 'loop back' communique will confirm what the review work found and what the next steps are.

12.1 Local leader discussions

One of the earliest engagement activities undertaken for the WAP reviews were the Local leader discussions. Four meetings were organised with people in the EMLR region who are well known and respected within their communities, and who have knowledge surrounding water planning, to discuss the WAP review. Local leaders included farmers and landholders, those in the agricultural industry, and people who have previously sat on water planning and/or natural resource management committees. The local leader discussions helped to identify the most effective ways of communicating with community and industry stakeholders throughout the WAP reviews.

The below table presents a selection of key points against the most commonly raised topics by participants across the four EMLR local leader discussions.

Topic	Key points raised by local leader participants
Low Flows	• Some were opposed to returning low flows at all, as it was seen as a potential risk to water security. • An added difficulty raised by numerous local leaders was the costs and maintenance associated with the low flow devices. • Methods for incentivising or penalising to improve uptake of low flow releases were discussed. • It wasn't clearly communicated when the WAP was first adopted how important low flows were to the existing allocation limits. • Unknown and unregulated quantities of stock and domestic (S&D) water use could undermine any flows passed.
Stock and domestic (S&D)	• There were differing views between local leaders surrounding stock and domestic use. • Some stated that stock and domestic use is not a main concern for irrigators, however, also stated that with towns expanding and no control over the amounts being pumped for stock and domestic it could become an issue in the near future. • Stock and domestic water use was felt by some to be significant, and lifestyle/hobby farms viewed as not using the water in an economically productive sense. • Incentives for removing unused stock and domestic dams were discussed.
Allocations	• There should be more flexibility within water licences year-to-year, and less restrictions around water trading and transfers. • Annual water levies should be based on what water you actually use, rather than what is allocated, and this would be a good way to promote water efficiency, and reward those already being conscious of their water usage. • Future impacts of climate change, and impacts on allocations. • If allocation reductions are needed, could they be aimed at unused allocations (sometimes called 'sleeper licenses')?
Buy-backs	• If allocations are reduced, there will be challenges.

	• One option discussed was water buy backs. There are water licence holders who want to sell their water.
Environmental concerns	• The environment currently has no allocation and just receives whatever is left over. • One local leader stated that they would be happy to give or lease unused water for environmental or First Nations purposes in exchange for other levies and costs to be removed. • For those trying to sell water, could that portion be used for environmental needs?
First Nations	• First Nations receiving water rights was supported, however, more information about how this would be done is needed. • It is not well known where culturally important areas are. • Will First Nations be managing environmental water? • Would the government be buying back water from existing allocations for First Nations? • It may be difficult to get all of the community on board.

12.2 Targeted Stakeholder Discussions

Throughout the review phase engagement process there were 15 targeted stakeholder discussions held across both EMLR and WMLR regions from January through to October 2023. The groups that were met with as part of the targeted stakeholder discussions are listed below.

Angas Bremer Water Management Committee (two meetings held)

Victor Harbor Agri-Business Reference Group

How to make your farm dam DAM GOOD Field Day participants

Bremer Water Watch Group

Fruit Producers SA Board Members

Hills Environment Centre

SA Dairy Association

Second Nature Conservancy Inc (formerly GWLAP)

McLaren Vale Water Discussion

Parawa Ag Bureau (and local landholders)

Meadows Ag Bureau

Southern Fleurieu Regen Ag Farm Walk participants

Mount Barker Ag Bureau

Fleurieu Environment Centre Committee and Nursery Volunteers

Some discussions were attended by both WMLR and EMLR community members (for example, at the Meadows or Mount Barker Ag Bureau meetings), and other discussions were focussed to either the WMLR or EMLR region (for example, at the Angas Bremer Water Management Committee meeting in EMLR).

A selection of the key points raised across the targeted stakeholder discussions are listed below, grouped into the most commonly raised topics. The below selection is intended to provide an insight into the diversity of

views expressed, and it is important to note that these views were not unanimously held across all the discussions or participants.

