Department of Climate Change, Energy, the Environment and Water

NSW Basin Salinity Management 2030 Comprehensive Report 2023-2024 to 2024-2025

January 2026

NSW GOVERNMENT

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the traditional custodians of the land and pays respect to Elders past, present and future.

We recognise Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to place and their rich contribution to society.

Artist and designer Nikita Ridgeway from Aboriginal design agency – Boss Lady Creative Designs, created the People and Community symbol.

NSW Basin Salinity Management 2030 Comprehensive Report 2023-2024 to 2024-2025

Prepared by NSW Department of Climate Change, Energy, the Environment and Water

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More information

NSW Basin Salinity Management Program

Acknowledgements

Front cover image – Lunette on the edge of Lake Goran, near Gunnedah NSW (Photo credit - Allan Nicholson)

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1 Executive Summary

In January 2024, the NSW Department of Climate Change, Energy, the Environment and Water (the department) replaced the Department of Planning and Environment, with the responsibility for observing Basin Salinity Management (BSM) Procedures and complying with accountability requirements as set out in Schedule B of the Murray-Darling Basin (MDB) Agreement remaining with the department's Water Group.

The Basin Salinity Management 2030 (BSM2030) strategy is a mechanism for Basin governments to work individually or collectively to meet salinity management obligations under Schedule B and the Basin Plan and identifies the objectives and targets to be achieved under the strategy.

New South Wales (NSW) key outcomes and achievements for the 2023-2024 to 2024-2025 period are reported against the elements of the BSM2030.

Salinity Accountability Framework

- NSW remains compliant with Schedule B of the MDB Agreement with a net credit balance of 27.17 EC (electrical conductivity), or $5.235 million/year, on the Salinity Registers.
- The assessment of 2 new accountable actions was initiated (RRC and Murray Irrigation impacts post 2000) to determine whether they should be included on the Salinity Registers.

Management of Salt Interception Schemes

- A total of 247,664 tonnes of salt was diverted from entering the Murray River through the operation of the Mallee Cliffs, Buronga and Upper Darling salt interception schemes.
- NSW invested in two new monitoring initiatives to manage risk and monitor the condition of salt interception schemes assets through a new Run of River salinity monitoring capability and aerial drone transects.

Salinity Management in Catchments

- A preliminary assessment of NSW's 10 Basin catchments was completed with the Murrumbidgee catchment identified as requiring further investigation based on its risk to the shared water resource.
- Wetter conditions in northern NSW resulted in increased EC and salt loads in many catchments compared to the previous reporting period, with an elevated salinity event recorded in the Darling River in 2024.
- Delivery of water for the environment continued to contribute to dilution and salt export outcomes in the reporting period by supplementing flows and maintaining connectivity across a number of catchments.
- The department and various Local Land Services (LLS) and Landcare groups all responded to a greater interest and demand in salinity extension and management advice in the reporting period. This was driven by 3 wet years and a change in land use to more widescale cropping

resulting in a significant increase in the number and size of salt sites in the Macquarie, Lachlan and Murrumbidgee mid catchments.

Efficient Governance

- The department continued to invest into new and existing models to assess the effect of NSW's outstanding salinity register reviews in the Murray and Lower Darling catchments. The review of the Salinity Register entries for Murray Irrigation LWMP, Sunraysia Irrigation Development (1997 – 2006) and provisional entry for Sunraysia Irrigation Development (2007 – 2021) is in progress and due to be completed in 2026.
- A census of NSW groundwater monitoring network was completed in readiness for the review of the Core Salinity Monitoring Network (CSMN) in 2026.

Strategic Knowledge Improvement

- NSW collaborated with the MDB Authority (MDBA) to complete and evaluate 3 Responsive Management Trail research studies and progress the review of the Responsive Management Trial for Mallee Cliffs Salt Interception Scheme (SIS).
- NSW invested in improving the statewide data layers and tools available to manage salinity through the continuation of Hydrogeological Landscapes (HGL) mapping and Profiling Catchment Salinity Risk project.
- The department entered a research partnership with Australian National University (ANU) to develop an improved framework for identifying and assessing river salinity risk at interim scales up to End of Valley (EOV) locations.

Community Engagement and Communication

- The department established 2 new flagship programs - Landcare Water Quality Sampling and Saline Site Mapping – which are providing dual benefit for engagement on salinity management issues and the capture of supplementary data in high-risk catchments.
- Public access to salinity information was enhanced through the development of a new NSW Basin Salinity Management webpage and updates to the eSPADE platform.

NSW will continue to focus on building on the successes in this reporting period, delivering on BSM2030 key tasks and objectives and making a valuable contribution to the BSM2030 strategic review. Specific priorities include the completion of identified register reviews, further investigation into catchment salinity risks, completing the 5-year review for the CSMN and investigating opportunities for improvement and efficiency of the current salinity management frameworks.

2 Purpose of Report

State Contracting Governments and the MDBA are required to prepare alternating BSM2030 status updates and comprehensive biennial reports for the Basin Officials Committee and Ministerial Council. This NSW BSM2030 Comprehensive Report has been prepared by the department and is consistent with the BSM Procedures and Reporting Plan for 2025.

The report structure and progress has been compiled against BSM2030 key elements. It includes information contained in the NSW 2023-24 Annual Status Report, resulting in a consolidated 2year report for 2023-24 and 2024-25.

3 Salinity Accountability Framework

Under Schedule B of the MDB Agreement, NSW is accountable for all actions that are assessed to have a significant effect on River Murray salinity. Actions such as new irrigation development, salt interception schemes, improved irrigation efficiency and changed river operations can all impact on NSW's salinity credit balance.

3.1 NSW Salinity Register position

NSW maintained a net credit balance on the Salinity Register in 2023-2024 and 2024-2025 (Table 3-1), in a continued commitment to Schedule B of the MDB Agreement.

Based on the MDBA Draft 2025 Salinity Registers, NSW has a salinity effect of -27.65 EC. This equates to a salinity cost effect of $5.41 million/year.

Table 3-1: NSW Salinity Register balance sheet summary

Register Description	2024 EC ($million/yr)	2025 EC ($million/yr)
Register A		
Salinity & Drainage Strategy (S&DS)	14.8 (1.615)	15.5 (1.577)
Basin Salinity Management Strategy (BSMS)	4.97 (0.797)	4.96 (0.788)
Shared (NSW and Victorian) Measures	1.05 (0.190)	1.05 (0.191)
NSW Works and Measures	4.6 (2.493)	4.5 (2.471)
Balance – Register A	*25.4 (5.111)*	*26.4 (5.203)*
Register B		
Transfers from Register A (BSMS)	2.61 (0.601)	2.65 (0.594)

Register Description	2024 EC ($million/yr)	2025 EC ($million/yr)
NSW Delayed Salinity Impacts	-1.4 (-0.368)	-1.4 (-0.401)
Balance – Register B	*1.21 (0.216)*	*1.21 (0.193)*
Net Balance - Register A and B	**26.63 (5.32)**	**27.17 (5.235)**

NSW credit balance remained relatively stable in 2024 and 2025 although there was some change in individual register values as a result of completed register reviews or because of annual interpolation in the River Murray model. This included a small increase in salinity impact modelled for Sunraysia Irrigation Development (1997-2006) from -1.8 to -1.9 EC, an increase in credits from the shared benefit from the review of the Woolpunda SIS and removal of a double counting error that reduced the benefit of the 1990 S&SD update of the Mildura-Merbein SIS and the Improved Buronga SIS register items.

