

Basin Salinity Management 2030

South Australia's Comprehensive Report 2025



**Government
of South Australia**

Department for
Environment and Water

Acknowledgements

This report has been compiled by the Department for Environment and Water (DEW) with contributions from other organisations and branches within DEW.

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- SA Water
- Water Science and Monitoring Branch
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Executive summary

South Australia remains committed to the Basin Salinity Management 2030 (BSM2030) strategy. High salinity levels pose environmental, social and economic risks across the Basin and it is important that Basin governments continue to coordinate management through the BSM2030 framework to guide salinity management and monitoring to optimise environmental, social and economic outcomes.

South Australia's key achievements during 2023–24 and 2024–25 are outlined below against the main elements of the BSM2030 strategy. Over this period, South Australia maintained compliance with Schedule B, held a credit position on the Salinity Register and advanced key initiatives in groundwater modelling, salt interception scheme (SIS) operations and Basin-wide salinity strategic knowledge improvement.

Salinity Accountability Framework

- Maintained a positive salinity credit balance of \$7.328 million on the 2025 Register.
- Continued inclusion and operation of South Australian Riverland Floodplains Integrated Infrastructure Program (SARFIIP) Pike and Katarapko works, ensuring a long-term credit position extending beyond 2100.
- No new or proposed accountable actions were triggered under Schedule B.

Management of Salt Interception Schemes

- South Australian SIS diverted an estimated 258,831 tonnes of salt from the River Murray in 2023–24 and 299,458 tonnes in 2024–25.
- The Pike Groundwater Management Scheme (GMS) intercepted around 91,000 tonnes of salt in 2023-24 and 98,000 tonnes in 2024–25, supporting ecological restoration across 2,000 ha of floodplain and recording improvements in black box and river red gum condition.

Salinity Management

- Salinity levels remained within Basin Plan targets at Lock 6, Morgan and Murray Bridge during 2023-24 and 2024–25. There was a brief exceedance at Milang in 2024-25 due to sea water ingress into the Lower Lakes during high tide events.
- Murray-Darling Basin Authority (MDBA) modelling estimated that salt export from the Murray-Darling Basin to the Southern Ocean averaged 2.11 million tonnes per year (2022–25).
- Significant progress towards ecological and water quality outcomes achieved through the Healthy Coorong, Healthy Basin (HCHB) and Sustaining Riverland Environments (SRE) programs, including new infrastructure at Bookmark Creek (\$9.8 million) and detailed investigations at Lock 3 and Lock 6.

Efficient Governance

- The Pike-Murtho and Woolpunda groundwater models were accredited by the MDBA and used to update existing salinity register entries.
- The Waikerie–Morgan groundwater model is under review and in the final stages of calibration.
- The Chowilla data review commenced as part of The Living Murray accountable action review.

Strategic Knowledge Improvement

- Refined floodplain, groundwater and salinity models, improved data collection and enhanced forecasting to strengthen Basin-wide salinity management.
- Unsaturated zone modelling and flood-risk assessments improved understanding of recharge, evapotranspiration and salinity dynamics.
- Testing transfer function methods for recharge estimation and evaluating uncertainty approaches to improve model transparency, calibration and confidence in salinity register reporting.

Community Engagement and Communication

- Continued public communication via the River Murray Flow Report and Water Resources Update to inform community and industry stakeholders.
- Supported Basin Plan engagement and local participation in major environmental programs, including consultation on the Coorong Restoration Roadmap and SRE site works.

Introduction

The 2025 Comprehensive Report outlines South Australia's progress in implementing the Basin Salinity Management 2030 (BSM2030) strategy and meeting obligations under Schedule B of the *Murray–Darling Basin Agreement* (Schedule 1 of the *Water Act 2007* (Cth)) (the Agreement). The strategy provides the Basin-wide framework for managing salinity through coordinated state and Commonwealth action, continuous monitoring, model review and transparent accountability.

Prepared by the Department for Environment and Water (DEW), the report summarises South Australia's 2023–24 and 2024–25 achievements across the BSM2030 elements endorsed by the Basin Salinity Management Advisory Panel (BSMAP). The report has been considered by the Independent Audit Group (IAG) for Salinity as part of their audit of implementation of the BSM2030 strategy and the obligations set out in Schedule B to the Agreement.

South Australia remains committed to effective salinity management as a foundation for protecting the River Murray's environmental, social and economic values. In 2023–24 and 2024–25, the State maintained full compliance with Schedule B. During the past 12 months, key model reviews were completed and the scientific and operational basis for salinity management was strengthened, in collaboration with the Murray-Darling Basin Authority (MDBA) and Basin states.

The 2025 Comprehensive Report is structured around the principal elements of the BSM2030 framework:

- **Salinity Accountability Framework** – the maintenance of the salinity registers and management of accountable actions.
- **Salinity accountability for environmental water management** – creating transparency through accounting for environmental watering salinity impacts and dilution flows.
- **Responsive management of salt interception schemes** – a new salt interception scheme (SIS) management regime being trialled by the MDBA.
- **Flow management** – supporting the implementation of Basin Plan salinity targets for managing water flows through a coordinated management approach.
- **Salinity management in catchments** – reporting on End-of-Valley Targets and implementing cost effective measures to improve salinity outcomes.
- **Efficient governance** – risk-based register management, maintaining monitoring networks, streamlining annual reporting and independent auditing.
- **Strategic knowledge improvement** – involvement in improving our understanding of the priority areas of Mallee legacy of history impacts, environmental watering impacts, predictive salinity forecasting and responsive SIS.
- **Community engagement and communication** – maintaining community engagement, relevant media releases and continuing consultation at community meetings.

1. Salinity Accountability Framework

1.1. South Australia's Salinity Register Balance

Under Schedule B of the Agreement, South Australia remains accountable for actions that influence salinity in the River Murray. Activities that increase river salinity, such as irrigation expansion or drainage disposal, are recorded as debits on the Salinity Register. Conversely, management measures that reduce salinity impacts, such as SIS, improved irrigation efficiency and groundwater management programs, are recorded as credits. These entries are used to assess South Australia's compliance with Schedule B and its overall contribution to managing salinity within the shared River Murray system.

South Australia maintains a strong positive balance of \$7.328 million on the 2025 Salinity Register, demonstrating continued compliance with Schedule B and BSM2030 requirements. This positive position reflects the long-term success of salinity management initiatives and the enduring benefits of infrastructure delivered under the South Australian Riverland Floodplains Integrated Infrastructure Program (SARFIIP), including the Pike Groundwater Management Scheme (GMS).

The inclusion and ongoing performance of these works have significantly enhanced the State's salinity credit profile, ensuring that South Australia remains in net credit beyond 2100. This represents a substantial improvement compared to earlier register projections and confirms that South Australia continues to meet its salinity management obligations.

Table 1. Summary of South Australia's Salinity Register entries

Register Number	Accountable Action	Impact on Morgan 95%ile Salinity (EC)	Salinity Cost Effect (\$M)
REGISTER A			
AUTHORISED WORKS OR MEASURES			
NA	SA Component of Salinity and Drainage Strategy Joint Works	-27	0.000 ¹
NA	SA Component of Basin Salinity Management Strategy Joint Works	-20	0.603
REGISTER A - JOINT WORKS TOTAL			0.603
BSM2030			
23	Mildura Merbein SIS Refurbishment 2015	-1	0.200
REGISTER A – BSM2030 TOTAL			0.200
SOUTH AUSTRALIAN STATE ACTIONS			
52	SA Irrigation Development Based on Footprint Data	27	-1.927
53	SA Irrigation Development Due to Water Trade	0	-0.007
54	SA Irrigation Development Based on Site Use Approvals	-1	-0.013
55	SA Component of Bookpurnong SIS	-3	0.262
56	SA Component of Loxton SIS	0	0.017
57	SA component of Waikerie Lock 2 SIS	-1	0.026
58	SA Improved Irrigation Efficiency and Scheme Rehabilitation Reg A	-78	6.361
59	Qualco Sunlands GWCS	-9	0.414
60	Pike Stage 1 SIS	-1	0.178
61	SA Component of Murtho SIS	0	0.015
62	Pike SARFIIP	-18	1.430
63	Katarapko SARFIIP	1	-0.031
REGISTER A – WORKS AND MEASURES TOTAL			6.726
REGISTER A TOTAL			7.529
REGISTER B			
79	SA Mallee Legacy of History	3	-0.254
80	SA Mallee Legacy of History – Irrigation	44	-2.942
81	SA Improved Irrigation Efficiency and Scheme Rehabilitation Register B	-26	1.620
NA	Transfers from Register A		1.375
REGISTER B TOTAL			-0.201
TOTAL			7.328

¹ South Australia component of Salinity and Drainage Strategy works or measures were set aside to improve River Murray salinity and contribute to net salinity reduction.

