South Australian evaluation of environmental outcomes under the Basin Plan | 2024

Approach and Summary

SOUTH AUSTRALIA

Government of South Australia

Department for Environment and Water

Acknowledgment of Country

We acknowledge and respect the Traditional Custodians whose ancestral lands we live and work upon and we pay our respects to their Elders past and present. We acknowledge and respect their deep spiritual connection and the relationship that Aboriginal and Torres Strait Islanders people have to Country. We also pay our respects to the cultural authority of Aboriginal and Torres Strait Islander people and their nations in South Australia, as well as those across Australia.

Acknowledgement of partners

Many individuals and staff from South Australian government agencies, universities, and organisations including the South Australian Department for Environment and Water, Northern and Yorke and Murraylands and Riverland Landscape Boards, Murray–Darling Basin Authority, South Australian Research and Development Institute, Commonwealth Scientific and Industrial Research Organisation and the University of Adelaide, contributed data, information, reports, expert input, and reviews at all stages of this evaluation. This evaluation report is the product of a collaborative effort and the authors thank all contributors.

This work has relied on several monitoring and research programs for data and information, including The Living Murray, the Commonwealth Environmental Water Office Short- and Long-term Intervention Monitoring and Flow Monitoring, Evaluation and Research Programs, South Australian Riverland Floodplains Integrated Infrastructure Program (SARFIIP), The Riverine Recovery Program, Sustaining Riverland Environments Program, the Bureau of Meteorology, the South Australian Environment Protection Authority and The Healthy Coorong, Healthy Basin Program.

Thank you to the many Department for Environment and Water staff, past and present, who have made contributions to the evaluation.

A special thanks to the following people for their continued support, access to data and ongoing contributions to the evaluation: Chris Bice, Luciana Bucater, Deborah Furst, Susan Gehrig, George Giatas, Matt Gibbs, Peter Goonan, Sarah Imgraben, Chris Madden, Dan Rogers, Rupert Mathwin, Paul McEvoy, Luke Mosley, Jason Nicol, Gareth Oerman, Jody O'Connor, Todd Wallace, Michelle Waycott, Nick Whiterod, Qifeng Ye and Brenton Zampatti.

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Introduction

South Australia is required to report in accordance with Schedule 12 of the Basin Plan on a range of reporting matters.

This evaluation of the environmental outcomes of the Basin Plan is underpinned by 5-yearly Matter 8 'achievement of environmental outcomes at an asset scale' reporting, along with a contribution from Matter 12 'progress towards water quality and salinity targets' reporting.

The *South Australian evaluation of the environmental outcomes under the Basin Plan 2024: Approach and Summary* document is one in a suite of reporting products and provides a summary of our environmental evaluation approach and the outcomes across all three South Australian Water Resource Plan (WRP) Areas.

Effective monitoring and evaluation of the Basin Plan is critical to ensure its objectives are achieved.

Basin Plan Outcomes

The outcome for the Basin Plan as a whole is a healthy and working Basin that includes:

a. communities with sufficient and reliable water supplies
b. productive and resilient water-dependent industries and communities
c. healthy and resilient ecosystems

Environmental Outcomes

Matter 8:
The achievement of environmental outcomes at an asset scale.

Water quality & Salinity Outcomes

Matter 12:
Progress towards the water quality targets in Chapter 9.

In 2020, South Australia completed a first evaluation on the achievement of environmental outcomes for Priority Environmental Assets (PEAs) within our three WRP Areas since implementation of the Basin Plan commenced.

In 2024, South Australia is required to undertake this evaluation and reporting for the second time to build on the evaluation undertaken in 2020. This evaluation comes at an important time for the implementation of the Basin Plan. It will contribute to the Murray–Darling Basin Authority's (the Authority) 2025 Basin-scale evaluation and will support South Australia's input to the upcoming review of the Basin Plan in 2026.

The 2024 evaluation has multiple purposes, including to:

- meet Basin Plan reporting obligations (Schedule 12, Basin Plan)
- inform South Australia's, the Australian Government's and other States' environmental water delivery decision-making and adaptive management capacity
- make a meaningful contribution to the Authority's evaluation of the effectiveness of the Basin Plan and its review in 2026
- communicate outcomes to stakeholders, including the wider community.

What is the Basin Plan?