Table 3-2 outlines NSW salinity credits and debits as per the Final 2025 Salinity Register A.

Based on Final Salinity Register B; NSW has total credits of 2.65 EC and total debits of 1.4 EC from Delayed Salinity Impacts.

Table 3-2: NSW 2025 Salinity Register A credit and debit summary

Register Entry – Credit	EC	Register Entry – Debit	EC
Salinity & Drainage Strategy			
Woolpunda SIS	9.7	Changed operation of Menindee and Lower Darling	-0.2
Improved Buronga and Mildura/Merbein SIS	0.2		
New Operating Rules for Barr Creek Pumps	0.9		
Waikerie SIS	2.6		
Changed MDBC River Operations 1988 to 2000	0.3		
Mallee Cliffs SIS	0.9		
Waikerie SIS Phase 2A	0.6		
Changed MDB Commission River Operations 2000 to 2002	0.3		

Register Entry – Credit	EC	Register Entry – Debit	EC
Basin Salinity Management Strategy			
Changed MDB Commission River Operations after 2002	0.0	None	
Pyramid Creek SIS	0.6		
Bookpurnong Joint SIS	0.9		
Improved Buronga SIS	0.1		
Loxton SIS	1.1		
Waikerie Lock 2 SIS	1.0		
Upper Darling SIS	0.6		
Murtho SIS	0.7		
Shared Measures			
Permanent Trade Accounting Adjustment - NSW to Victoria	0.1		
Barmah-Millewa Forest Operating Rules	1.0		
NSW Works and Measures			
Boggabilla Weir	0.1	Pindari Dam Enlargement	-0.7
Tandou Pumps from Lower Darling	0.1	Sunraysia Irrigation Development 1997-2006	-1.9
Murray LWMP	4.0	Sunraysia Irrigation Development 2006-2018 (provisional)	-3.7
NSW Changes to Edward-Wakool and Escapes	2.0		
Permanent Trade Accounting Adjustment - NSW to SA	0.4		
NSW RISI	4.0		
S&DS Commitment Adjustment	0.0		
Total NSW Credits	**34.9**	**Total NSW Debits**	**-6.5**

3.2 New Accountable Actions

NSW is required to report all actions that have a significant effect on River Murray salinity for inclusion on the Salinity Registers. An action is considered to be significant if it is assessed as causing a change in average daily salinity at Morgan, South Australia of 0.1 EC or more by 2100.

In the reporting period, NSW progressed investigation into 6 actions according to the department's preliminary salinity assessment procedure to determine whether they require further investigation or should be notified as accountable actions under Schedule B of the MDB Agreement. Four were deemed to be low risk with the following projects still under investigation:

- Reconnecting River Country (RRC) Program – Murrumbidgee and Murray rivers
- Murray Irrigation Limited (MIL) actions post-Murray LWMP.

3.2.1 Reconnecting River Country

The RRC program aims to address physical, policy and operational barriers (constraints) to water delivery allowing greater environmental benefit to be achieved using existing water for the environment. The RRC program will consider options to increase operational flow limits for delivery of water for the environment in the Murray and Murrumbidgee rivers to increase the frequency of flows connecting low-lying wetlands and floodplains (Figure 3-1). The change in river flow and additional inundation caused by these events has the potential to mobilise salt from the floodplain into the Murray River.

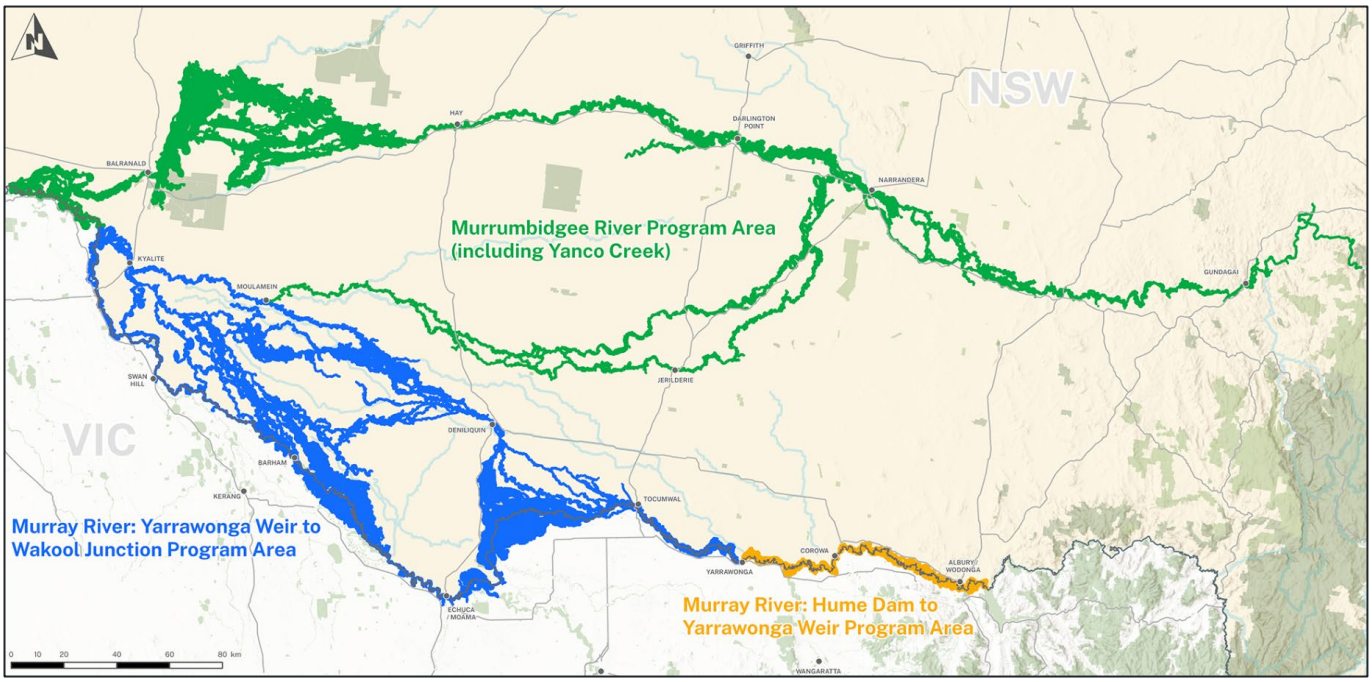


Figure 3-1: Map of the Reconnecting River Country program area

The initial preliminary assessment in 2023 uncovered difficulties in estimating the salinity effect of such a complex project, rendering it inconclusive. Deficiencies in data inputs as well as the assumptions necessary to use a simple analysis method produced substantial uncertainty in an estimated salinity effect of 0.15 EC. New data addresses one of the previous deficiencies, i.e. hydrology regime that defines both the increase in small/medium inundation events as well as the

decrease in large inundation events. This will enable a more accurate preliminary assessment, however, there remains one key challenge with the Ready Reckoner overestimating the impact at Morgan due to its inability to capture the benefit from additional dilution flows from the Murrumbidgee. The preliminary assessment will be rescoped and completed by December 2026.