1.2. New and Proposed Accountable Actions

In accordance with the requirements of Schedule B of the Agreement, the South Australian Government is obliged to notify the MDBA of any actions that are likely to have a Significant Effect, as defined under subclause 18(3) of Schedule B. This provision ensures that all accountable actions with the potential to influence Basin-wide salinity outcomes are transparently identified, assessed and reported.

During the reporting period, no new or proposed accountable actions were identified. This outcome reflects that activities undertaken during the period were consistent with previously approved measures and did not trigger the thresholds or criteria for classification as a Significant Effect. As such, no formal notifications to the MDBA were required.

The absence of new accountable actions demonstrates both the maturity of salinity management in South Australia and the careful planning underpinning the delivery of works and measures. Existing initiatives continue to operate within the parameters agreed under Schedule B, ensuring that South Australia's obligations to manage salinity risks are met, while supporting local environmental and water management outcomes.



Figure 1. Katarapko regulator and fishway built as part of SARFIIP

2. Management of Salt Interception Schemes

2.1. Management and Operation of Salt Interception Schemes in South Australia

The salt interception schemes (SIS) at Bookpurnong, Loxton, Murtho and Waikerie Lock 2 were constructed as part of the 61 EC joint works program delivered under the Basin Salinity Management Strategy (2001-2015). These important works build on and complement earlier investments, including the Woolpunda SIS and the remaining Waikerie SIS established under the Salinity and Drainage Strategy. Together with the Qualco–Sunlands and Pike SIS and the Pike GMS, which are implemented as South Australian state actions, these schemes form an integrated network of salinity mitigation measures along the River Murray.

The South Australian SIS play a critical role in protecting water quality by diverting saline groundwater away from the River Murray system. Collectively, these schemes contributed significantly to Basin-scale outcomes, intercepting an estimated 258,831 tonnes of salt in 2023–24 and a further 299,458 tonnes in 2024–25. These levels of diversion demonstrate the ongoing effectiveness of the schemes and highlight their importance in supporting the achievement of the Basin Salinity Target. Annual performance results for the South Australian SIS are presented in Table 2 below, demonstrating the contribution of each scheme to overall salt interception outcomes.

Table 2. Annual performance of salt interception schemes in South Australia

Salt Interception Scheme	2023–24			2024–25		
	Volume Pumped (ML)	Salt Load Diverted (Tonnes)	Average Salinity (EC)	Volume Pumped (ML)	Salt Load Diverted (Tonnes)	Average Salinity (EC)
Pike	432	15,043	45,989	414	13,889	46,425
Pike GMS	2,681	90,690	52,979	2,756	98,173	53,397
Murtho	841	19,098	36,384	1,081	24,137	36,040
Bookpurnong	253	4,213	30,778	700	13,960	31,119
Loxton	33	290	22,511	936	13,347	25,788
Woolpunda	4,415	75,079	27,056	4,744	85,807	28,532
Waikerie	3,757	54,418	25,139	3,257	50,145	25,564
Total	12,412	258,831	N/A	13,888	299,458	N/A

By reducing salinity inputs, the SIS also provide an essential buffer during periods of low river flows, helping to maintain acceptable salinity levels and safeguard water supplies for irrigation, stock and domestic use, as well as sustaining riverine ecosystems. The continued operation and performance of South Australia’s SIS are central to meeting shared responsibilities under the BSM2030 strategy and delivering long-term benefits to communities, industries and the environment.

2.2. Pike Groundwater Management Scheme

The Pike GMS forms a key component of SARFIIP. The scheme was designed to manage saline groundwater beneath the Pike Floodplain to enable large-scale environmental watering without adversely impacting floodplain or river salinity. The GMS operates alongside the Pike Floodplain surface-water regulators and blocking banks to facilitate managed inundation events, supporting floodplain health, vegetation recovery, and biodiversity outcomes.

The Pike GMS consists of a network of extraction bores, pumps and conveyance infrastructure that removes highly saline groundwater and redirects away from the floodplain and into disposal basins. This process reduces the mobilisation of salt during floodplain inundation and helps maintain a hydraulic gradient that limits saline intrusion into shallow water tables. Together, these operations protect floodplain vegetation, enhance water quality and contribute to Basin Plan salinity management outcomes. The scheme is formally recognised as a State Work or Measure under the BSM2030 framework and is included in South Australia's Salinity Registers for accounting and reporting purposes.

Since 2023, the Pike GMS has transitioned from establishment and optimisation to routine operation and adaptive management, with notable achievements across salinity management and ecological outcomes and technical review processes:

- **Salt Interception and Salinity Outcomes**
In the 2024–25 reporting period, the Pike GMS intercepted nearly 100,000 tonnes of salt, significantly reducing the volume of saline discharge into the River Murray and protecting adjacent floodplain ecosystems. Performance data confirms that the scheme is now fully operational and performing to design expectations under a range of hydrological conditions.
- **Ecological Monitoring and Environmental Outcomes**
Ecological monitoring undertaken across 2023-24 and 2024-25 demonstrated continued improvement in floodplain vegetation condition and habitat quality.
- **Integration with Environmental Water Delivery**
The Pike GMS continues to enable the operation of surface regulators that inundate large areas of the Pike Floodplain (up to 2,000 ha) without unacceptable salinity risk. This integration ensures that environmental water deliveries can occur at ecologically meaningful scales while maintaining water quality and salinity targets consistent with Basin Plan objectives.
- **Institutional and Policy Integration**
The Pike GMS has been incorporated into South Australia's salinity accounting framework as a fully commissioned and accountable measure, with performance reported annually through BSM2030 reporting and the Salinity Register updates.

DEW will continue to refine GMS operations and monitoring to optimise groundwater drawdown efficiency and maximise environmental benefit during managed inundations. Focus areas include:

- Adaptive operation under varying flow and climate conditions
- Integration of groundwater and floodplain monitoring to improve predictive management
- Ongoing evaluation of ecological response indicators
- Continued reporting under the BSM2030 framework to demonstrate compliance and long-term performance.

The Pike GMS remains a leading example of integrated floodplain and groundwater management, balancing ecological restoration with salinity mitigation. Its continued success supports South Australia's BSM2030 and Basin Plan commitments, ensuring long-term environmental and water quality outcomes for the Pike Floodplain and the broader River Murray system.



Figure 2. Pike floodplain observation bore

3. Salinity Management

3.1. Flow-Based Management

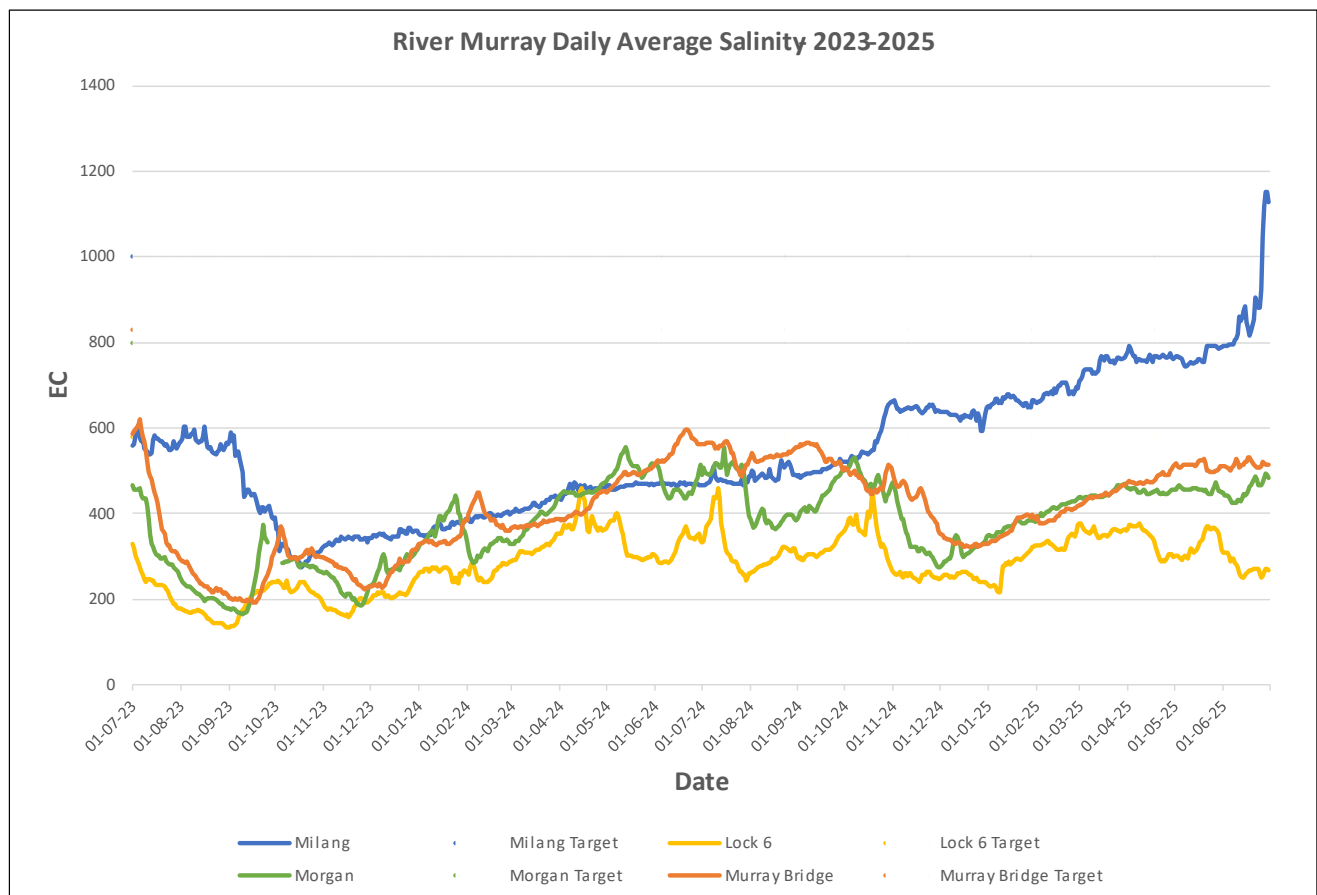
The Basin Plan establishes the Water Quality and Salinity Management Plan (WQSMP), which identifies the key causes of water quality decline across the Murray–Darling Basin, sets water quality objectives for Basin water resources and specifies water quality targets to guide management. The WQSMP also includes provisions requiring relevant entities to have regard to these water quality targets when making decisions relating to flow management and the use of environmental water.