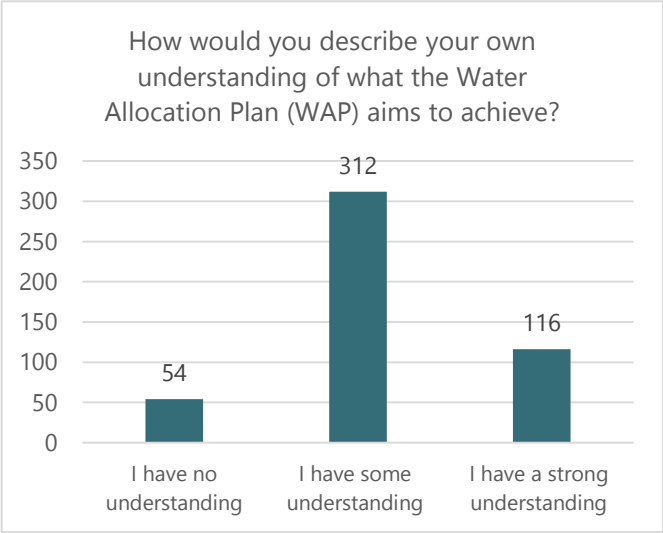
Topic	Key points raised by targeted stakeholder discussion participants
Low flows	• Common concerns raised about low flows included: - Risk to water security - Seen as taking landholders' water away • In support of low flows the below points were raised: - Important for ecosystem health - If passing low flows is the way to maintain allocations at a higher volume, then it needs to happen • Instead of expensive physical 'low flow devices', other cheaper or more high tech solutions should be considered.
Allocations	• Concerns expressed for the potential of allocation changes. • Concern that if allocations are cut, even if people aren't using their full allocation they will lose their flexibility and 'spare water'. • Scale used to manage surface water resources is too large - Generalises across landscapes that are very different - Makes allocations too generalised • Allocations originally granted were too generous - The 'actual use' in areas is generally below the allocated volume - Not necessarily the volumes being used by people, but the full allocation volumes, that present a risk
Environment	• Permanent pools should be given greater priority in future WAP policies • How do we adapt to changing climate; climate change resilience and readiness - WAP needs to be reviewed more than every 10 years to keep up • Without a healthy environment, you can't have a good economy
Information accessibility	• Lack of awareness of what the WAP is trying to achieve and how • There should be more information shared about water resources, and the information should be presented in a form people can understand
Flexibility of WAP	• Transferring and trading of allocations and/or licences is a difficult process • Transfer rules are too restrictive • Why are we using a set number for allocations and not an adaptive system that responds to yearly fluctuations and a changing climate
Land use and practice changes	• Urbanisation occurring throughout region, what does this mean for the balance of water supply, run off, and demand? • Impacts of deeper rooted crop and pasture species that retain more water in the soil and reduce surface run-off • High water use industries in the region have reduced significantly e.g. potato growing, some horticulture, dairy industry
Stock and domestic	• Shouldn't be licenced, but should be metered

	- Can then know impact of all use not just licenced use • Inherent risks and uncertainties in not having the same level of 'actual use' data for non-licenced water users
Monitoring	• Allocations should be based on the most locally relevant data possible, and decisions should not be based on generalised data or without sufficient data • Should be mandatory monitoring of bore levels as a requirement on the licences
Economic	• Growing costs to farmers, and the Board need to keep in mind what any additional costs will mean for those already at their limit • Levies should be based on water usage rather than a fixed amount to encourage water efficiency • The current reservations don't allow for business growth
Water efficiency	• On-farm water efficiency could be improved and needs to be better promoted, or even be a requirement of future policies. • Use market access/financial incentive for farmers to demonstrate they are as water efficient as possible.
Water security	• Being able to plan multiple seasons ahead important for farm planning - Farm dams play large role in this
Water quality	• Doesn't strictly fall within the policies of the WAP, but is of interest for many people in the community.
Angas Bremer PWA	Groups and individuals engaged with in the Angas Bremer Prescribed Wells Area (PWA) raised a number of regionally-specific questions and points, including: • There is currently a revegetation requirement within the WAP (principle 28, p. 142) for 2 ha of non-irrigated revegetation to occur for every 100 ML of allocation usage, within *relevant land* the Angas Bremer region. - Investigations were requested to determine the ongoing need for this policy in the next EMLR WAP, especially given it is not audited currently. • Ongoing need for monitoring wells across the Angas Bremer PWA region. • Irrigators who pump water from the Angas or Bremer Rivers reported salinity levels to be increasing, impacting their water security. Calls were made for ongoing monitoring and investigation into what is contributing to the increased salinity levels.