3.2.2 Murray Irrigation Limited impacts post-Murray Land and Water Management Plan

The prolonged run of dry years from 1997 to 2009 (the Millennium drought) and significant water management reforms, system modernisation, technology and market driven changes in the MIL area of operations have resulted in a marked reduction in drain flows (and consequent salt export) from this region to the Murray River. It is considered likely that the impact of these changes would exceed the threshold for a new accountable action.

To better represent changes in the MIL area, NSW has proposed to assess a new scenario using the same model used to assess the impact of existing register entry for the Murray Land and Water Management Plan (LWMP). The preliminary assessment of this new action is planned to be completed in 2026 and will consider the changes in levels of development, water use and account management and observed changes in the area after 2000.

3.3 Salinity Accountability for Environmental Water Management

The department's Conservation Programs, Heritage and Regulation Group manage the delivery of water for the environment on behalf of the NSW Government, the Commonwealth Environmental Water Office and The Living Murray program. Delivery of water for the environment considers and manages salinity impacts of environmental watering events, with a particular emphasis on impacts of site watering and receiving streams and waterways.

Long Term Water Plans guide the management of water for the environment over the longer term (see Section 5.2) and identify any areas of known salinity or acid sulphate soil risk with specific strategies for management. The Long Term Water Plans are supported by annual watering plans that outline priorities for the coming year depending on climate factors and water availability. Water quality is monitored in river via established monitoring network, and additional site-specific and event monitoring also occurs.

3.3.1 Sustainable Diversion Limit Adjustment Measures

Sustainable Diversion Limit Adjustment Measures (SDLAM) can be achieved through supply, including constraints, or efficiency measures. Supply measures involve improvements to the way rivers are managed, while efficiency measures involve activities to change water use practices, to save water for the environment.

NSW is currently progressing 7 SDLAM projects in collaboration with local communities, key stakeholders and other Basin states:

1. Koondrook-Perricoota flood enhancement project

2. Gayini Nimmie-Caira project
3. Reconnecting River Country – Murrumbidgee and Yarrawonga to Wakool Junction focus areas
4. Yanco Creek Modernisation project
5. Murray (Millewa Forest) and Murrumbidgee (Yanga National Park) Valley National Parks
6. Lower Murray: Locks 8 and 9 Weir Pool Manipulation
7. Menindee Lakes Water Savings Project (including consideration of Baaka - Lower Darling constraints).

The Menindee Lakes Project is being rescoped to consider alternatives to what was previously proposed. Five projects are part of the accelerated SDLAM program across the Murray and Murrumbidgee rivers in southern NSW to be delivered by 31 December 2026. Construction has begun on 2 of the accelerated projects – Mid Murray Anabranches Project and Koondrook-Perricoota Forest Project.

A preliminary salinity assessment has been completed for Lock 8 and 9 Weir pool, Yanco Creek Modernisation project and Murray (Millewa Forest) and Murrumbidgee (Yanga National Park) Valley National Parks projects, with RRC assessment currently underway. Consistent with the approach for determining the salinity benefits of salt interception schemes, an operational plan will be the basis for the final estimation of salinity impacts of SDLAM projects that are identified through the preliminary assessment as requiring further investigation.

4 Management of Salt Interception Schemes

Salt interception schemes were established to reduce in-river salinity and provide Basin states with salinity credits to offset salinity-generating activities. The NSW SIS program currently consists of 4 SIS (Figure 4-1):

- Mallee Cliffs SIS - located on the River Murray, in the south-west corner of NSW
- Buronga SIS - located on the River Murray, in the south-west corner of NSW and downstream of Mallee Cliffs
- Upper Darling SIS – located on the Darling River, downstream of Bourke, in north-west NSW
- Billabong Creek SIS – located on the Billabong Creek in southern NSW, north of the town of Albury.

Figure 4-1: Location of NSW Salt Interception Schemes.

The first 3 are included in the MDBA Joint Venture Program and are jointly owned, with costs and benefits shared between Basin states. Billabong Creek SIS is solely owned by NSW, as are the benefits to the community that it generates. Billabong Creek SIS is not included as an accountable action on the BSM2030 salinity registers, so the benefits are not included in this report.

4.1 Salt Intercepted

The Joint Venture operational scheme statistics for 2023-2024 and 2024-2025 are summarised in Table 4-1. Operating Protocols are in place for each SIS, relating to in-stream flows. Flows above a threshold generally dictate the cessation of a scheme's operation for the period flows exceed the threshold, due to the hydraulic pressure preventing saline groundwater flow into the river.

In total, 104,618 tonnes of salt was diverted from the Murray and Darling River systems in 2023-2024 and 143,046 tonnes of salt in 2024-2025. The decrease in 2023-2024 is mainly attributed to high river flows in the Murray River resulting in cessation of Mallee Cliffs SIS operations for approximately 6 months.

Table 4-1: Joint Venture Salt Interception Scheme statistics for 2023-2024 and 2024-2025.

	2023 - 2024			*2024 - 2025*		
Salt Interception Scheme	*Volume pumped (ML)*	*Salt load diverted (tonnes)*	*Average salinity (EC)*	*Volume pumped (ML)*	*Salt load diverted (tonnes)*	*Average salinity (EC)*
Upper Darling	942	29,218	46,948	1,010	29,715	44,683
Buronga	1,708	42,798	39,196	1,641	43,481	42,089
Mallee Cliffs	985	32,602	51,600	2,040	69,850	52,704
Total		**104,618**			**143,046**	

4.1.1 Asset Register and Asset Management Plan

The Asset Register and Asset Management Plan for NSW managed Joint Venture was completed in 2023. The Asset Register includes all production bores, collector and disposal main pipelines, disposal basins and monitoring pontoons. A stocktake of all plant, property and equipment was completed in the reporting period and uploaded into the NSW asset management and reporting database. Alignment with the MDBA Asset register and review and update of the department's Asset Management Plan will be completed as part of the next phase of improvements. Monitoring bores (and associated instrumentation) are yet to be included pending the endorsement of stakeholders of the revised monitoring network.

4.1.2 New monitoring initiatives

The department acquired a new device to enable the completion of the Run of River salinity monitoring surveys, with the first run completed in late June 2024. This will enable salinity surveys to be conducted at optimal times and provides the opportunity to undertake surveys on the Upper Darling SIS, enhancing our understanding of the scheme's effectiveness.

During 2023-2024, the NSW SIS program undertook the first annual aerial drone footage transect of the disposal basins for both the Upper Darling and Mallee Cliffs schemes. This information will be used in conjunction with annual electromagnetic geophysical investigations to monitor the vegetation, perimeter seepage and embankment integrity around the basins.