For South Australia, the salinity targets for managing water flows (Basin Plan section 9.14) are of particular importance. These targets are:

- River Murray at Lock 6 – 580 EC
- River Murray at Morgan – 800 EC
- River Murray at Murray Bridge – 830 EC
- Lower Lakes at Milang – 1,000 EC

These targets are intended to ensure that salinity remains within levels that support environmental health, maintain water usability for irrigation, stock and domestic purposes and protect critical ecosystems across the River Murray and Lower Lakes.

Figure 3. South Australian River Murray Daily Average Salinity



During 2023–24, daily average salinity across the River Murray in South Australia remained well below the Basin Plan salinity targets (Figure 3). Salinity levels at Lock 6, Morgan and Murray Bridge were consistently maintained below target thresholds, with values generally ranging between 200–600 EC. At Milang, salinity levels in Lake Alexandrina increased gradually from mid-2023, but remained below the Basin Plan target of 1,000 EC.

In 2024–25, salinity trends showed a progressive increase across most South Australian sites, particularly from early 2025 onwards. While salinity at Lock 6, Morgan and Murray Bridge remained below their respective targets (580 EC, 800 EC and 830 EC) for the whole period, levels steadily rose by mid-2025. The most notable change occurred at Milang, where salinity exceeded the 1,000 EC target from mid-June 2025, peaking above 1,200 EC by the end of the reporting period. This exceedance reflects the heightened influence of sea water ingress into the Lower Lakes during a series of storm surge events which pushed large volumes of water in through the Murray Mouth. The four storm surges between May–June 2025 were the four highest ever recorded at the Goolwa Barrage downstream monitoring site (records dating back to 1976).

Throughout both reporting years, operational decisions were guided by South Australia’s River Murray Annual Operating Plan and associated environmental water planning frameworks, ensuring actions were coordinated and transparent. Where proposed activities carried potential risks to water quality, such as floodplain inundations or regulator operations, River Murray Action Requests were assessed to account for both individual and cumulative impacts. These processes continue to provide an effective mechanism for balancing ecological outcomes with the need to protect water quality and meet Basin Plan objectives.

Exporting Salt from the Murray-Darling Basin

There remain large natural salt stores in the Murray–Darling Basin, approximately 100 billion tonnes in groundwater, with additional annual inputs (from rainfall, runoff, and atmospheric deposition) that continuously add salt. Unless salt is exported from the Basin via flows over the barrages into the Southern Ocean, there is a risk of accumulation that could degrade wetlands, floodplains and estuarine systems. Environmental water allocations, particularly during moderate to high flow years, continue to be critical in driving this export.

According to the MDBA’s 2023-24 assessment, the average annual salt export over the barrages, averaged over the most recent three-year period (July 2022 to June 2025), was 2.11 million tonnes per year, exceeding the Basin Plan’s indicative objective of 2.0 million tonnes per year. This builds on previous high flow contributions, particularly from the 2022-23 period.²

In terms of environmental water delivery, during 2023-24, 1,639 gigalitres of water was delivered to South Australia for sites including the Coorong, Lower Lakes and Murray Mouth³. This environmental flow assisted in maintaining the Lower Lakes within their target range, sustained barrage releases for connectivity and supported estuarine habitats. While conditions were wetter early in 2023-24, flows

² . <https://www.mdba.gov.au/sites/default/files/publications/assessment-of-the-salt-export-objective-and-salinity-targets-for-flow-management.pdf>

³ *South Australian River Murray Water for the Environment Report 2023-24*

reduced over summer and autumn, increasing the reliance on environmental water to maintain salinity, connectivity and ecological function.

Post the major 2022-23 flood event, the Coorong lagoons (North and South) experienced substantially lowered salinities; for example, salinity in the South Lagoon dropped from about 100 grams per litre (g/L) pre-2022 flood to ~75 g/L during that flood period, reaching ~60 g/L at peaks of inundation.⁴

However, as flows receded through late 2023 and into early 2024, salinity in the South Lagoon began to rise again.⁵

3.2. Land-Based Management

Water Quality Management Plans

A key element of Basin Plan implementation in South Australia is the implementation and review of Basin Plan-compliant Water Resource Plans (WRPs) for each of the State's three Murray-Darling Basin WRP areas. The requirements for these plans are set out in Chapter 10 of the Basin Plan, with specific water quality management plan provisions detailed in Part 7.

South Australia currently has three accredited WRPs covering the South Australian portion of the Basin:

- South Australian River Murray Water Resource Plan
- Eastern Mount Lofty Ranges Water Resource Plan
- South Australian Murray Region Water Resource Plan

These WRPs were accredited by the Commonwealth Minister responsible for water and remain in effect under the *Water Act 2007* (Cth) and the Basin Plan. Each WRP includes a Water Quality Management Plan that identifies causes and risks to water quality, establishes water quality targets and outlines measures to support the achievement of Basin Plan objectives.

In 2025, South Australia completed a [Matter 12: Progress towards the water quality targets in Chapter 9](#) report in accordance with Basin Plan reporting obligations and contributed to the MDBA [review of water quality and salinity management plan targets](#) in accordance with section 13.08 of the Basin Plan.

Healthy Coorong, Healthy Basin

The Healthy Coorong, Healthy Basin (HCHB) program continued to progress as a joint initiative of the Australian and South Australian governments in the reporting period. The program is aimed at restoring the long-term ecological health of the Coorong, Lower Lakes and Murray Mouth.

Since 2023, the program has entered a new phase with expanded research and strengthened collaboration with First Nations and local communities with an additional \$26.2 million investment to the next phase of HCHB, bringing total investment to \$77.8 million since the program's launch in 2018.

The Coorong Infrastructure Investigations Project (CIIP) has evolved from feasibility assessment to a detailed investigations phase using hydrodynamic and ecological modelling combined with field and

⁴ *Coorong water quality responses to the 2022-2023 River Murray flood*, Adelaide University (2023)

⁵ *South Australian Murray-Darling Basin 2022-2023 Flood Environmental Response in the Coorong*. Goyder Institute for Water Research (2024)

geotechnical studies to assess infrastructure options that could enhance water exchange and reduce salinity within the South Lagoon. Works remains under assessment with no construction decisions made.

Supporting this, the Coorong Restoration Roadmap (finalised in 2024) and the State of the Coorong discussion paper (published September 2024) provide a coordinated, science-based framework for managing water quality and salinity risks. Research through the Goyder Institute for Water Research and DEW confirm that limited freshwater inflows and high evaporation rates drive salinity increases, nutrient accumulation and sediment anoxia reinforcing the need for improved hydrological connectivity.

The HCHB On-Ground Works program continues to deliver tangible outcomes for habitat restoration and water quality improvement with construction at priority wetland sites such as Tolderol Game Reserve having commenced in early 2025.

Sustaining Riverland Environments

The Sustaining Riverland Environments (SRE) program is a \$37.6 million initiative funded by the MDBA and delivered by DEW to enhance the ecological condition and water quality of the lower River Murray channel, floodplains and wetlands. Building on SARFIIP outcomes, SRE targets improved fish passage, hydraulic connectivity and salinity management across key sites including Lock 3, Lock 6 and Bookmark Creek.