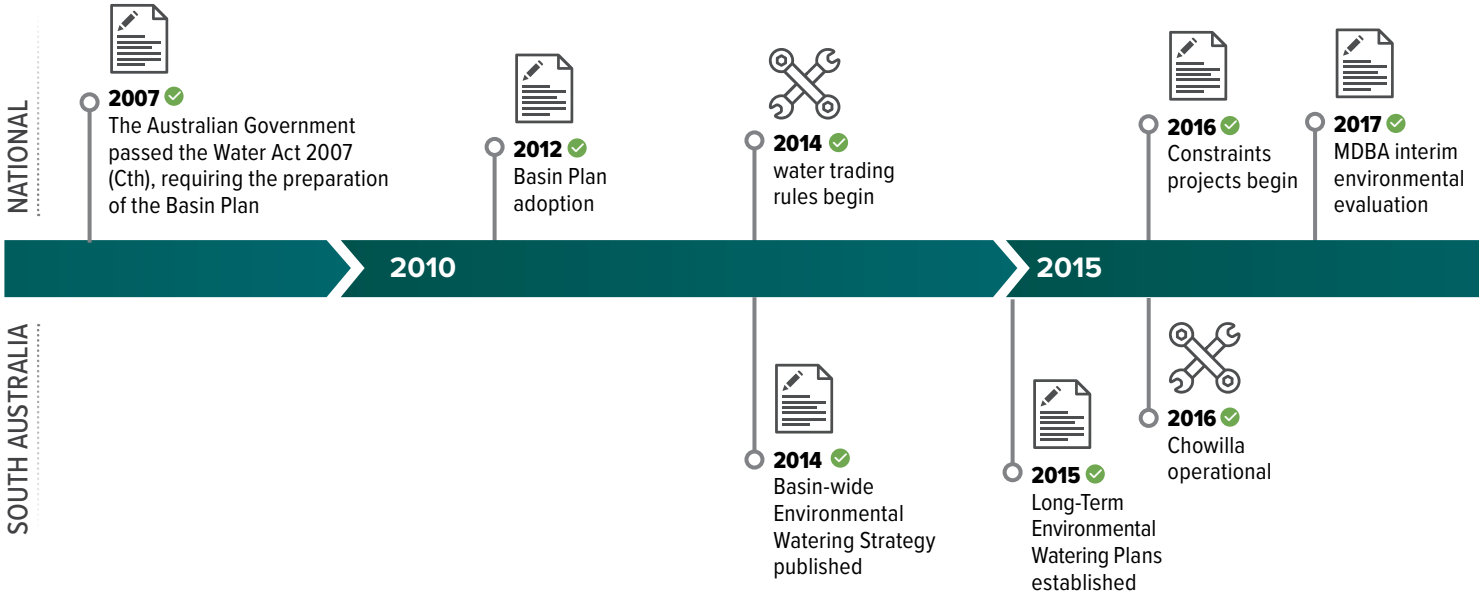
The South Australian River Murray supports a vibrant, unique and highly valued environment, as well as providing significant social, economic and cultural benefits to regional communities.

In 2012, the Basin Plan was adopted by the Australian Government with bi-partisan support. It provides an integrated and strategic framework for water reform, consistent with the requirements of the *Water Act 2007 (cth)*.

The aim of the Basin Plan is to ensure the long-term health and sustainability of the Murray–Darling Basin. It does this by sharing water among all water users, including the environment, to leave enough for the rivers, lakes and wetlands and the plants and animals that depend on them.

The South Australian Government remains committed to ensuring that the implementation of the Basin Plan is completed in full, to ensure the protection of the Basin's internationally recognised and protected wetlands including the Coorong and Lakes Alexandrina and Albert Wetland and to continue to support the irrigation, water supply, recreation and tourism activities that rely on a healthy aquatic environment.