12.3 Survey

The survey consisted of 10 questions and was available online (via 'SurveyMonkey' platform) and as hard copy versions. There were a large number of 'bot' responses received through the online SurveyMonkey platform. After analysing the dataset and removing responses deemed to be from bots, a total of 485 legitimate survey responses were received.

The survey was completed for both WMLR and EMLR regions as a whole, so the following summary is for all survey respondents, regardless of region.



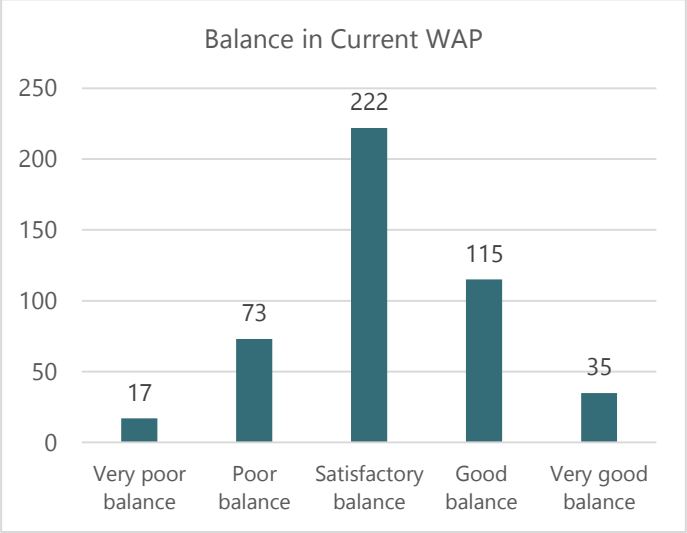


Figure 16 (left) Bar graph of answers to question "how would you describe your own understanding of what the WAP aims to achieve?"

Figure 17 (right) Bar graph of answers to question "how well do you feel the current Water Allocation Plan achieves an equitable balance between different water needs?"

The majority of respondents stated they have some understanding of what the WAP aims to achieve, and that the WAP has a satisfactory balance.

There were 315 people who provided answers to the open-ended surveys questions. Some of the key themes raised in the free-text responses included:

- Concern about urbanisation/development and what this means for water resources.
- The current water trading system is difficult.
- Water users should not pay a levy for their allocation but rather what water they use.
- Water efficiency needs to be prioritised and incentivised.
- The resources fluctuates on a year to year basis and this needs to be considered going forward.
- Primary producers need stability and the chance to plan ahead.
- The economy relies on the environment.
- Split opinions over the current ban on new dam capacity.
- Primary production for commercial food production should be prioritised. Consideration should be given to the suitability and water use of certain crops.
- Efforts in regards to water management should not impose extra cost to farmers.
- Over-allocation could be addressed through buy-back schemes.
- Concerns about the environment getting enough water.

- Mixed views for whether current restrictions and regulations should be reduced or increased.
- 'One size fits all' approach to allocations and other water management issues doesn't work.

There were also 73 people providing comments on other areas of water management that fall outside of the direct control of the WAPs. The key themes were:

- Importance of preventing erosion to watercourses/bodies.
- Requests for more priority and resources to assist with weed/vegetation management in watercourses/bodies.
- Water quality is very important and needs to be taken in to consideration.
- Water resources need to be protected from pollution and contamination.