Major works in 2024–25 include \$9.8 million in upgrades at Bookmark Creek, improving two-way water exchange and nutrient cycling to support fish recruitment and reduce local salinity accumulation. At Lock 3, feasibility studies are assessing variable weir pool management to enhance habitat complexity and mitigate salt build-up in floodplain and wetland systems such as Wachtels Lagoon and Lake Bonney. Planning at Lock 6 is exploring new fish passage and flow enhancement options to extend ecological connectivity and support Basin Plan salinity objectives.

Through collaboration with councils, irrigation trusts and communities, the SRE program integrates on-ground works, monitoring and adaptive management to maintain hydraulic connectivity, improve water quality and sustain the resilience of Riverland ecosystems.

3.3. End of Valley Outcomes

Under the BSM2030 strategy, End-of-Valley Targets (EoVTs) provide consistent Basin-wide salinity monitoring and assess risks to shared and within-valley assets. They set salinity and salt-load targets for major valleys and track progress against Schedule B and Basin Plan objectives. States continuously monitor and report EoVT data to the MDBA as part of comprehensive BSM2030 reporting.

In South Australia, EoVT sites at Lock 6, Berri, Morgan and Murray Bridge track cumulative downstream salinity. Daily averages are assessed using five-year rolling exceedance curves, showing the proportion of time salinity or salt load remains below targets relative to historical benchmarks.

Over the five-year reporting period, salinity at all South Australian EoVT sites remained well below target thresholds and within or below long-term benchmarks. At Morgan (95th percentile) and at other sites (80th percentile compliance point), salinity typically ranged from 200–270 EC upstream (Lock 6 to Morgan) and 350–400 EC at Murray Bridge, indicating consistently strong performance.

Over the past two years, salinity levels at all monitoring sites have increased compared with the earlier low-salinity years (2017–2018) now excluded from the five-year reporting period. The removal of those years has raised the current five-year averages. Minor short-term exceedances during low-flow periods were consistent with natural variability. Salt loads remained within benchmark limits and well below the 1990s reference period. High flows in 2022–23 flushed large volumes of salt from the Basin, and favourable flow conditions through 2023–24 and 2024–25 have helped sustain these lower salinity levels.