4.2 Joint Works and Measures Operations

4.2.1 Upper Darling SIS

Upper Darling SIS operates in accordance with set pumping (flow) rates, with the scheme being shut down when operating protocols are triggered when flows in the Darling River at Weir 19A are greater than 4,500ML/Day. The Upper Darling SIS operated consistently across 2023-2024 with some minor maintenance outages. Bore 3 was offline for 3 months due to variable speed drive failure and Bore 4 had to be cleared of a build-up of organic matter post flooding and was offline for 6 months. The SIS was also shut down under operating exceedance instructions for approximately 4 weeks. As a result, the scheme ran at 54% of its target (of 274 days per year). However, the average EC reading for 2023-2024 was up from the previous year, reflecting post flood changes in the aquifer and increasing salinity as freshwater recharge waned.

The Upper Darling SIS performed strongly in 2024–2025, achieving 92% efficiency against its benchmark. This figure accounts for an 8-week period of non-operation due to flow-based shutdowns in accordance with operating rules, as well as scheduled maintenance outages. The main operational impact was the turnaround time for repairs, influenced by limited availability of local technical contractors and the scheme's remote location. The average EC was slightly less than the previous year, reflecting fluctuating salinity levels as freshwater recharge with a number of high flows.

4.2.1.1 Disposal Basin and Enhance Leakage Pit

The Disposal Basin is in the process of having repairs undertaken to rectify legacy construction issues, damage from recent flooding and deferred maintenance. The deterioration required a reduction in the basin operating level from 101.2m AHD (Australian Height Datum) to 100.9m AHD, representing a reduction of 41% in basin holding capacity. This reduction in holding capacity will remain in place until works are completed. The levels in the basin are being actively monitored to inform pumping operations.

The 2023-2024 period saw the Stage 1 repairs completed, including removing sections of the embankment, reconditioning and rebuilding the embankment to engineered standards with approximately 1600m refurbished. In 2024–2025, preparation for Stage 2 works was completed including basin geotechnical investigations, Issued for Construction drawings, technical specifications, and the finalisation of environmental and construction plans. Stage 2 package of works, involving crown and embankment thickening and top capping with Grade 2 road base, are ready to proceed as soon as funding is secured.

The 2022-2023 floods caused considerable erosion of the ELP western embankment. This has not been addressed, however, as part of the Stage 2 Basin Embankment Repair project, modified embankment designs will be incorporated to manage future flooding. Funding is required to undertake ELP civil works in line with the modified designs and remove the clay deposit at the

bottom of the ELP and improve seepage. Monitoring of safe storage levels in such a remote location is proving challenging with installation of radar level sensors connected to SCADA currently under consideration.

4.2.2 Buronga SIS

The Buronga SIS aims to pump 300 days per year, operating 24/7. In 2023-2024, the system achieved 86% of this target, reflecting a relatively consistent year of operation despite some maintenance and project work impacts. The provision to shut down the scheme when instream flows exceed 30,000 ML/day was not activated during 2023-2024, maintaining operations to support Sunsalt's commercial salt production at Mourquong Basin.

Scheme performance was slightly lower than average in 2023-2024 primarily due to bores 1, 2, and 3 being offline for maintenance and to address yield loss following flooding. Bores 2 and 3 were also taken offline in May for switchboard replacement. In 2024-2025, the Buronga SIS achieved 98% operational efficiency despite the challenges posed by an ongoing switchboard upgrade program, with the upgrade and commissioning of bore sites 1, 2, 3 and 4 completed.

The Buronga scheme has been operational for over 40 years, with upgrades in 1991 and 2006, and now requires significant refurbishment, upgrades or replacements to meet current Workplace Health and Safety (WHS) standards, SIS best practices and original specifications. As an immediate priority, work continues on the installation of additional protection and signage to mitigate potential exposure to traffic and public access from expansion in urban development in the area.

4.2.3 Mallee Cliffs SIS

The 2023-2024 period saw the Mallee Cliffs SIS shut down from July to November because of high flows, when the operating rules direct that pumps should not be operated at flow exceeding 20,000 ML/day. Bore 1 and 2 were rehabilitated to address reduced yield after flood inundation. Bores 5 and 6 had ongoing issues with iron bacteria deposits.

In 2024-2025 the schemes achieved 99% operational target reflecting favourable river conditions and the benefits of recently completed infrastructure upgrades. However, performance was impacted by looming basin capacity constraints, with bore field pumping rates reduced to extend the operational timeframes. This adjustment was necessary due to the reduced holding capacity of the disposal basin (see Section 4.2.3.2).

Historically, resourcing has been inadequate to support routine maintenance and requires an increased effort to refurbish and modernise the system to align with the current WHS Act requirements, repair aging infrastructure and restore the scheme to original operational specifications. Over the past 3 years, the Mallee Cliffs scheme has undergone multiple investigations, business cases and condition reports; many of which were finalised in 2023-2024. In the last period improvements included: Completion of the switchboard upgrades; completion of telemetry building, installation of disposal basin sensors and connection to SCADA; bore maintenance and rehabilitation; and planning for disposal basin and ELP rehabilitation.

4.2.3.1 Responsive management of SIS operations

The BSM2030 includes a 3-year trial of Responsive Management of Salt Interception Schemes (2016 to 2019), with Basin Officials Committee subsequently agreeing to extend the period of the trial until 2025, to inform the BSM2030 strategic review.

Over the reporting period, NSW has given effect to responsive management of SIS operations through participation in quarterly workshops and implementing agreed operations for the Mallee Cliffs SIS (as advised in writing by the MDBA), except for critical operational/maintenance tasks.

4.2.3.2 Disposal Basin and Enhanced Leakage Pit

The current poor condition of the Disposal Basin and the loss of function of the ELP have significantly reduced the capacity of the Mallee Cliffs SIS to dispose of saline inflows from the bore field. Operating at target pumping rates will result in the shutting down of the scheme once full holding capacity is reached. The lag time for salt to start entering the river once pumps have been turned off can be short, so operation of the scheme until the bays and ELP can be repaired will need to balance operating capacity with in-stream impacts. This will result in the scheme operating at a significantly reduced pumping rate, or shutting down for extended periods, until works can be completed.

Disposal Basin remediation has made progress with several construction plans, investigations, and reviews completed in the reporting period. In 2023-2024, investigations evaluating the current general condition of the Mallee Cliffs Disposal Basins were completed. These investigations generated several bodies of work.

- Interim Works Package for ELP Remediation - the ELP is currently non-operational due to silting and embankment erosion. The design, approval and completion of construction work package with pre site works have been completed, involving the clearing and levelling of the ELP work area and preparing of southern end of Bay 4 to accommodate extracted material.
- Remediation of 4 Disposal Basins – option analysis following the assessment of embankment stability and operating condition.
- Investigations of the evaporation bay embankments indicated they were functioning well, however seepage beneath what is meant to be an impermeable clay layer at their base was occurring at several locations. Two reviews conducted by independent experts mitigated many of the original concerns about piping and risk to neighbouring national park values, resulting in an updated and more accurate assessment of basin management requirements.

Figure 4-2: Erosion and siltation of the Mallee Cliffs SIS enhanced leakage pit (photo D Lalor 2024)

5 Salinity Management in NSW

The department's Water Group is the overarching body that manages in-stream salinity and is responsible for observing BSM Procedures and complying with accountability requirements as set out in Schedule B of the MDB Agreement (Schedule 1 of the *Water Act, 2007*).