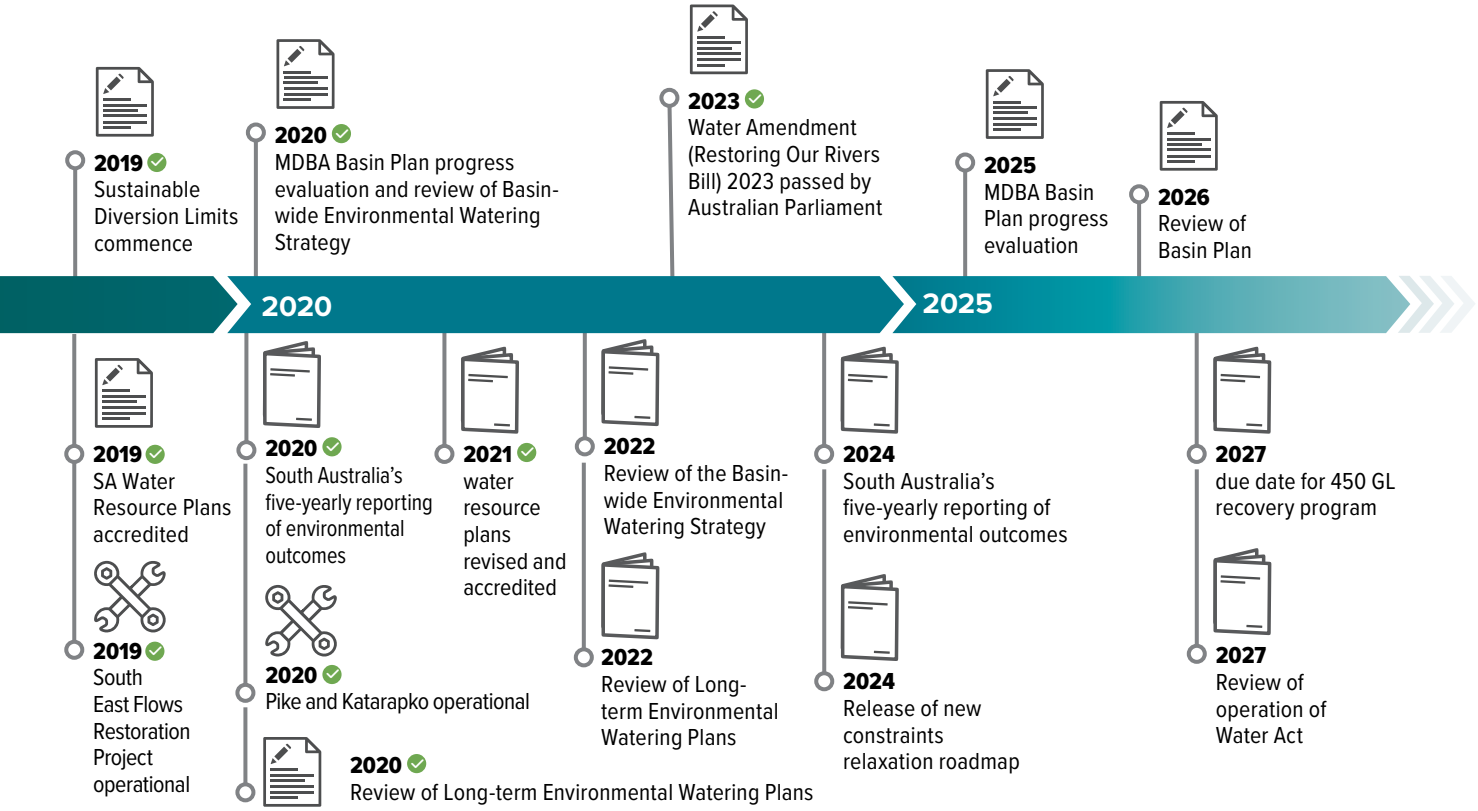
Implementation of the Basin Plan in South Australia



Implementation of the Basin Plan

South Australia has made significant progress towards full implementation of the Basin Plan, including:

- Implementation of new Sustainable Diversion Limits (SDL) for surface water and groundwater, which came into effect from 1 July 2019.
- All three WRPs submitted on time and accredited by the Commonwealth Minister.
- Completing implementation of 5 of the 6 Supply measure projects it has lead responsibility for and is making good progress on the project for completion by the December 2026 deadline.
- Environmental infrastructure at Chowilla, Pike and Katarapko floodplains are currently operational, enabling ecological benefits to be realised.
- Delivery of Efficiency Measures projects that contribute towards the recovery of the final 450 GL of water for the environment.
- Meeting our `bridging the gap' water recovery target of 183.8 GL for the environment.
- Continuing to work with a range of partners and water holders to coordinate the effective delivery of water to our priority assets to achieve short and long-term environmental outcomes in South Australia.
- On 15 September 2023, the South Australian Government published its response to the Murray–Darling Basin Royal Commission Report. In this response, the South Australian Government has outlined its expectations and requirements for the full delivery of the Basin Plan.