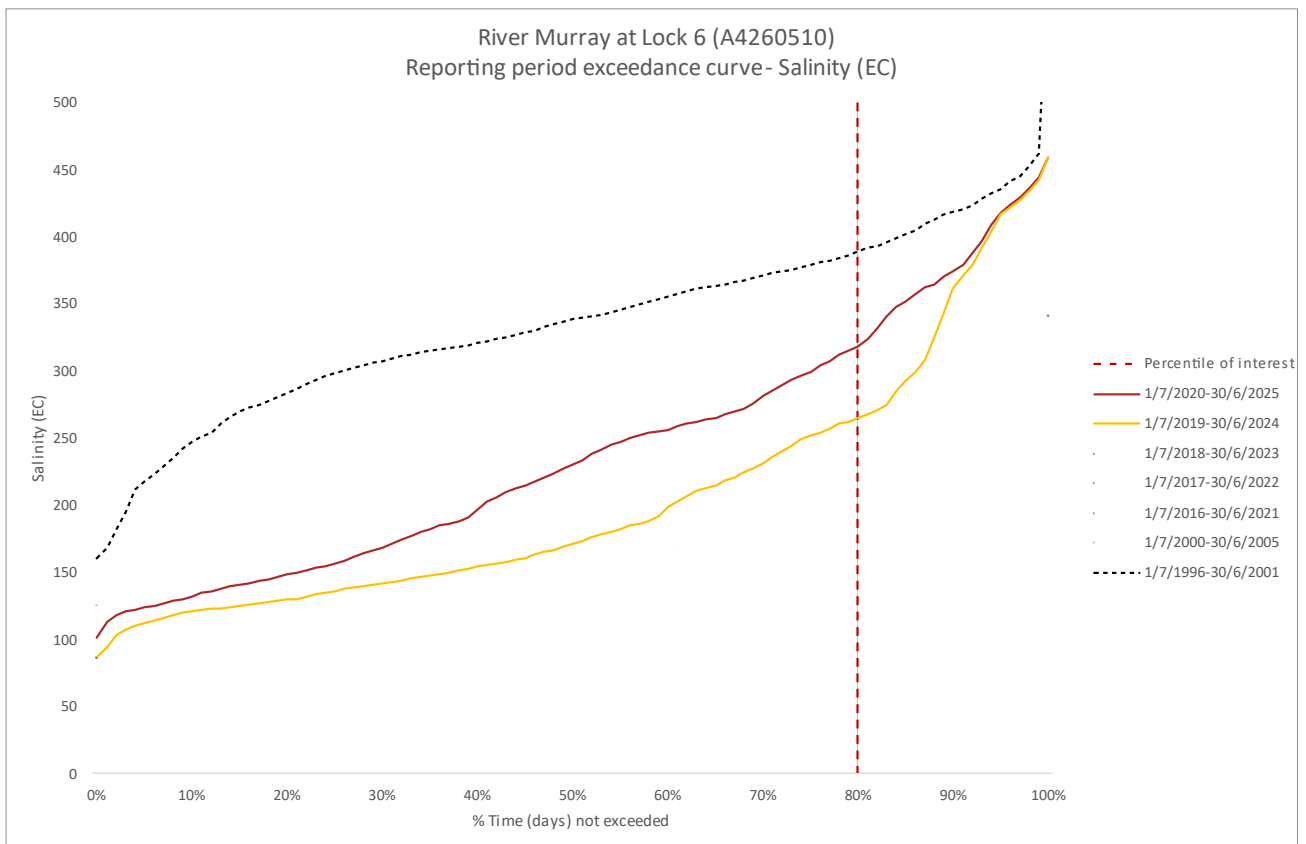


Figure 4. SA Border – Salinity Exceedance Curves

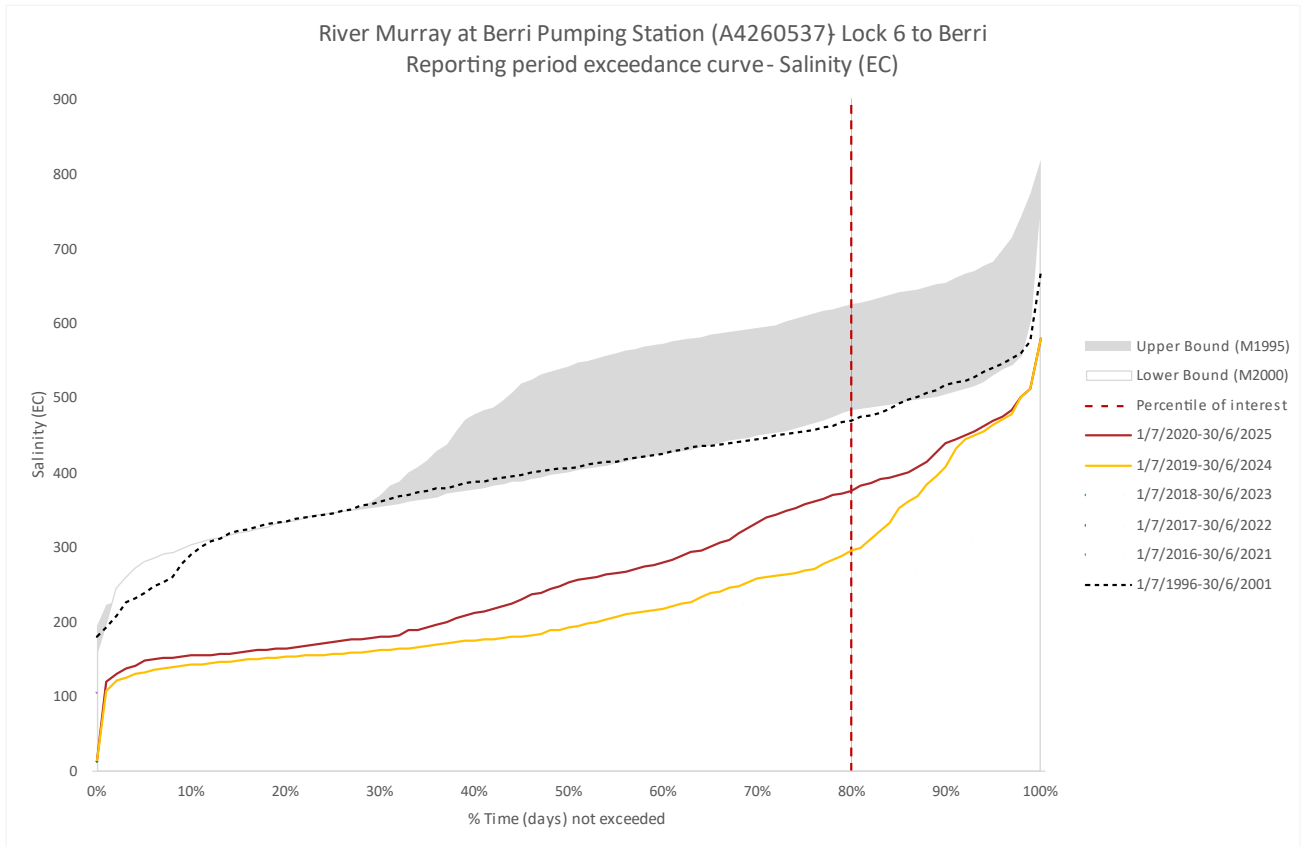


Figure 5. Berri – Salinity Exceedance Curves

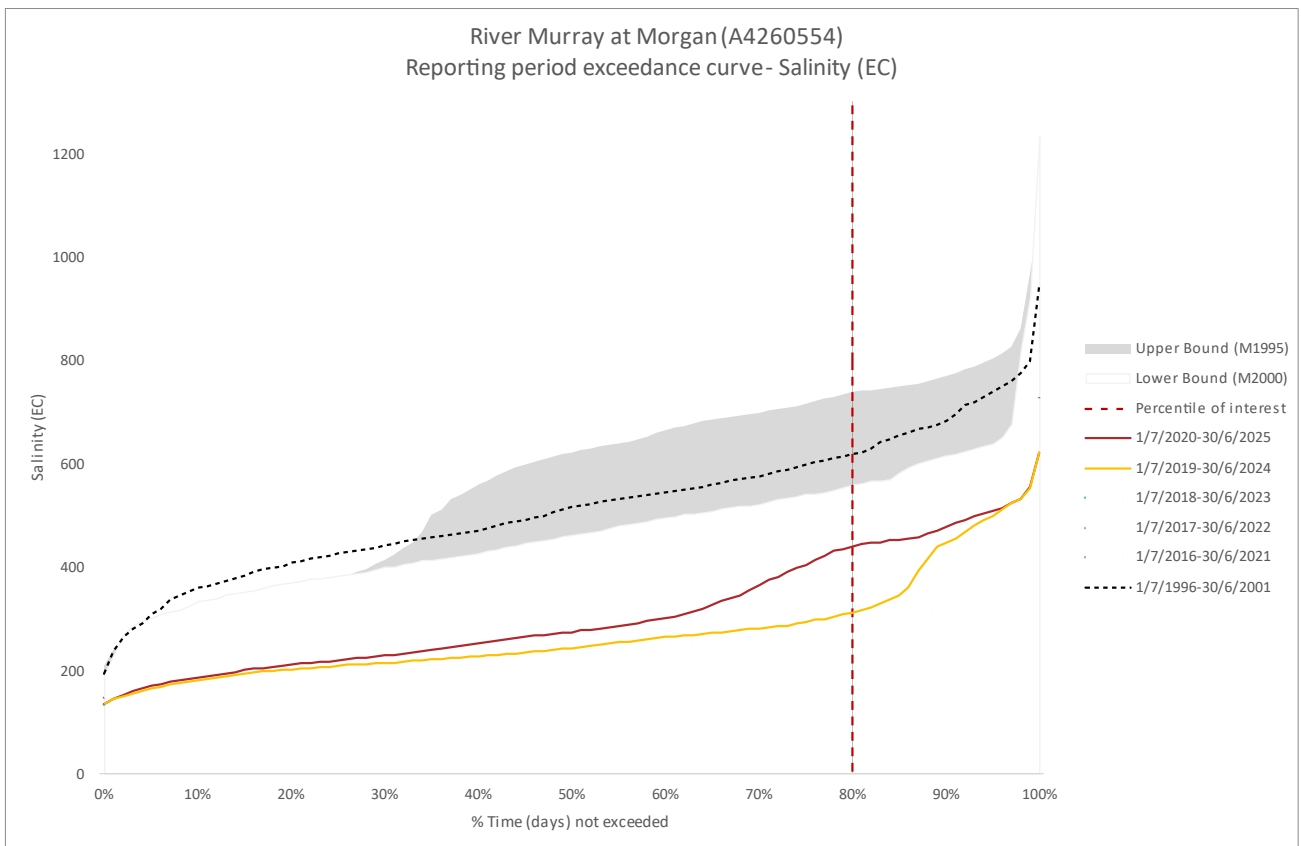


Figure 6. Morgan – Salinity Exceedance Curves

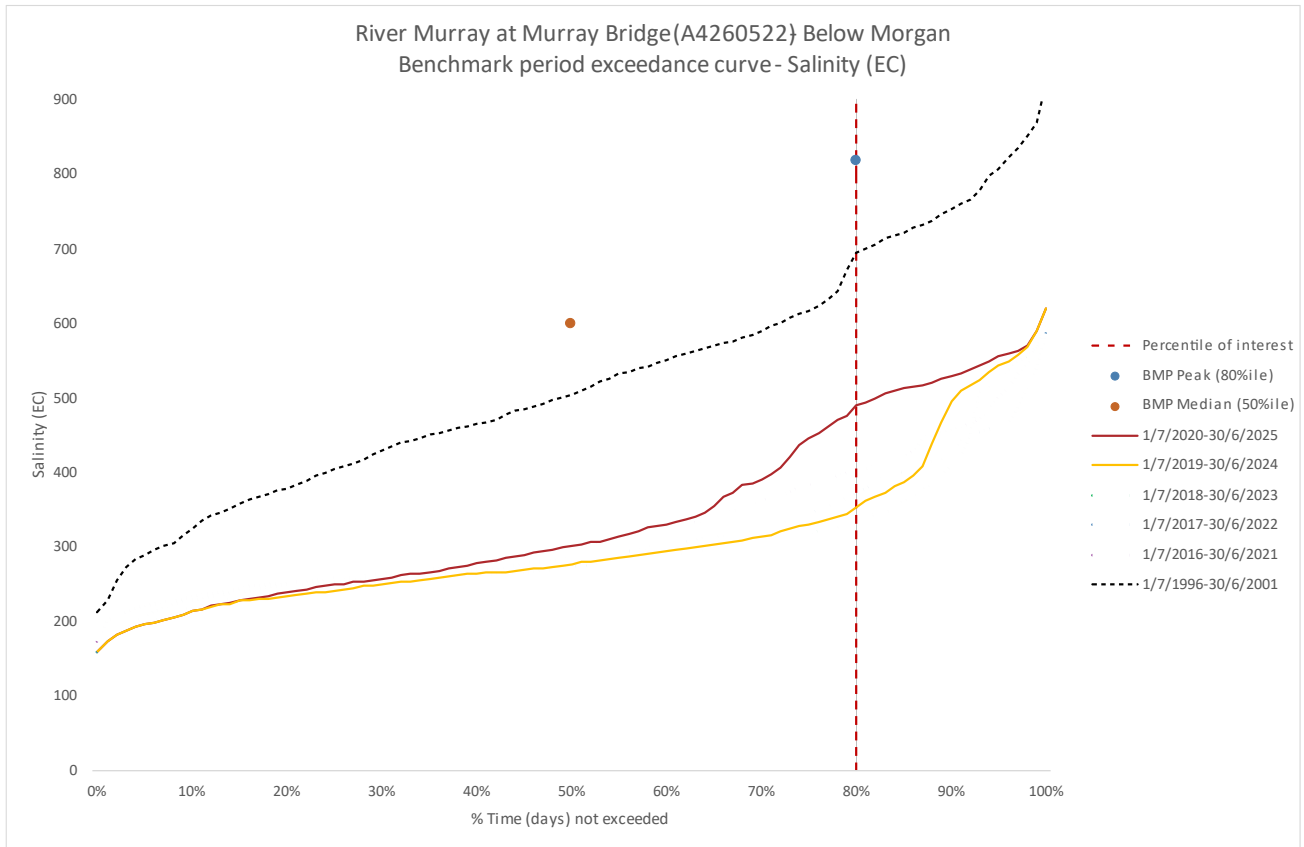


Figure 7. Murray Bridge – Salinity Exceedance Curves

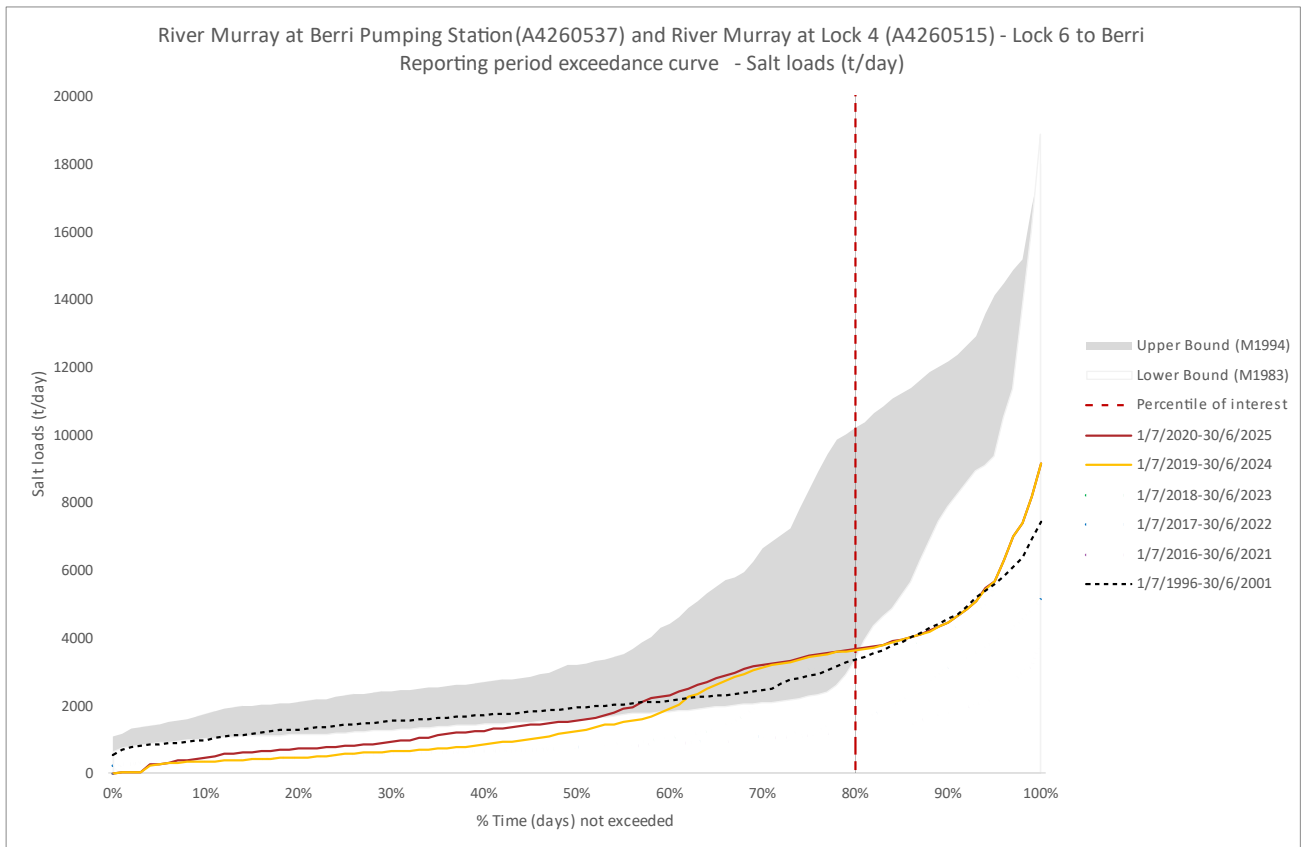


Figure 8. Berri – Salt Load Exceedance Curves

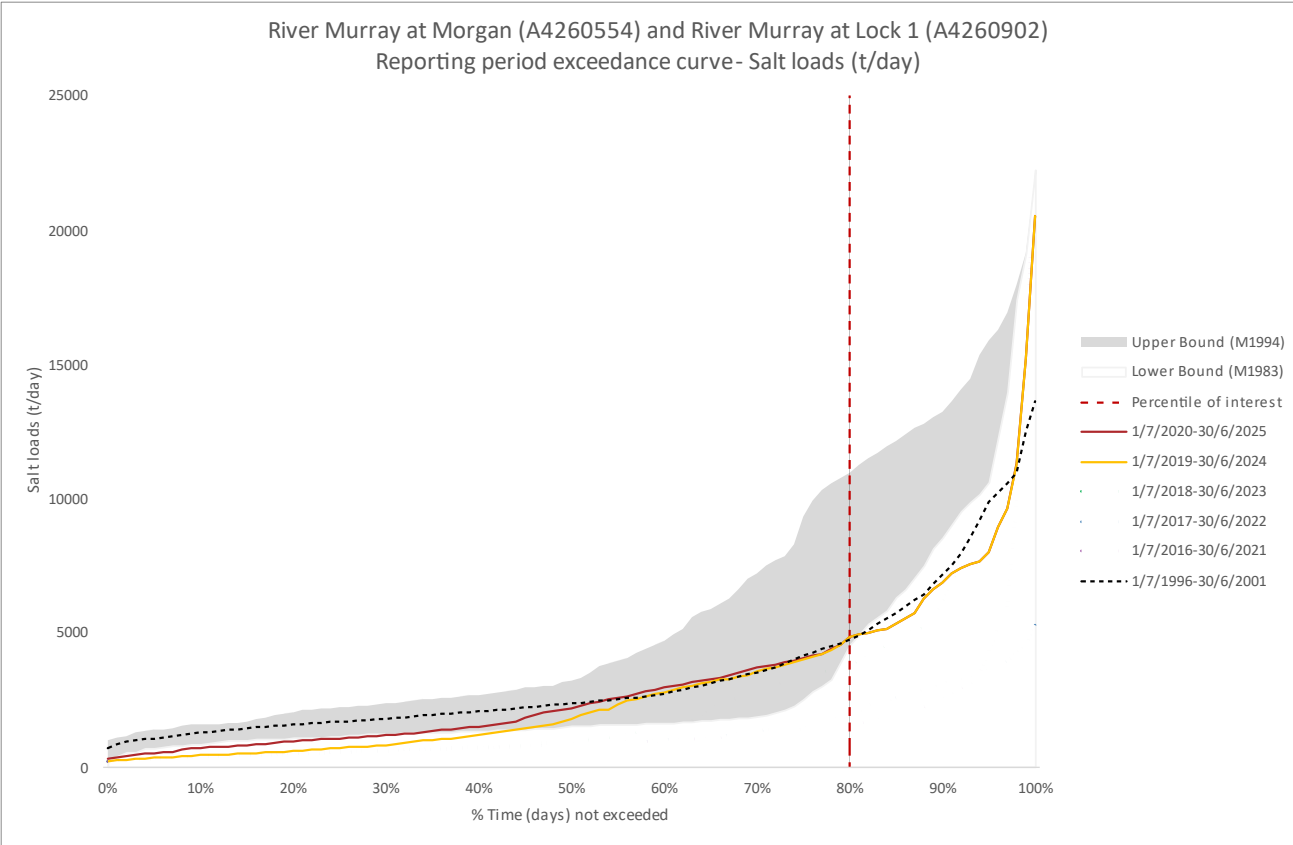


Figure 9. Morgan – Salt Load Exceedance Curves

4. Efficient Governance

4.1. Basin-wide Core Salinity Monitoring Network

Under the BSM2030 strategy, partner governments and the MDBA are required to nominate a core salinity monitoring network and commit to its long-term operation, maintenance and reporting. This network is intended to include sites that are essential for underpinning models that quantify Salinity Register entries, evaluating trends at End-of-Valley Target sites, assessing compliance with the Basin Plan, improving knowledge in priority areas and supporting the management of the River Murray, salt interception schemes and environmental flows.

South Australia continues to maintain the nominated monitoring sites which include the 435 groundwater bores originally nominated in October 2017 that are monitored by DEW, the additional 475 groundwater bores monitored in support of the SIS as nominated by the MDBA and the 66 surface water sites in South Australia that are funded under the joint programs.

No changes to the sites for which the Government of South Australia is responsible for within the Basin-wide Core Salinity Monitoring Network were made in 2023-24 or 2024-25.

4.2. Review of Salinity Register Models and Entries

Regular reviews of accountable actions and delayed salinity impacts are undertaken to ensure that approved models, methods and Salinity Register entries remain current and reflect the best available science.

South Australia applies a suite of accredited regional groundwater models that collectively cover the length of the River Murray from the South Australian border to Wellington (see Figure 10).

These models form the technical foundation for estimating salt loads entering the River Murray and provide the basis for assessing, accrediting and updating authorised works and measures as well as state action entries on the salinity registers.

By maintaining these accredited models and periodically validating their performance, South Australia ensures that salinity management decisions and register accounting continue to be robust, transparent and scientifically defensible.