Responsibility for land and water management activities that address or can impact on salinity risk are shared amongst a number of agencies and implemented through:

- NSW Water Resource Plans (Basin Plan) and water sharing plans
- NSW Long Term Water Plans (Basin Plan)
- NSW State and Regional Water Strategies
- Basin Salinity Management 2030 (BSM2030) Strategy (MDB Agreement)
- Local Land Services State Strategic Plan 2020-2030 and 11 local strategic plans
- Various NSW policies and planning instruments.

5.1 Statewide Initiatives

In the last reporting period, a contemporary risk assessment for each catchment in the NSW MDB was completed, evaluating risks at the sub-catchment, catchment and whole-of-basin to understand risks and management options at the appropriate scale (see Section 7.5). The assessment noted that mid-catchments were consistently rated medium to high risk, with regions within the Murrumbidgee and Murray and Baaka - Lower Darling valleys being key contributors to the moderate to high-risk ratings at the valley scale. The outcomes and recommendations from this risk assessment will help focus priorities for management at the local, state and basin scale.

The NSW Office of Chief Scientist and Engineer independent review into the 2023 fish deaths in the Darling–Baaka River at Menindee has resulted in a number of recommendations and actions to address the broader degradation of ecosystem health and consequential long-term risks to the Darling-Baaka River system. The recommendations focus on the enforcement of regulatory protections, better data to inform decision making and effective emergency management. Statewide actions will also benefit salinity outcomes, including:

- Introduction of Integrated Catchment Management - Current policy approaches do not consider catchments as integrated systems, where upstream impacts, including land use and development, water extraction and pollution, can impact downstream water quality. The introduction of an Integrated Catchment Management framework through the department's NSW Water Quality Governance Roadmap (2024) represents an opportunity for improved salinity outcomes through a whole of system approach particularly in high-risk landscapes.
- New water quality monitoring framework - Water quality data is collected, stored and used by a range of state government agencies as well as councils. There is a need to improve the visibility of data held among agencies and enhance transparency with the wider community regarding which organisations hold water quality data, the nature of the data, its completeness, accuracy and how to access it. A new NSW Water Quality Monitoring Framework aims to improve environmental outcomes and public awareness of water quality

issues through a statewide system for collecting, managing, sharing, and accessing water quality data across government agencies.

5.2 Flow-based Management

The department's Water Group has developed water quality management plans for each water resource plan area in the Murray Darling Basin in NSW. These plans provide a framework to protect, enhance or restore water quality that is 'fit for purpose' for a range of uses and consider the needs of all water users. Water quality data is collected monthly for the State Water Quality Assessment and Monitoring Program and is responsible for analysing and reporting the ambient water quality condition of rivers in NSW. Trends in catchment water quality are reported and published annually. Water quality events are managed collaboratively with other state and federal agencies via water quality working groups and water quality incident management plans.

How water quality issues were considered, when making decisions about flow management or the use of environmental water, are reported annually against matters listed in Schedule 12 of the Basin Plan. The implementation of the water quality and salinity management plan, including the extent to which regard is had to the targets in Chapter 9, is reported under Matter 14.

In the reporting period, higher salinity was detected at Burtundy in April 2024 following increased inflows to Menindee Lakes. There was also an increase in salinity readings in the Darling River above the lakes that corresponded to the higher flows. It is possible that the front of this flow mobilised material on the floodplain resulting in increases in salinity in the river. There were no short-term management options available to provide mitigation.

5.2.1 Water for the Environment

Water for the environment is a share of the water available in NSW dams and rivers that is managed to support the ongoing health of rivers and wetlands. Water for the environment comes from a variety of mechanisms including:

- NSW licensed environmental water
- Commonwealth licensed environmental water
- Environmental water allowance accrued under water sharing plans
- The Living Murray
- River Murray Increased Flows.

Annual Environmental Water Plans for each valley are prepared based on best available science, management experience and local knowledge to identify priorities. Ecological objectives include consideration of salinity targets but also identify where watering events can contribute to other salinity outcomes such as:

- dilution of saline groundwater via recharge areas
- salt export from the Basin (e.g. Edward Wakool system)
- using large floods recharge the groundwater systems and flush salts from the soils
- higher frequency of inundation for vegetation communities with saline soils (e.g. lignum shrublands in the Baaka - Lower Darling and Lower Murray).

Delivery of water for the environment is managed in coordination with WaterNSW and the Commonwealth Environmental Water Office. Managers assess delivery risks, including those associated with water quality, prior to delivery along with appropriate risk mitigation strategies (if required). On completion of a watering event, any issues are identified and documented and used to inform adaptive management.

The total volume of water for the environment used in 2023-2024 is summarised in Table 5-1with events that contributed to water quality outcomes also noted. Data for 2024-2025 was not available at the time of reporting.

Table 5-1: Summary of water for the environment used in the reporting period

Catchment (s)	2023-2024 delivery
Border Rivers	1,437 ML delivered to Border Rivers. Wet to very wet conditions resulted in higher-than-average flows, floodplain inundation and continuous connection to the Barwon River for the whole year.
Gwydir	27,049 ML Included flows delivered to watercourses and wetlands through Barwon River connection flows via Mehi River and Carole Creek, and protecting refuge pools during low and cease to flow conditions.
Namoi	12,879 ML Included flows delivered into the Namoi–Peel rivers, maintaining a connection between the Namoi and Barwon rivers during spring and maintaining water quality
Macquarie-Castlereagh	206,212 ML Included flows were delivered to the Macquarie Marshes, Macquarie and Cudgegong rivers, providing connections within and in downstream catchments
Intersecting streams	8,369 ML Included flows delivered to floodplains, improving system connectivity, inundating Darling Floodplain at Toorale National Park and wetlands along the Paroo River.
Barwon-Darling	64,436 ML Included flows protected down the Barwon–Darling watercourse following above average rainfall from December 2023 created a series of flow events over the summer and autumn of 2023–24 that were supplemented to achieve connectivity with Menindee Lakes and the Lower Baaka – Darling.
Lachlan	47,073 ML

Catchment (s)	2023-2024 delivery
	Included flows delivered to wetlands, rivers and creeks under very wet conditions to improve water quality outcomes below Lake Brewster as well as maintain improved water quality to benefit native fauna in the Great Cumbung Swamp.
Murrumbidgee	478,616 ML Included elevated base flows in the lower reaches of the river and across the Gayini (Nimmie-Caira) wetlands. Flows also delivered to prioritised wetlands across the Murrumbidgee Irrigation Area.
Murray and Baaka-Lower Darling	619,257 ML Included supplementing high unregulated flows to restore floodplain and wetland linkages including NSW Central Murray Forest, the Edward–Wakool–Niemur system, and the Baaka – Lower Darling and Great Darling Anabranch. In partnership with MIL and private landholders, 200,000ML of water was diverted through the hundreds of kilometres of creeks in the Edward–Wakool–Niemur system.