Question 7 in the survey provided a list of 13 'challenge statements' related to the existing WAPs. These were issues that had been indentified during early consultation, such as in discussions with local leaders. The question asked respondents to rate how important it was to them that a new WAP addressed each of the issues listed (*Figure 18, overleaf*). The challenge statement which received the highest number of "very important" ratings (n = 308) was '*Commercial forestry plantations are a large water user in some parts of the region but do not require a water licence*'. The challenge statement relating to whether First Nations water interests are meaningfully represented in the current WAP received the most "not at all important" responses (n = 245).

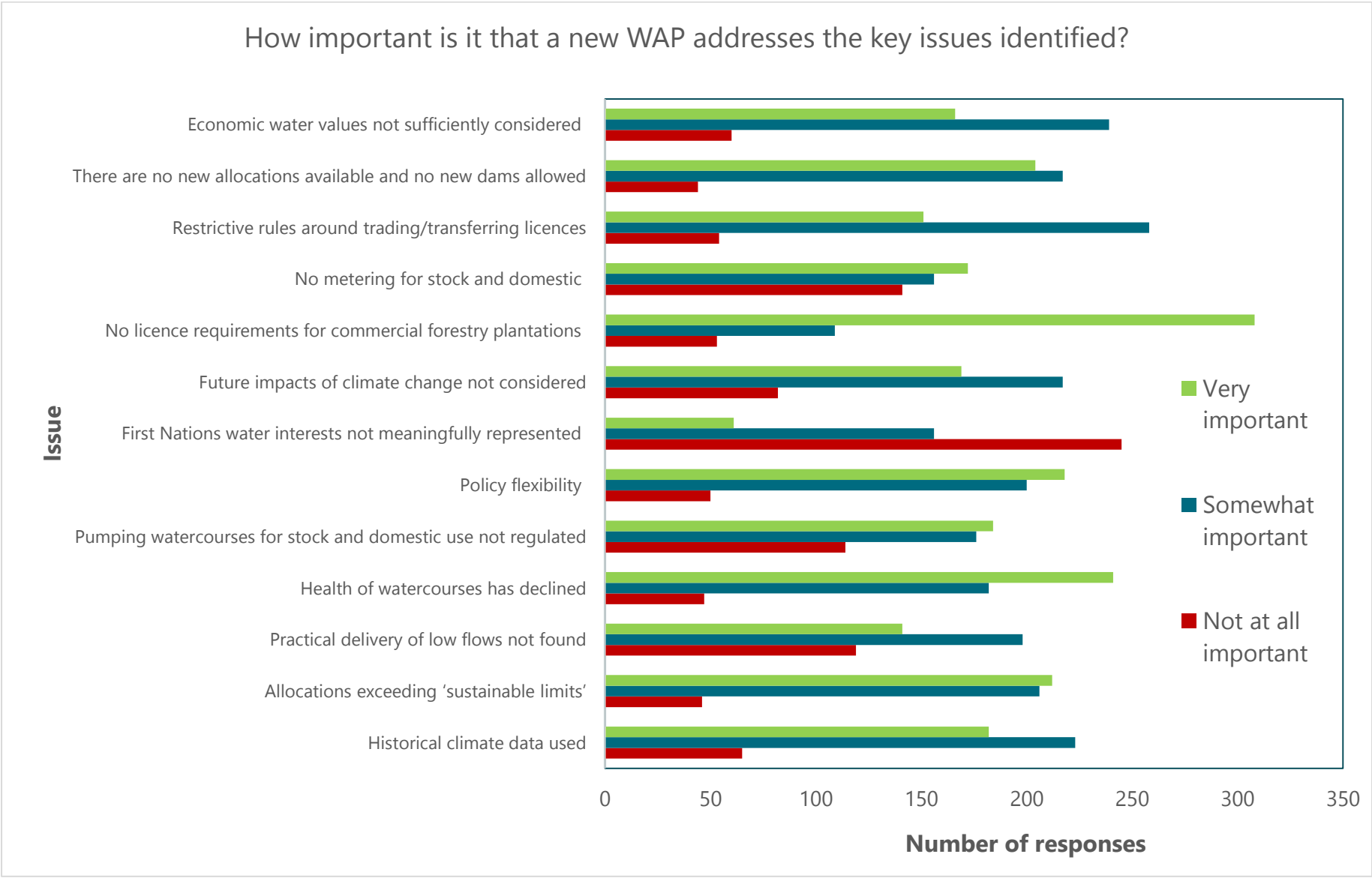


Figure 18 Key issues identified in the WAP were presented to respondents for ranking. The survey asked "How important is it to you that a new WAP addresses each of these?"

12.4 Drop-in sessions

Six drop-in sessions were held during three weeks across the WMLR and EMLR regions. These sessions were run at;

- Mount Compass Memorial Hall (21 August 2023),
- Inman Valley Community and Memory Hall (24 August 2023),
- Macclesfield Institute (29 August 2023),
- Woodside Hall (1 September 2023),
- Gumeracha Town Hall (6 September 2023); and,
- Mount Barker Town Hall (8 September 2023).

The drop-in sessions were used as a method of engagement that were open to anyone from the community, so that there were opportunities to hear broader perspectives not captured during the targeted stakeholder discussions. A long format (2pm-7pm) was used for all the drop-in sessions so that they were as accessible as possible for those with various commitments. Information about the status of water resources and ecosystems, key trends and allocation and use data was displayed on large posters that were positioned with lots of space for people to move around and talk to staff on hand. This format was a really effective way of providing information that supported conversations, whilst still having the flexibility of talking to whatever was of interest to each attendee.

As well as being able to walk through and browse the display information and speak to any available team member at the drop-in session, people were also encouraged to pre-book a timeslot with a dedicated team member staffing the one-on-one discussion desk off to the side of the main hall set up. The one-on-one pre-bookings were well attended and proved to be a useful way to explore specific questions and concerns in a focussed conversation.

A selection of the key points raised by participants attending the drop-on sessions are listed below, grouped into the most commonly raised topics. The below selection is intended to provide an insight into the diversity of views expressed, and it is important to note that these views were not unanimously held across all the discussions or participants.

Topic	Key points raised by drop-in session participants
Fire risk	• Need for access to water for firefighting purposes