Environmental outcomes for South Australia

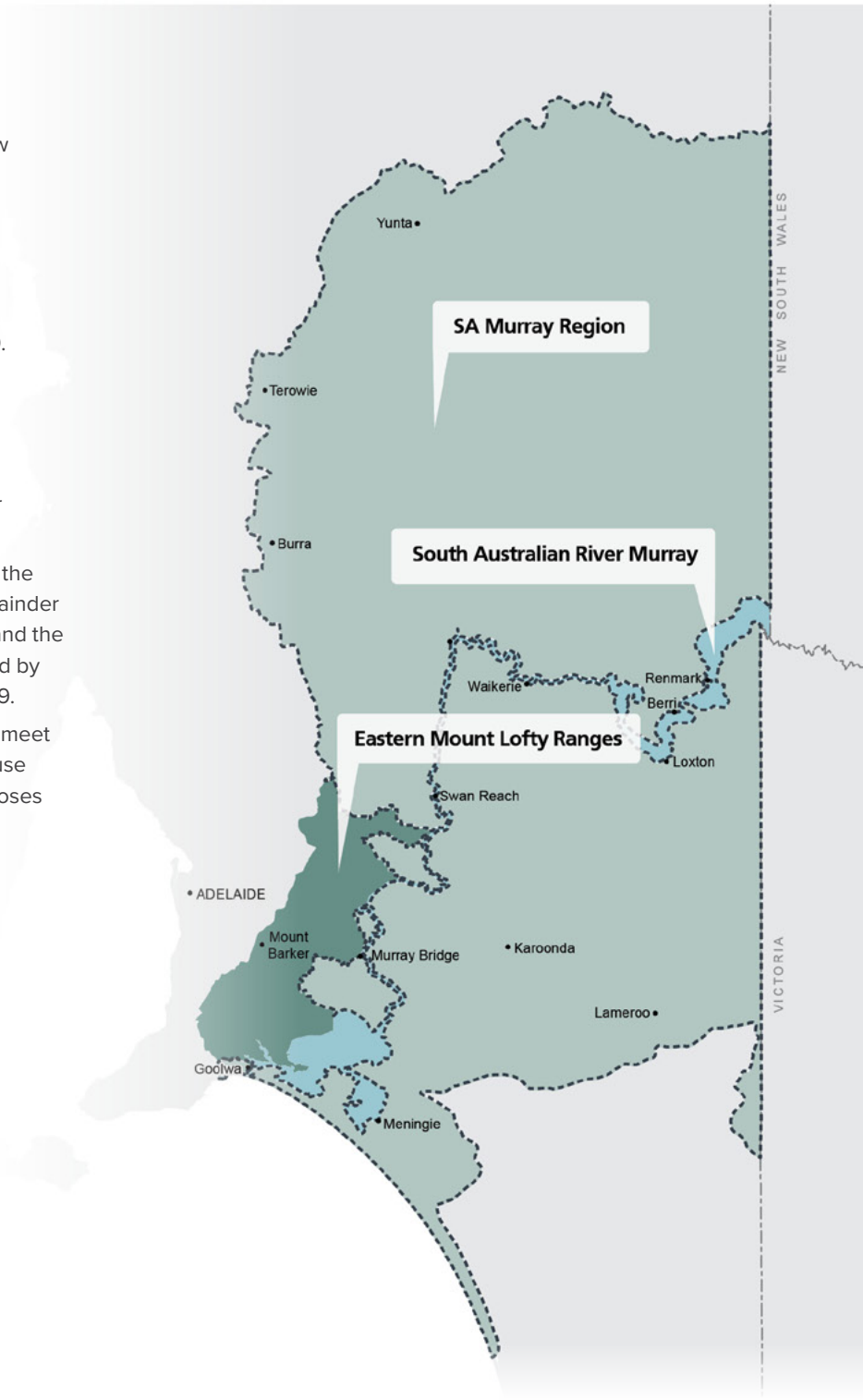
South Australia has three Water Resource Plan Areas

South Australia's WRPs were accredited by the Commonwealth Water Minister in 2019 and are now operational for each of the three areas:

- The South Australian River Murray – includes the surface waters and floodplain of the South Australian River Murray and Lakes Alexandrina and Albert and was accredited by the Commonwealth Minister on 16 November 2019.
- The Eastern Mount Lofty Ranges (EMLR) – includes the groundwater and surface waters of the EMLR and the Marne Saunders Prescribed Water Resource (PWR) Areas and was accredited by the Commonwealth Minister on 16 November 2019.
- The South Australian Murray Region - includes the surface and groundwater resources of the remainder of the South Australian Murray–Darling Basin and the Coorong and Murray Mouth and was accredited by the Commonwealth Minister on 20 August 2019.

These plans demonstrate how we manage water to meet our obligations under the Basin Plan, including the use of water for the environment and consumptive purposes such as urban, agricultural and industrial use.

See: Water resource plans for more information.



Targets and objectives for environmental outcomes

Basin Plan

The overall environmental objectives for the water-dependent ecosystems of the Murray-Darling Basin within the context of the Basin Plan are to:

- Protect and restore water dependent ecosystems (rivers, wetlands, floodplains and their plants and animals).
- Protect and restore the function of water dependent ecosystems (connectivity, mobilisation of carbon, nutrients propagules and salt export).
- Ensure water dependent ecosystems are resilient to climate change and other risks and threats.

Basin-wide Environmental Watering Strategy

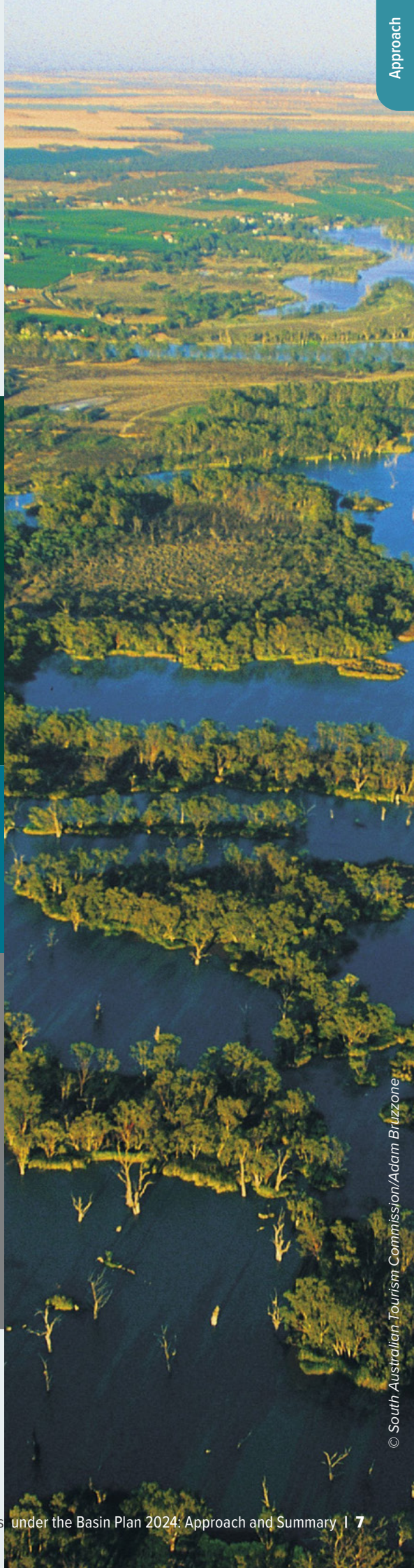
- Sets measurable outcomes for river flows and connectivity, vegetation, waterbirds and fish across the whole Basin.
- See: Basin-wide Environmental Watering Strategy.