5.3 Land-based Management

Land management activities, including how the land is used or the way the water is used, can affect salinity risk at the local or catchment scale. Salinity usually occurs with other natural resource problems such as decreasing soil and water quality, erosion and loss of native vegetation. In NSW, there are several state agencies that share responsibility for managing dryland, irrigation, urban, industrial and river salinity. Local government, LLS and Landcare networks and groups work with local communities, industries and landholders to achieve healthy landscapes and sustainable primary industries.

5.3.1 State salinity management

The department's Water Group are responsible for water security and managing NSW water resources, including surface and groundwater management, sustainably. New developments and irrigation water use applications require technical input to ensure that water resources and their values are protected. The department has a role in the assessment of development applications but also has a key function in maintaining and providing access to information and advice that help to inform sustainable management of the state's resources.

There has long been a collaborative link in understanding landscapes for land management within the department, with complementary and joint activities being undertaken between soils and salinity staff. This has continued within the reporting period with the contribution and maintenance of the eSPADE platform where soils and salinity data is made available to the general public, providing specialist advice to development applications (such as urban salinity risk in the Lloyd Subdivision in Wagga Wagga), and supporting the regional delivery of salinity management through development of knowledge products, advice and training.

5.3.2 Regional salinity management

Local Land Services local strategic plans drive detailed service delivery and frameworks for natural resource management and agricultural services within the regions. The Land Management Framework describes those aspects that relate to native vegetation management on rural land. The LLS is responsible for implementing the land management and biodiversity reforms, including implementing the NSW government plan for nature to deliver projects and provide advice for conservation and restoration of our natural resources.

The LLS is also the frontline NSW government organisation delivering agriculture extension, advisory and capacity building. Services to producers aim to increase farm productivity and enhance natural assets through the management of native vegetation and supporting the management of soils and water.

The LLS employ Landcare coordinators and support staff to enable Landcare groups to undertake programs to care for their local natural environment and agricultural systems by increasing skills, knowledge transfer and engagement in natural resource management.

In the reporting period there has been a significant increase in the number and size of salt sites in the mid catchments of Macquarie, Murrumbidgee and Lachlan due to impact of 3 wet years and a change in land use to more widescale cropping. This expansion in land salinity has triggered major Landcare group interest in salinity extension and management advice.

Table 5-2 captures the on-ground activity across regions by LLS and Landcare groups that contributed to salinity management outcomes in the reporting period.

Table 5-2: Summary of land management activities with salinity outcomes in the reporting period by Local Land Service region

LLS Region	LLS Activity	Landcare Group Activity (LCG name)
North West	Property planning 1:1 salinity advice Soil Pit Days	
Northern Tablelands	Grazing management programs	
Central Tablelands	Co-ordinated site visits 1:1 salinity advice Salinity Field days	Soils and Salinity Project - Soil PET1 (Little River, Central Tablelands) Landcare Water Quality program (Mid Lachlan, Little River, Central Tablelands, Watershed) Landcare Saline Site mapping (Mid Lachlan, Little River)

[1] People, Education and Technology

LLS Region	LLS Activity	Landcare Group Activity (LCG name)
		Land use and salinity change snapshot (Little River) Grazing Management (Watershed, Mid Lachlan) Co-ordinated site visits/ 1:1 salinity advice / Salinity Field days/ Training
Central West	Soils Pit & Kits Co-ordinated site visits 1:1 salinity advice Salinity Field days	Soils and Salinity Project - Soil PET (Mid Macquarie, Coonamble) Landcare Water Quality program (Mid Macquarie, Weddin, Three Rivers) Landcare Saline Site mapping (Mid Macquarie, Weddin) Land use and salinity change snapshot (Mid Macquarie) Co-ordinated site visits/ 1:1 salinity advice /Salinity Field days/ Training
Riverina	Co-ordinated site visits 1:1 salinity advice Salinity Field days	Landcare Water Quality program (Harden - Murrumburrah, Murrumbidgee Landcare Inc) Landcare Saline Site mapping (Harden -Murrumburrah, Murrumbidgee Landcare Inc) Co-ordinated site visits/ 1:1 salinity advice /Salinity Field days/ Training
Murray	Co-ordinated site visits 1:1 salinity advice Salinity Field days	Landcare Groundwater Monitoring Program (West Hume) Saline Site mapping (West Hume, Holbrook) Salinity and Soil Erosion Rehabilitation project (West Hume) Co-ordinated site visits/ 1:1 salinity advice /Salinity Field days/ Training
South East	Co-ordinated site visits 1:1 salinity advice Staff training Salinity Field Days	Landcare Water Quality program (Yass, Boorowa) Co-ordinated site visits/ 1:1 salinity advice /Salinity Field days/ Training Landcare coordinator briefing and support
Western	Saline Scald reclamation programs	

LLS Region	LLS Activity	Landcare Group Activity (LCG name)
	Grazing management programs	

5.3.3 Land and Water Management Plans and irrigation development

Land and Water Management Plans (LWMP) ensure long-term economic and environmental sustainability of large-scale irrigated landscapes in NSW. NSW irrigation companies' annual compliance/environment reports are available on-line by 31 October each year. These reports include LWMP implementation details for the year and are independently audited. Annual reports are available at:

- Murray Irrigation Limited – https://www.murrayirrigation.com.au/
- Coleambally Irrigation – https://www.colyirr.com.au/
- Murrumbidgee Irrigation – https://www.mirrigation.com.au/
- Western Murray Irrigation – https://westernmurray.com.au/

In the NSW Murray and Baaka - Lower Darling region between 2021 and 2024, there were 2,410 ha of expansion and 415 ha retired from irrigation since 2021. The net change was a 4% increase in the irrigable area of 1,995 ha, from 49,570 ha in 2021 to 51,565 ha in 2024. Expansion was mainly around the Euston area (1,235 ha) and the Baaka - Lower Darling River (615 ha) with plantings of citrus, almonds, wine grapes and vegetables. Retired areas were mainly also in the Euston reach. Total irrigable area remains less than the peak of 58,055 ha in 2018 with field crops (such as pasture, lucerne and fodder) still the dominant crop type. (SunRISE, 2025)

NSW monitors change in irrigation footprint through detailed crop mapping, combining historic and current data. This data informs salinity register reviews and policy development.

5.4 End of Valley Outcomes

Schedule B to the MDB Agreement (Schedule 1 of the *Water Act, 2007*) requires all states and the ACT to monitor salt loads and salinity at EOV sites. This monitoring plays an important role in building an understanding of salinity trends and risks to the shared water resource arising from tributary catchments.

An evaluation of flow and salinity monitoring over the reporting period for each of NSW's 10 EOV sites has been summarised in accordance with BSM2030 Procedures. Data is presented as 5-year rolling salinity and salt load exceedance curves for comparison against an estimate of baseline conditions. Exceedance curves display the probability that salinity or salt load will remain below a concentration or amount over a period of time (percentage of days). Rainfall mass balance graphs indicate where rainfall is either increasing or decreasing, denoting wet or dry periods. Rainfall stations were selected in areas where stream salinity is generated by saline landscapes.

In this reporting period rainfall fluctuated around average conditions, maintaining high groundwater and through-flow in catchments. Higher EC and salt load has occurred in many upland smaller sub-catchments. Rainfall reflected wetter conditions in the north of the state and drier conditions, mostly in 2025 period, in the southern catchments.