Low flows	• Against low flows • Agree with principles of low flows but concerned about the effects on summer water use • Low flows are a good part of the plan • Look for alternatives to low flow devices for more flexibility
Surface water dams and allocation reservation	• Issue is not dams, it is irrigators • Dams are good for biodiversity and providing habitat • Farmers have entitlement to store water on their property • Blanket restrictions don't allow for future planning
Stock and domestic	• Concerns about high use of S&D use • Should be metered so you know how much is being used • No need to licence S&D

Water efficiency	• In SA, about 20% of berry growers are looking into being more water efficient, but the capacity of berries group to help drive change is limited • Crops are being irrigated during the daytime because electricity is cheaper than at night, but this isn't water efficient
Information accessibility	• Improve communications beyond social media • Need to better communicate trends in water resources • Not clear what the WAPs or any of the current water regulations are really trying to achieve
Water trading	• Complicated process, difficult to find information on trading, need better information • reduce restrictions for trading and transfers
Climate change	• Concern for what any changes might mean for water availability • Climate change needs to be better reflected in the WAP
Land use and management changes	• Impact of future urban development on aquifers, run off, streamflow • Less land being intensively irrigated • Many more 'hobby farms' seen throughout area, these put different pressures on water resources
Water for the environment	• Environment needs to be represented in these discussions • Most farmers want to look after the environment • Dams provide habitat • Support for biodiversity protection and having a fair balance of water
Water allocation	• Spare allocation gives flexibility. May need to use full allocation in future – need to have that option • Have to pay for whole allocation even if whole allocation is not used • In support of allocations being brought in line with extraction limit • Fear of losing allocation. Don't cut allocations if there is no reason to
First Nations	• First Nations representation should be included within existing social or environmental representation, not as a separate 'category'. • More information needed on what Indigenous/cultural water is
Economy	• Cost too high, fear this is going to increase • To be able to continue primary production, WAP needs more flexibility • A landholder shouldn't have to pay for their own water meter • Water is an asset
Suggested changes to WAP	• Buy backs should be used for 'unused' portion of allocations to protect those who do use all of their allocation • Trading un-used allocations to people who are using most of their allocation could be problematic, lead to price-gouging • If the levy was paid on use there'd be more incentive • Commercial forestry should be licenced
Mount Compass – Specific Topic	A specific topic was frequently raised by attendees to the Mount Compass drop-in session. Questions and concerns were heard from residents who receive their domestic water supply from a third party supplier. The water is sourced from the