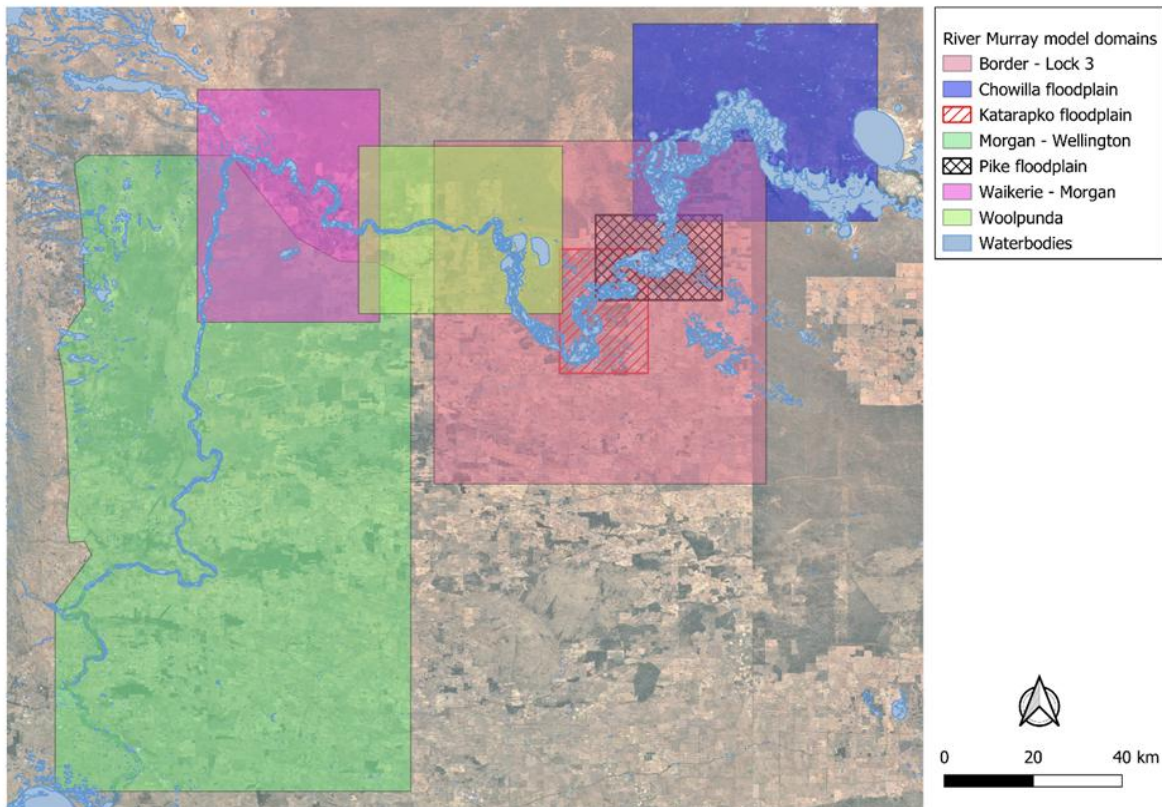


Figure 10 - Coverage of South Australian Accredited Regional Numerical Groundwater Models

Waikerie-Morgan Groundwater Model

The Waikerie–Morgan Groundwater Model, which was last reviewed and updated in 2012, supports South Australia’s salinity accountability by quantifying groundwater salt loads to the River Murray between Lock 3 and Morgan. Following more than a decade of new data collection, advances in numerical modelling and updated irrigation and SIS operations, a model review and redevelopment commenced in 2024.

As part of this review, extensive datasets have been collated and quality-assured, including updated groundwater levels, salinity profiles, aquifer properties and irrigation recharge information. The new model uses refined conceptual and spatial data that better represent current conditions and groundwater–surface water interactions across the Waikerie–Morgan reach. These improvements aim to enhance confidence in simulated salt-to-river fluxes and strengthen South Australia’s capacity to assess the effectiveness of salinity mitigation works.

The model is now in the final stages of calibration, with performance testing showing strong agreement between simulated and observed groundwater responses. Once calibration is complete, the standard prediction scenario suite will be run to estimate salt loads to the River Murray under a range of management and climatic conditions.

These simulations will generate updated estimates of salinity benefits and impacts for use in South Australia’s Salinity Register entries, replacing older outputs from the 2012 model.

The model redevelopment is expected to be finalised by late 2025, with results incorporated into the 2026 Salinity Register. Once completed, the updated Waikerie–Morgan model will provide a robust, peer-reviewed tool for evaluating groundwater–river interactions, supporting effective salinity management and accountability across one of the River Murray’s key reaches.

Pike-Murtho Groundwater Model

South Australia completed a formal review of the Pike–Murtho salinity-register model in 2023–24, with endorsement noted by BSMAP in August 2023 and completion reported in the 2023–24 status report. The review refreshed inputs, recalibrated the model and re-ran register scenarios to update salt loads to the River Murray for accountable actions.

The work program during 2023–24 focused on collating recent hydrogeological and operational datasets (groundwater heads, salinity profiles, SIS operations, floodplain information), refining conceptual boundaries and revising scenario runs following Salt Interception Technical Working Group feedback. Results and methods for floodplain-related salt loads (e.g. SARFIIP at Pike/Katarapko) were presented to BSMAP alongside the model scenario updates, strengthening the linkage between environmental watering actions and salinity accounting.

Woolpunda Groundwater Model

The Woolpunda model was last accredited in 2018 and has recently been reviewed, redeveloped and re-calibrated in accordance with the Basin Salinity Management 2030 Review Plan.

The model is used to estimate salt loads entering the River Murray under different accountable development and management actions (with 100-year predictions from current year) for use as Salinity Register entries including:

- Mallee clearance
- Irrigation development
- Improved irrigation practices
- Woolpunda SIS

The Woolpunda Groundwater Model 2023⁶ provides an updated and scientifically robust understanding of how saline groundwater interacts with the River Murray in South Australia. It identifies that around 180 tonnes of salt per day naturally enter the river along the Woolpunda reach, largely from upward leakage of highly saline water from the Renmark Group aquifer through the Ettrick Formation into the Murray Group Formation. This process forms a persistent groundwater mound that discharges to the river and floodplain. To counter these impacts, the Woolpunda SIS (commissioned in 1990) continues to extract groundwater from the Mannum Formation, progressively lowering the watertable and reducing salt inflows to the river.

The 2023 update enhanced the scientific reliability of South Australia’s salinity accounting framework through new datasets, improved calibration methods and modern modelling tools. The model incorporates extended groundwater level and salinity monitoring, refined aquifer parameterisation and

⁶ Woolpunda numerical groundwater model (2023)

advanced calibration using PEST++, resulting in improved agreement between observed and simulated conditions. These improvements strengthen confidence in prediction of salt loads to the River Murray.

The Woolpunda groundwater model 2023 review and upgrade was undertaken in consultation with a project steering committee and has undergone an independent peer review which was completed in December 2024. The final report and model results were endorsed by BSMAP at meeting 73 on 24 July 2025 and the relevant entries have been updated in the 2025 Salinity Register.

The relevant Basin Salinity Management procedures were followed as part of the Woolpunda Groundwater Model review and the South Australian review team has not identified any deviation or innovation from the procedures.

Chowilla data review

The Chowilla data review forms the foundation for the upcoming redevelopment of the Chowilla Floodplain Groundwater Model, which underpins The Living Murray (TLM) accountable action on the Salinity Register. As part of the current Review Plan, Chowilla has been prioritised for review, marking the first step in a series of model updates for TLM sites.

The review involves a detailed data discovery and scoping phase which has focused on sourcing and assessing new or updated datasets relevant to the Chowilla floodplain, including groundwater monitoring, surface water interactions, floodplain hydrology and environmental watering operations. The collated datasets will form the technical foundation for an upgraded Chowilla floodplain groundwater model, scheduled for development in 2026.

The purpose of this work is to ensure that salinity register modelling remains aligned with contemporary data and management practices. The Chowilla groundwater model is a key tool for estimating salt mobilisation and discharge processes associated with floodplain inundation and environmental watering.

Key priorities moving forward include:

- Finalising data integration and metadata verification to support model redevelopment.
- Developing the upgraded Chowilla model using current monitoring and ecohydrological datasets.
- Completing Independent Peer Assessment and technical assurance processes to meet MDBA accreditation standards.
- Producing model outputs to update salinity register entries and inform future BSM2030 and Basin Plan reporting.

During 2025, DEW has finalised scoping and completed the data discovery phase. In 2025–26, the focus will shift to model reconstruction and calibration, incorporating the newly assembled datasets. Following peer review and accreditation, the upgraded model will be used to refine Chowilla's salinity register entry and support Basin-wide salinity management initiatives.

4.3. Progress Towards 2023 IAG Salinity Recommendations

South Australian progress towards implementation of the 2023 IAG Salinity recommendations is discussed below.

Recommendation 1

The IAG-Salinity recommends that a focus of the 2026 review be to simplify the Registers and their presentation

This recommendation was supported by South Australia. Improving the Salinity Accountability Framework to meet risk management needs has been included as a key area of focus in the draft Plan for the BSM 2030 strategic review.