South Australian Long-term Environmental Watering Plan Targets

In accordance with the Basin Plan and the Basin-wide Environmental Watering Strategy, South Australia's targets for environmental watering are set in three Long-term Environmental Watering Plans for the following Water Resource Plan areas:

- South Australian River Murray
- Eastern Mount Lofty Ranges
- South Australian Murray Region

See: Environmental Water Planning for more information on these plan.



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Environmental evaluation approach

The South Australian evaluation of environmental outcomes has been developed to directly align with The Authority's 2025 Evaluation Framework, including key evaluation questions that will ensure a meaningful contribution to the Authority's evaluation of the effectiveness of the Basin Plan.

These are:

1. To what extent have outcomes been achieved?
2. If outcomes were not achieved, why not?
3. To what extent did the Basin Plan contribute to achieving outcomes?
4. Have there been any unanticipated outcomes?

As part of the Basin Plan we are seeking to achieve environmental outcomes for:

Flows and ecosystem function

Vegetation

Fish

Birds

Water Quality

This South Australian evaluation of environmental outcomes describes progress towards targets in the Long-Term Environmental Watering Plans for each of the Priority Environmental Assets within the three Water Resource Plan Areas.

Achievement of environmental outcomes at the asset scale

Expected outcomes for the SA River Murray WRP Area

Our approach for the South Australian River Murray WRP Area is underpinned by the development of expected environmental outcomes for a selection of South Australian River Murray Long-term Environmental Watering Plan (LTWP) targets.

Many of these targets are long-term and were developed to represent what we consider a 'healthy, functioning ecosystem' would look like. That said, there are a mix of targets and some are in fact expected to be achieved sooner than others due to their pattern of response to environmental watering and other management actions, over time.

Developing quantitative expected environmental outcomes gives a more nuanced approached to evaluation and reporting as it allows us to track the trajectory towards outcomes and demonstrate progress towards our targets, rather than just a pass or fail in relation to the long-term targets. Expected environmental outcomes document our expected progress towards the LTWP targets over three time points post-Basin Plan adoption (2019, 2029 and 2042).

Outcomes for the EMLR and SA Murray Region WRP Areas

Our approach for the EMLR WRP Area is underpinned by the targets and environmental water requirements outlined in the EMLR LTWP and the EMLR and Marne-Saunders Water Allocation Plans for the respective Prescribed Water Resource Areas (PWR Area). Environmental outcomes in the SA Murray Region represent the environmental water requirements for the WRP Area described in the SA Murray Region LTWP.

Indicators

To ensure that the evaluation focuses on the most relevant indicators, indicators were prioritised using a number of considerations:

- spatial and temporal availability and quality of data
- response to flow and environmental water delivery
- ability to manage or influence response through implementation of Basin Plan measures
- consistency with South Australian LTWPs and Murray–Darling Basin Authority's (MDBA) Basin-wide Environmental Watering Strategy
- scientific credibility and reproducibility.

Many indicators are constrained to sites where there has been a targeted delivery of water for the environment, including through weir pool manipulation and managed floodplain inundations. As a result, outcomes may not be representative across the whole of the priority environmental assets, for example River Murray Channel and Floodplain assets.

Progress towards water quality targets

Water quality targets in the Basin Plan have been set for three purposes:

- targets to which entities must have regard to when performing functions, particularly in relation to the management of water flows
- targets that inform the development of certain measures required to be included in the WRP
- targets for the purposes of long-term salinity planning and management.

Our approach for reporting on progress towards water quality targets is underpinned by an assessment of relevant targets within Chapter 9 of the Basin Plan.

An assessment was undertaken at a range of sites in the SA River Murray and EMLR WRP Areas for water quality targets associated with:

- managing water flows, including target salinity and dissolved oxygen values along the length of the River Murray in South Australia
- water-dependent ecosystems, including declared Ramsar wetlands, for a range of parameters, such as dissolved oxygen, nutrient levels, turbidity and pH
- irrigation water, with a focus on salinity
- recreational water, with a focus on blue-green algae
- long-term salinity planning.

Meeting these targets indicates progress towards water quality and salinity objectives and outcomes under the Basin Plan.