5.4.1 NSW Border Rivers valley – 416001 Macintyre River at Mungindi

The residual mass rainfall graph (Figure 5-1) for Inverell shows increasing trend from 2020 to 2023 with fluctuations around the mean more recently. The EC exceedance curve for the current reporting year is outside the upper bounds envelope reflecting increased flow and EC from sub-catchments which are experiencing slightly wetter conditions (Figure 5-2). From late 2024 to mid-year 2025 there has been 3 major periods of increased flow. Salt load (Figure 5-3) is similar to the previous reporting period, which was also a wet period.

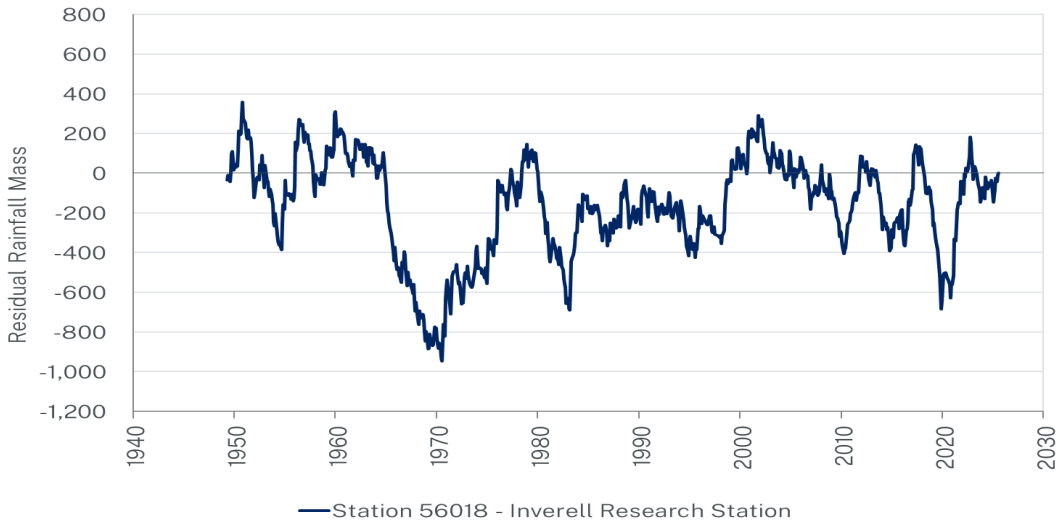


Figure 5-1: Residual mass rainfall for Inverell Research Station

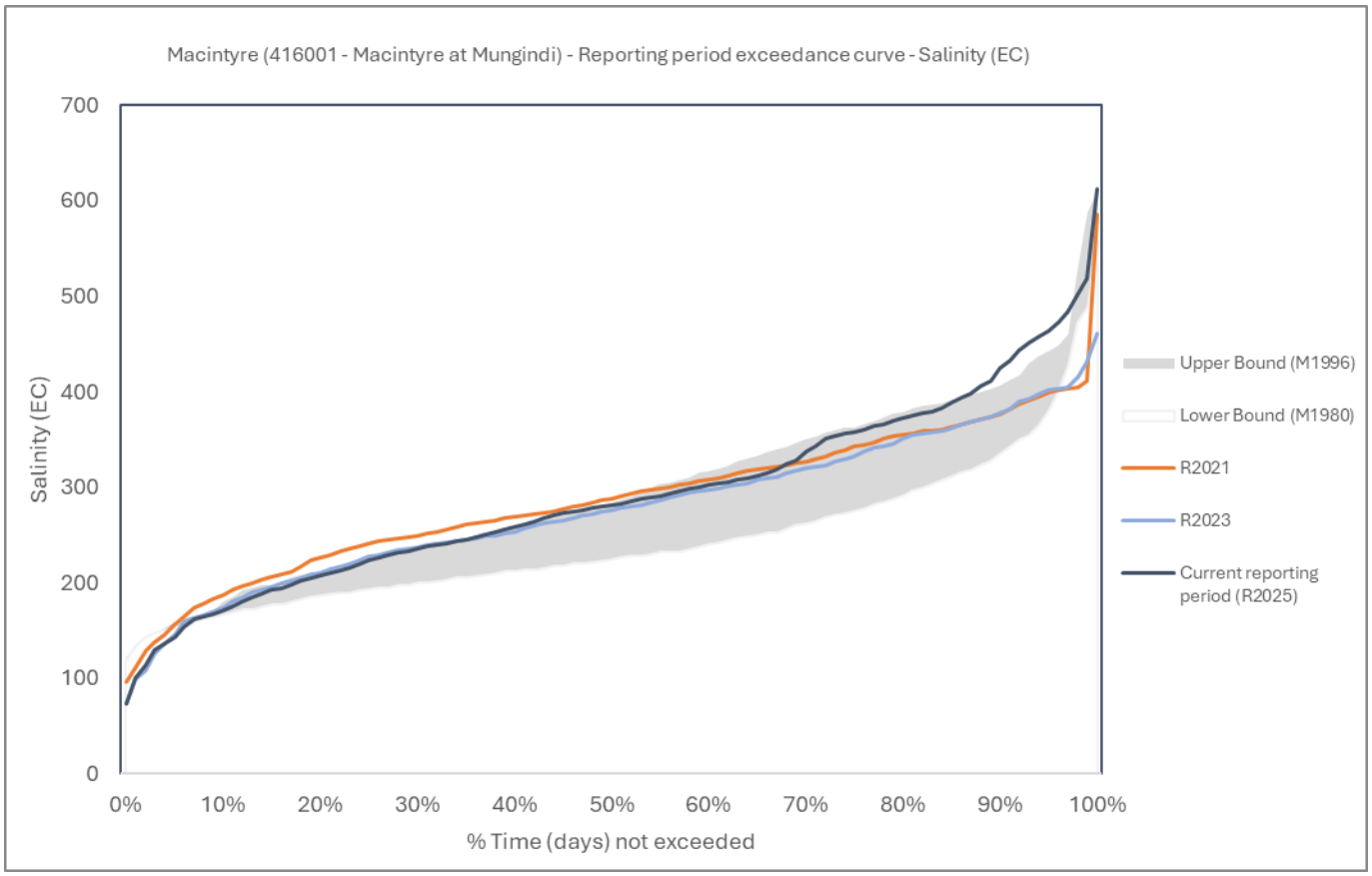


Figure 5-2: Salinity EC - Exceedance Curves for Macintyre River @ Mungindi (416001) for reporting years 2021, 2023, 2025.