	local aquifer under an existing water licence. The questions and concerns included: • Why isn't Mount Compass Township connected to reticulated mains water supply? • Water quality and supply cost concerns. • Concern about the capacity of the local aquifer to supply households. And, the impacts of expanding this use to accommodate proposed dwellings.

Figure 19 Set-up of the information display at Macclesfield drop-in session. One-on-one discussion desk shown in bottom left.

12.5 Agency Engagement

In addition to community engagement, the review also sought to hear from agencies involved in water planning and management. The intent of these conversations was to provide an opportunity for feedback about the effectiveness of the WAP, and the areas that require focus during amendment. The organisations engaged with through this process included; ForestrySA, SA Water, DEW Water Licensing Branch, neighbouring Landscape Boards, PIRSA/SARDI, Local Councils and the Flows for the Future program.

12.6 Formal Submissions

Formal submissions were received from both individuals and organisations who have an interest in how water resources are managed across the EMLR and WMLR regions. A list of those who provided formal submissions is given below. Submissions received from individuals are labelled below with the drop-in session that they attended (i.e. Woodside Drop-In Session Attendee #1) to protect an individuals privacy.

Fleurieu Environment Centre

Inman Valley Drop-in Session Attendee

Fruit Producers SA

Canopy/ Greening Australia

Koolah Beef

Woodside Drop-in Session Attendee #1

Woodside Drop-in Session Attendee #2

SA Forest Products Association

Amdena Nominees Pty Ltd.

Parawa Ag Bureau

SA Dairyfarmers Association

13 Appendix 3 Aboriginal cultural objectives

Aboriginal nations developed cultural objectives through the Water Resource Planning process (EMLR WAP section 1.3.3) and by participating in the WAP's engagement process conducted for the purpose of amending the Plan in 2019. The cultural objectives developed by nations through this process are set out below.

Aboriginal cultural objectives:

a) To pursue opportunities for legally recognised water entitlements for nations.

b) For the hydrological and ecological conditions of the landscape to resemble, as closely as possible, those experiences by nations' ancestors.

c) For water resources to be managed in a way that supports the ongoing spiritual, cultural, environmental, social and economic needs of current and future generations.

d) For adequate monitoring and evaluation to be undertaken to ensure compliance with water management rules and to assess whether objectives are being achieved.

e) To seek support to build capacity for nations' voices in water planning and management, building on and further developing nations' water co-ordinator roles.

f) To create opportunities for nations' businesses to engage in the delivery of on-ground water planning monitoring and evaluation, particularly cultural health assessments of waterways.

g) For water allocation plans and other water planning and management tools and instruments to promote awareness and respect for nations' cultural values, perspectives and worldview of water and its critical importance to the health of nations' cultural water and cultural living landscape.

h) For continued conversation through meaningful engagement between nations and government to be invested in as an on-going priority and not be undertaken as disjointed and sporadic engagement driven by government planning and management timeframes.