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Data and evidence

Data sources

Data used in the compilation of this evaluation report was drawn from existing knowledge and monitoring programs within the SA Murray–Darling Basin and adheres to the principle of 'collect once, use multiple times.' This includes both State and federal government programs, directly linked to the Basin Plan and additional monitoring programs.

Key programs include:

- *The Living Murray*
- *Healthy Coorong, Healthy Basin*
- South Australian Riverland Floodplains Integrated Infrastructure Program
- Sustaining Riverland Environments
- Commonwealth Monitoring Evaluation and Research Program (Flow MER)

What we are assessing:

Expected outcome: the current status of an indicator in relation to where we expected it to be at this point in time based on.

Change: how has the status of an indicator changed since the evaluation in 2020?

Trend: the trajectory of change of an indicator over multiple points in time.


Trend **Improved**


Trend **Stable**


Trend **Declined**

Trend **Not Applicable**


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Data reliability

The availability of data, how it is assembled and its quality (reliability, dependability, credibility and validity) will be managed using data classification and licensing protocols that adhere to agency standards.

Confidence in data quality will be assessed by scoring questions related to the methods used for data collection, representativeness and repetition and is consistent with SA's 2020 environmental outcome evaluation and reporting.

Data reliability scoring system to assess and analyse trend, condition and expected environmental outcomes

Methods	
Methods used	Are the methods used appropriate to gather the information required for evaluation?
Standard methods	Has the same method been used over the sampling program?
Representativeness	
Space	Has sampling been conducted across the spatial extent of the PEA with equal effort?
Time	Has the duration of sampling been sufficient to represent change over the assessment period?
Repetition	
Space	Has sampling been conducted at the same sites over the assessment period?
Time	Has the frequency of sampling been sufficient to represent change over the assessment period?

Each metric is scored out of 2: Yes = 2, Partially = 1, No = 0

The final score for data reliability is then converted to an information reliability rating, ranging from poor to excellent. This rating is then presented using a star rating.

★★★★★	Excellent
★★★★☆	Very good
★★★☆☆	Good
★★☆☆☆	Fair
★☆☆☆☆	Poor

Summary of environmental outcomes

Implementation of the Basin Plan has led to measurable improvements in the health of South Australia's River Murray ecosystems – enhancing biodiversity, habitat quality and resilience.

Key findings from South Australia's assessment and evaluation of the achievement of environmental outcomes under the Basin Plan include:

- The recovery and coordinated delivery of water for the environment has been critical to maintaining flows along the entire length of the River Murray and through the Murray Mouth and across all South Australian priority environmental assets.
- Water for the environment under the Basin Plan has led to significant improvements in system connectivity, water quality and habitat conditions.
- The operation of South Australia's environmental regulators in conjunction with targeted watering actions has expanded water delivery areas across the floodplains, improving connectivity to support critical habitats and ecosystem functions.
- High (unregulated) flow events and rainfall conditions, are vital for increased system connectivity, productivity and resilience of ecosystems.
- The 2022–23 River Murray flood event delivered significant environmental benefits along the South Australian River Murray but some improvements may be short-term if not followed-up with further watering.
- Key challenges persist across the South Australian River Murray and Murray-Darling Basin more broadly – including habitat loss, water extraction and a changing climate – which will require targeted interventions for restoring, maintaining and protecting the health of aquatic ecosystems.
- Low rainfall in the unregulated environments of the SA Murray Region has limited the frequency of flows required to support aquatic ecosystems and is projected to continue.
- The continued restoration of a variable flow regime across the Eastern Mount Lofty Ranges, including critical low flows, is required to achieve environmental outcomes.
- Whilst there have been improvements, ecosystem condition in parts of the South Australian Murray-Darling Basin, particularly the Eastern Mount Lofty Ranges and Coorong South Lagoon, remains poor and will require further action to improve their health and resilience.
- The continued implementation of controls and policies, including through Water Resource Plans and Water Allocation Plans, will be critical to ensure water use is sustainable, taking into account environmental, social and economic needs.
- Monitoring has provided valuable data and information to understand the condition of aquatic ecosystems and will continue to be important to ensure we respond effectively to changing environmental conditions for enhanced environmental outcomes over time.

Further action must be taken to maximise environmental outcomes from the Basin Plan

The Basin Plan has offered a once-in-a-generation opportunity to rebalance the system, address the historical over-allocation and over-extraction of water and prioritise the health of the Basin for the long-term benefit of all Australians. The importance of delivering the outcomes envisaged under the Basin Plan are as relevant today as in 2012.

Full implementation of the Basin Plan is necessary to safeguard the protection of the Basin's internationally recognised and protected wetlands and to ensure that the Murray-Darling Basin will continue to support irrigation, water supply, recreation and tourism activities that rely on a healthy aquatic environment.

This evaluation has shown that implementation of the Basin Plan has contributed to improvements in the health and resilience of River Murray ecosystems in South Australia, particularly in areas where water for the environment has been delivered. Despite improvements, challenges remain and sustained actions, operations and additional investment are required to secure long-term environmental outcomes.