Recommendation 2

The IAG-Salinity recommends that the MDBA in consultation with BS MAP develop a streamlined process for certifying that reviews and assessments have followed the BSM Procedures.

The BSM procedures have been updated to address this recommendation.

Recommendation 3

The IAG-Salinity recommends that future comprehensive reports include estimates of the area and locations of new irrigation developments and their potential salinity risks.

South Australia has done some preliminary work and will present this to the Independent Audit Group – Salinity.

Recommendation 4

The IAG-Salinity recommends that the BSM2030 strategic review consider replacing End of Valley Targets and Appendix 1 of Schedule B with an obligation to undertake simple risk reviews.

This recommendation will be considered as part of the BSM2030 strategic review.

Recommendation 5

The IAG-Salinity recommends that the MDBA, in consultation with BS MAP, investigate the effects of climate change on the severity and frequency of extreme wet events and their salinity impacts.

The MDBA is investigating the impacts of climate change impacts on salinity in the shared water resources as part of the Basin Plan Review.

Recommendation 6

The IAG-Salinity recommends that the 2023 draft Review Plan be adopted after confirming the costs of the proposed reviews can be funded.

BS MAP agreed to the finalisation of the draft review plan at meeting 68.

Recommendation 7

The IAG-Salinity recommends that both the MDBA and the jurisdictions develop and prioritise indicative budgets for the tasks identified in the Roadmap.

South Australian representatives are working with the MDBA to finalise the Plan for the BSM2030 strategic review, scope the required tasks and identify resourcing requirements.

Recommendation 8

The IAG-Salinity recommends that the MDBA prepare adequate documentation for each Register entry following the transition to Source.

The development of the Source model is ongoing and documentation for all registry entries will be prepared when the model is finalised. South Australia supported this recommendation.

Recommendation 9

The IAG-Salinity recommends that the MDBA develop a Procedure to manage future updates of the Source model.

South Australia supported this recommendation.

Recommendation 10

The IAG-Salinity recommends that the Commonwealth salinity credits be used to offset changes to the jurisdictions' balances caused by the transition to Source until the 2026 review.

South Australia did not support this recommendation but is open to further discussions if jurisdictions' salinity register balances are significantly affected as part of the transition to Source.

Recommendation 11

The IAG-Salinity recommends that Procedure 2.3.5 (Management of major shifts in the registers) be updated once the transition to Source is agreed and the approach to adjust the registers has been determined.

South Australia supported this recommendation.

Recommendation 12

The IAG-Salinity recommends that prior to the Authority approval of the salinity registers prepared using the Source Murray model, the Authority seeks the endorsement of Basin Officials Committee regarding changes to the register entries.

This recommendation was not supported by South Australia. As an alternative it was suggested that that the Basin Officials Committee is informed of the changes to the salinity registers resulting from the Source Murray model transition through either the status or comprehensive reporting package.

Recommendation 13

The IAG-Salinity recommends that the MDBA assign a high priority to repairing flood damaged salt interception schemes.

South Australia supported this recommendation and noted that this work should be considered and prioritised in the context of the broader Joint Venture work program and budget and the capacity of State Contracting Authorities.

Recommendation 14

The IAG-Salinity recommends that the management of salinity peaks be considered as part of the Enhanced Environmental Water Delivery project.

South Australia supported this recommendation.

5. Strategic Knowledge Improvement

In 2023-24 and 2024-25, South Australia has advanced several key strategic knowledge initiatives under the BSM2030 framework to close knowledge gaps and strengthen salinity management across the Murray–Darling Basin. Work has focused on refining models, improving data collection in floodplain systems, quantifying impacts of environmental watering, investigating uncertainty analysis options and application of the transfer function and enhancing forecast capabilities.

Taken together, these research and modelling improvements significantly strengthen salinity management across the Murray-Darling Basin. They enhance the scientific rigour underlying model accreditation, register accounting and operational decision-making (for salt interception, environmental flow scheduling and responsive management). By progressively integrating higher-resolution floodplain process models, refined groundwater schemes and better in-river salinity risk predictions, South Australia is positioning itself to reduce uncertainty in salinity management.

Unsaturated Zone Data Review and Modelling Project

One major effort is the Unsaturated Zone Data Review & Modelling Project (2022-23), conducted jointly by MDBA, DEW and partner research institutions (UQ, CSIRO, Flinders, SA Water). This project collated and reinterpreted existing field datasets across the lower River Murray floodplains and produced improved conceptual and numerical models of water / salt movement in relation to inundation, vegetation and shallow soils. Its findings are now being integrated into the “Floodplain Processes” knowledge priority under BSM2030. Key results affirmed that recharge during inundation is strongly influenced by clay cover thickness, preferential pathways in low-conductivity layers and antecedent soil moisture and that accurate representation of evapotranspiration and extinction depth in models is critical for simulating subsurface salt dynamics.

Salinity Risk Assessment and Flood Modelling

In parallel, South Australia has undertaken in-river salinity risk assessments for major flood recession events, including the 2022–23 flood. DEW’s analysis examined historical flood data, salt load records and groundwater modelling to estimate the potential for in-river salinity spikes during rapid recession periods and to inform management strategies under variable flow scenarios. While actual flows after the flood included ongoing unregulated contributions which helped reduce salinity spikes, the modelling work has clarified risk envelopes and worst-case scenarios for future flood recessions.

Hydrodynamic and flood modelling in South Australia has also been strengthened. A recent DEW technical report describes updated flood inundation modelling from Wellington to Lock 7, with refined MIKE+ model domains for W–L3, L3–6 and L6–7 reaches, calibrated against the 2022–23 flood event and new LiDAR topographic data. These updated models feed into floodplain inundation and recharge understanding as well as salinity risk assessments for different flow regimes.

Transfer Functions

DEW has been undertaking investigations to utilise the MDBA’s transfer functions for the Mallee region to link surface fluxes (e.g. irrigation, rainfall) with groundwater recharge, reducing the need for detailed soil moisture modelling in salinity assessments. Work to date has attempted to replicate the examples shown in the transfer function documentation and then attempting to use the software at a site within the South Australian River Murray region. Currently there has not been a suitable site found in or near

an irrigation area within the region that was not influenced by other sources (e.g. river inflow) and showed time-lagged arrival of irrigation recharge.

Assessment of Uncertainty Analysis

Complex parameter uncertainty analysis has been recommended by the MDBA peer reviewer for Salinity Register groundwater models. However, the scope of MDBA peer reviews excludes reviewing the Salinity Register models with respect to the policy that underpins the Salinity Register and influences model and scenario design. Complex parameter uncertainty analysis has no defined validated methodology, can be expensive and time consuming and often produces outcomes that have little practical relevance to the use of model outputs.

DEW is in the process of developing two discussion papers, one which examines the technical approaches to uncertainty analysis and their relevance to the Salinity Register groundwater models, the other which examines whether undertaking such analysis is in line with the BSM modelling procedures guiding principles. These papers are currently in draft and are being reviewed as additional information has become available as part of other DEW projects including the revision of the Australian Groundwater Modelling Guidelines.

6. Community Engagement and Communication

Local knowledge continues to inform salinity and water management initiatives across South Australia. Following the high-flow and flood conditions of 2022–23, DEW engagement activities have refocused on supporting adaptive river operations, environmental water planning and salinity risk management during variable flow conditions.

DEW continues to publish weekly River Murray Flow Report available through the [WaterConnect portal](#). The Flow Report provides up-to-date information on flow at the South Australian border, environmental watering activities, barrage and weir operations, storage volumes, water entitlements and salinity levels at Basin Plan target sites.

7. Priorities for Future Work

BSM2030 and Basin Plan Reviews

South Australia will contribute to the upcoming Basin Plan and BSM2030 reviews, ensuring the State's salinity management framework remains aligned with Basin-wide objectives and evolving knowledge.

Transition to the Source Hydrological Model

Work with the MDBA and Basin states to complete the shift to the Source model for Basin-scale salinity accounting and generation of new register entries, improving consistency and forecasting accuracy.

Groundwater Model Review and Accreditation

South Australia will finalise the Waikerie–Morgan Groundwater Model review and update accredited regional models in accordance with the BSM2030 Review Plan, ensuring accountability and best-available science underpin register entries.

Responsive SIS Management

Support will continue for the Responsive SIS Management Trial to refine cost-effective operational rules and inform the BSM2030 and Basin Plan reviews.

Support for Basin Plan Evaluation and Knowledge Integration

Ongoing participation in Basin Plan evaluation activities will focus on integrating the latest salinity science, particularly findings from DEW's groundwater and floodplain modelling projects, AEM investigations and environmental flow salinity studies into the Basin-scale assessment of water quality targets and environmental outcomes.