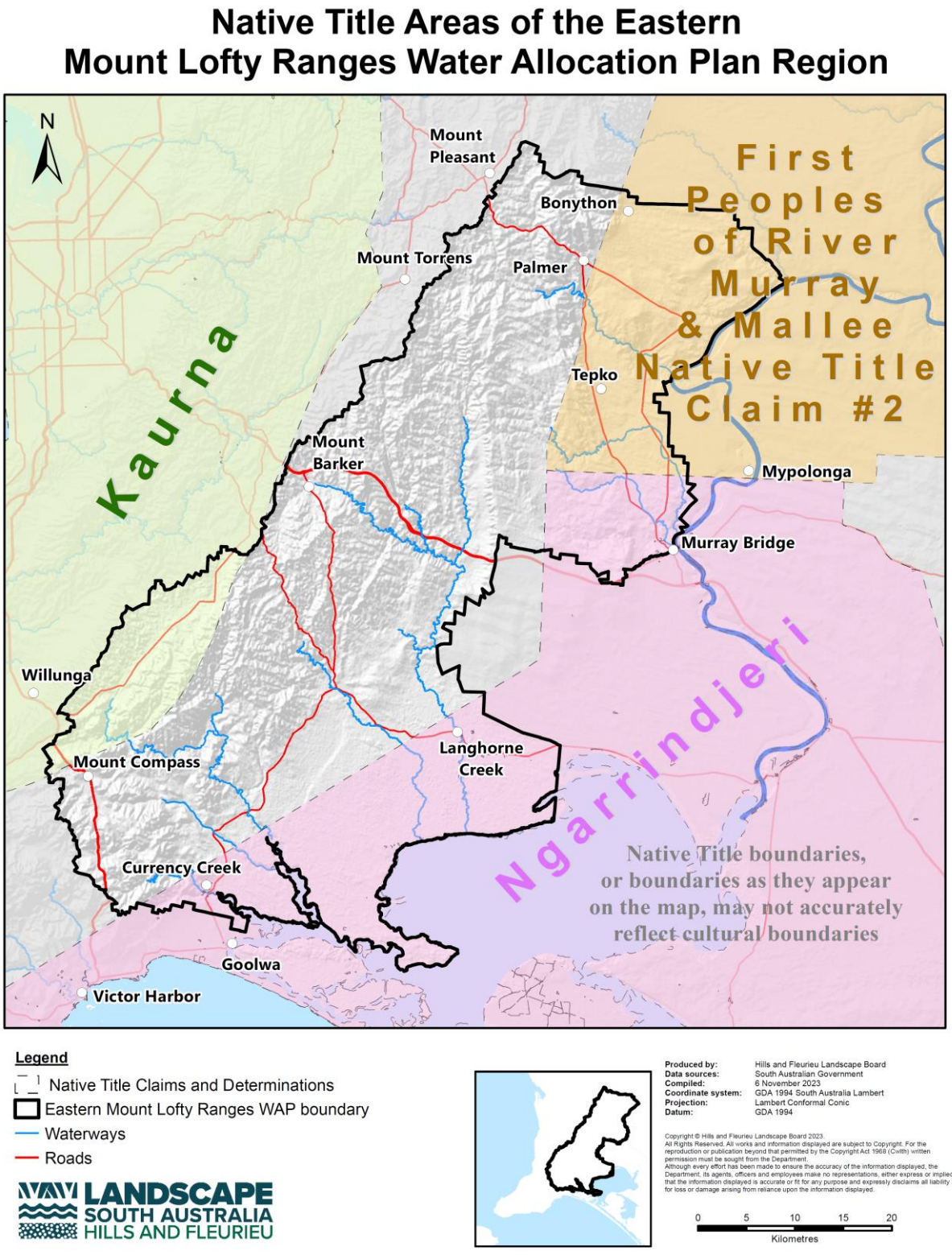


Figure 20 Native title Areas of the Eastern Mount Lofty Ranges Water Allocation Plan Region.

LANDSCAPE
SOUTH AUSTRALIA
HILLS AND FLEURIEU