These include:

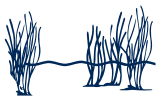
- delivery of the current Basin Plan commitment to recover the equivalent of 3,200 GL of water for the environment – including the recovery and delivery of the 450 GL to enable the envisaged environmental outcomes to be realised
- recovery and delivery of the 450 GL to be completed as soon as possible and from the southern Basin to achieve the intended environmental outcomes and meet a key condition of the 2012 agreement to the Basin Plan
- addressing physical, operating and policy constraints that impact the delivery of water for the environment to allow for greater flexibility in water delivery for both environmental and consumptive use and to maximise environmental outcomes across the system
- continued collaboration between the MDBA and Basin jurisdictions to ensure rigorous and relevant Basin-scale climate change information guides future decision-making
- effective monitoring and evaluation processes are in place and are used to build an evidence base to ensure adaptive management informs management improvements and achievement of environmental outcomes across the Basin
- continued engagement of local communities and First Nations to identify sustainable water management solutions and actions.

Matter 8: Environmental outcomes at an asset scale

South Australian River Murray: Channel and Floodplain

Theme	Indicator	Trend	Information reliability	Key findings
Flow & Ecosystem Function 	Flow velocity	Trend **Improved**	Reliability **Good**	There has been an improvement in the frequency of fast-flowing conditions, but this was largely driven by unregulated high flows.
	Productivity (microinvertebrates)	Trend **Unknown**	Reliability **Very good**	Microinvertebrate density and richness increased, particularly following high flow conditions.
Vegetation 	River red gum	Trend **Improved**	Reliability **Poor**	The condition of river red gum has increased across the managed areas of Chowilla, Pike and Katarapko floodplains.
	Black box	Trend **Improved**	Reliability **Poor**	The condition of black box has improved particularly in managed floodplain areas.
Fish 	Murray Cod	Trend **Improved**	Reliability **Good**	Recruitment of Murray cod has continued to improve, with the population structure characteristic of a more resilient population.
	Golden Perch	Trend **Improved**	Reliability **Good**	Golden perch recruitment has improved, with young-of-year detected in the population since 2021.

South Australian River Murray: Coorong, Lower Lakes and Murray Mouth

Theme	Indicator	Trend	Information reliability	Key findings
Flow & Ecosystem Function 	Murray Mouth openness	Trend **Improved**	Reliability **Good**	An open Murray Mouth has been possible at times by barrage flows supported by water for the environment but is still heavily reliant on dredging.
Vegetation 	Aquatic and littoral vegetation	Trend **Improved**	Reliability **Very good**	Vegetation in the Lakes has continued to improve largely due to the management of seasonally variable water level, supported by the delivery of water for the environment.
	Ruppia tuberosa	Trend **Improved**	Reliability **Very good**	The health of Ruppia has improved, but the community is still not considered resilient and threatened by future perturbations.
Fish 	Black bream and greenback flounder	Trend **Improved**	Reliability **Excellent**	Black bream and greenback flounder population condition have improved, reflecting more resilient populations.
	Diadromous fish	Trend **Improved**	Reliability **Good**	Improved connectivity between freshwater, estuarine and marine habitats in the system has supported increased recruitment of diadromous fish.
	Small-mouthed hardyhead	Trend **Improved**	Reliability **Very good**	Small-mouthed hardyhead populations have improved, reflecting a more resilient population with an increased abundance of juvenile fish.
Birds 	Lakes waterbirds	Trend **Improved**	Reliability **Very good**	Abundances of Lakes waterbirds have improved, but with variability across the different waterbird guilds.
	Coorong waterbirds	Trend **Declined**	Reliability **Very good**	The abundance of Coorong waterbirds has continued to decline, particularly for resident and migratory shorebirds.

Eastern Mount Lofty Ranges

Theme	Indicator	Trend	Information reliability	Key findings
Flow & Ecosystem Function	Flow regime: the number of flowing days	↗ Trend **Improved** ↙ Trend **Declined**	★★☆☆☆ Reliability **Fair**	**Not achieved** – maintained or improved in EMLR PWRA but declined in the Marne Saunders PWRA.
Macroinvertebrates	Community condition within sampling sites	↙ Trend **Declined**	★☆☆☆☆ Reliability **Poor**	**Not achieved** – only 4 of the 42 sampled sites with moderate or better condition.
Fish	Community condition	↙ Trend **Declined** – Trend **Stable**	★★★☆☆ Reliability **Good**	**Not achieved** – only 3 of 9 catchments with moderate or better condition.
	Recruitment success (in key species)	NA Trend **Not Applicable**	★★★☆☆ Reliability **Good**	**Achieved** –continued persistence of key species across the prescribed area, despite lower abundances and less sites where detected.

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South Australian Murray Region

Theme	Indicator	Trend	Key findings
Flow & Ecosystem Function	Base flows	NA — Trend **Not Applicable**	Baseflows to permanant pools have improved, with no cease to flow events since 2019.
	Higher flows: Freshes	— Trend **Stable**	Freshes were observed in every year since 2009-10, but this did not meet the flow requirement (all years).
	Higher flows: Bankfull	↗ Trend **Improved**	Bankfull flows have improved, but requirements have not been met in 3 of the last 5 years.
Information reliability* ★★☆ Reliability **Fair**	Higher flows: Overbank	↗ Trend **Improved**	Overbank flow requirements have been met across the assessment period, with flows detected across 2 of the last 6 years.

Progress towards water quality and salinity targets

Flow conditions (volume, timing, origin) and the quality of upstream water are key drivers of water quality in the South Australian River Murray. As a result, water quality outcomes vary in response to these drivers, with target exceedances primarily episodic, event-driven and short-lived. Water quality exceedances in the SA River Murray were primarily episodic and event-driven, with impacts that are typically short-lived.

Overall, there has been good progress towards meeting water quality targets. However, water quality remains relatively poor in the Coorong and EMLR. It is important to note the current water quality targets for the Coorong and the EMLR are not appropriate and require updating, as they are based on freshwater ecosystems, which do not fully reflect the estuarine environment of the Coorong or the intermittent systems of the EMLR.

Water for the environment has a significant influence on conditions in the Coorong, Lower Lakes and Murray Mouth and is critical to achieving water quality outcomes along the length of the SA River Murray, particularly during low-flow periods.

Managing water flows

Location	Variable	Information reliability	Key findings
Lower Murray – River Murray channel	Dissolved oxygen (DO)	★★★★★ Reliability **Excellent** Discrete & Continuous	Exceedances are typically episodic and linked to poor water quality events upstream and/or high flow events, such as the 2022–23 River Murray flood event.
	Salinity		Since the Millennium Drought, salinity levels have generally remained below target thresholds at all sites, except for some exceedances at Milang during low flow periods in 2019 and 2020.

Water-dependent ecosystems – Declared Ramsar wetlands

Location	Variable	Information reliability	Key findings
Coorong and Lakes Alexandrina and Albert Wetland	DO	★★★★★ Reliability **Excellent** Discrete ★★☆☆☆ Reliability **Fair** Continuous	DO, pH, TN and TP exceedances are common in the Coorong, typically linked to higher salinity and evaporation. Exceedances typically increase with distance from the barrages and in low flow years when freshwater flushing is reduced. High water residence time (particularly in the South Lagoon) leads to hypersaline conditions and elevated nutrient concentrations and sediment in the water column.
	pH		
	Total Nitrogen (TN)		
	Total Phosphorus (TP)		
	Turbidity		Turbidity exceedances in the Coorong are sporadic and can be influenced by high flow events such as the 2022-23 flood. Wind and wave action can also resuspend sediments, increasing turbidity.

Water Resource Plans - Water-dependent ecosystems

Location	Variable	Information reliability	Key findings
Lower Murray – River Murray channel	Dissolved oxygen (DO)	Reliability Excellent Discrete & Continuous	Dissolved oxygen has frequently exceeded the target ranges, particularly during the 2022-23 flood.
	pH		pH levels have consistently remained within the target range at all sites.
	Total phosphorus (TP)		TP target exceedances are common, occurring during very low and high flow events. These originate upstream of SA and can result from the mobilisation of organic matter from floodplains.
Lower Murray – Pike, Katarapko and Chowilla floodplains	Dissolved oxygen (DO)	Reliability Excellent Discrete	DO levels at Pike, Katarapko and Chowilla floodplains were within the target range from 2017-18 and 2022-23, except for one exceedance at Katarapko in 2022-23 due blackwater event originating upstream during the floods.
Eastern Mount Lofty Ranges	Dissolved oxygen (DO)	Reliability Poor Discrete & Continuous	Low flows during the Millenium Drought led to DO saturation levels below targets at most sites from 2000–01 to 2009–10, with minimal data available beyond that period.
	pH		No pH exceedances were observed in the EMLR, though data availability is limited in many years.
	Total nitrogen (TN)		TN exceedances in the EMLR occur in years with data, though availability is limited.
	Total phosphorus (TP)		TP exceedances in the EMLR were infrequent, coinciding with the Millennium Drought and historically low flows across the Murray-Darling Basin.

Water Resource Plans – Irrigation water

Location	Variable	Information reliability	Key findings
Lower Murray – River Murray channel	Salinity	Reliability Excellent Discrete & Continuous	Salinity has generally remained below the irrigation water target, with the last exceedances observed towards the end of the Millennium Drought below Lock 1.

Water Resource Plans – Recreational water

Location	Variable	Information reliability	Key findings
Lower Murray – River Murray channel	Cyanobacteria (blue-green algae)	Reliability Excellent Discrete & Continuous	Cyanobacteria levels are generally below target levels at all sites, except for exceedances at Lake Alexandrina and Goolwa, due to reduced mixing and flushing of the Lower Lakes and on occasion, influenced by inflows from upstream.

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