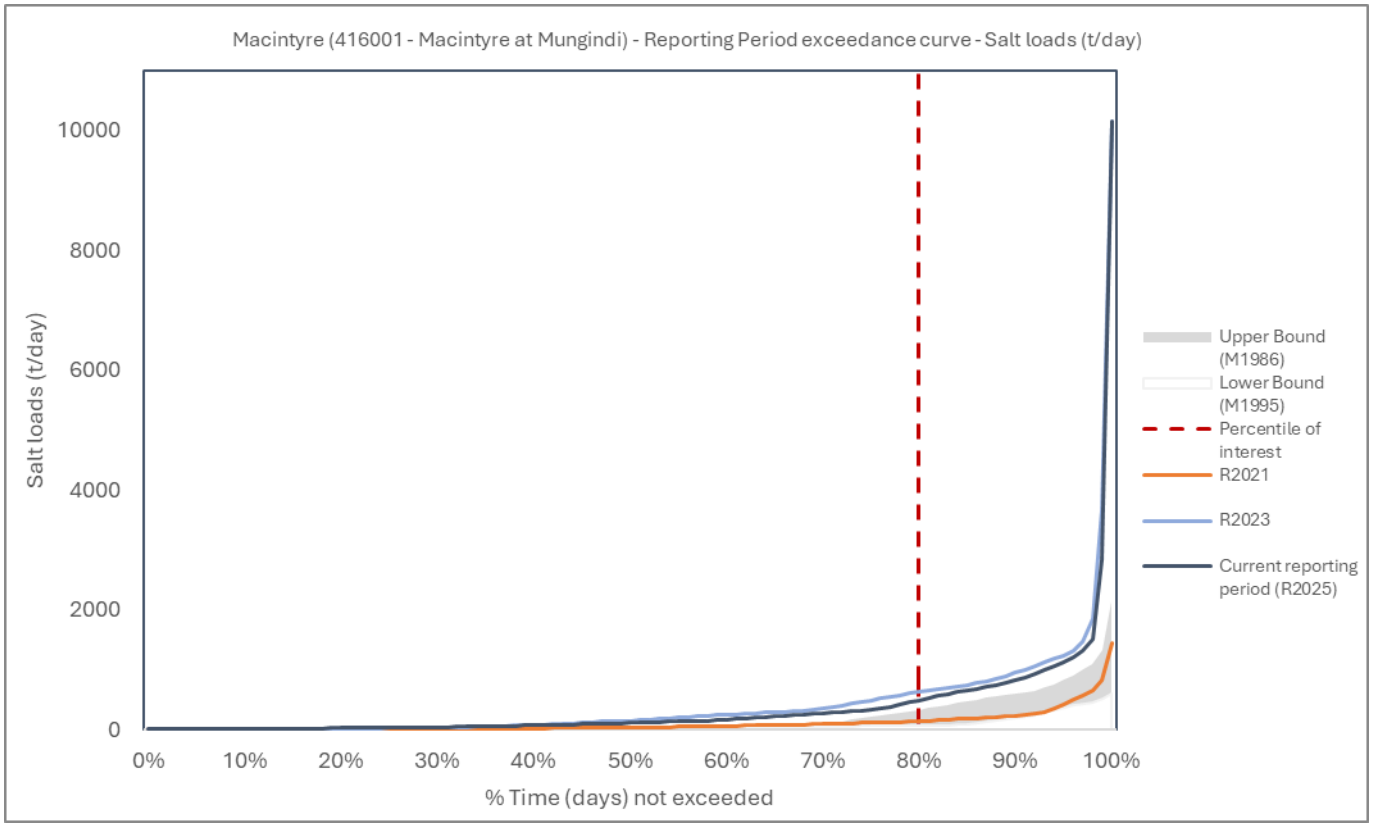


Figure 5-3: Salt Load - Exceedance Curves for Macintyre River @ Mungindi (416001) for reporting years 2021, 2023, 2025.

5.4.2 Gwydir valley – 418058 Mehi River at Bronte

The residual mass rainfall graph (Figure 5-4) for Bingara shows a decline to 2020, then recent increasing trend.

The EC in the current reporting period is approaching the upper bounds of exceedance curve reflecting increased flow conditions and increasing impact from a small number of saline catchments (Figure 5-5). High EC conditions occurred in late 2023, followed by 3 high flow periods with variable EC conditions since late 2024. The salt load is similar to the last reporting period and remains high. In the current year, the higher flow and higher EC have resulted in high salt load (Figure 5-6), due to increased saline flows from mid valley catchments There may be some increased load from saline catchments.

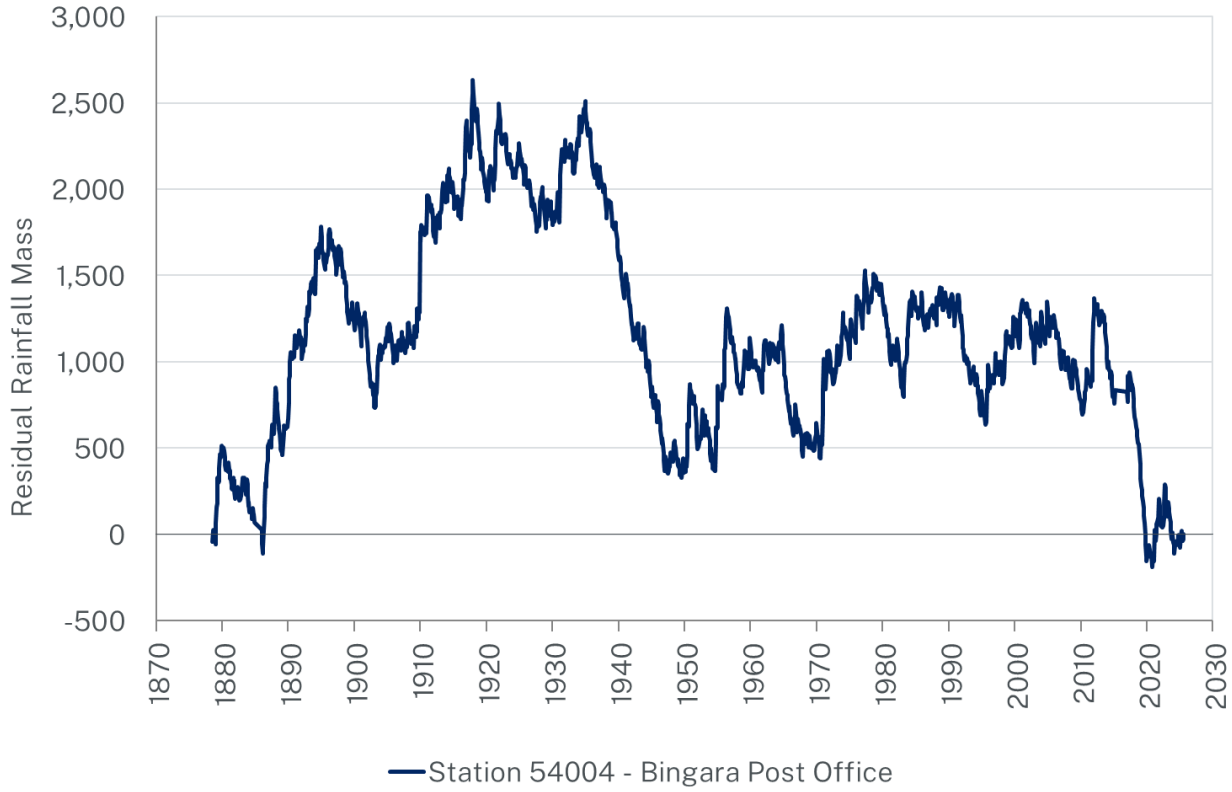


Figure 5-4: Residual mass rainfall for Bingara Post Office

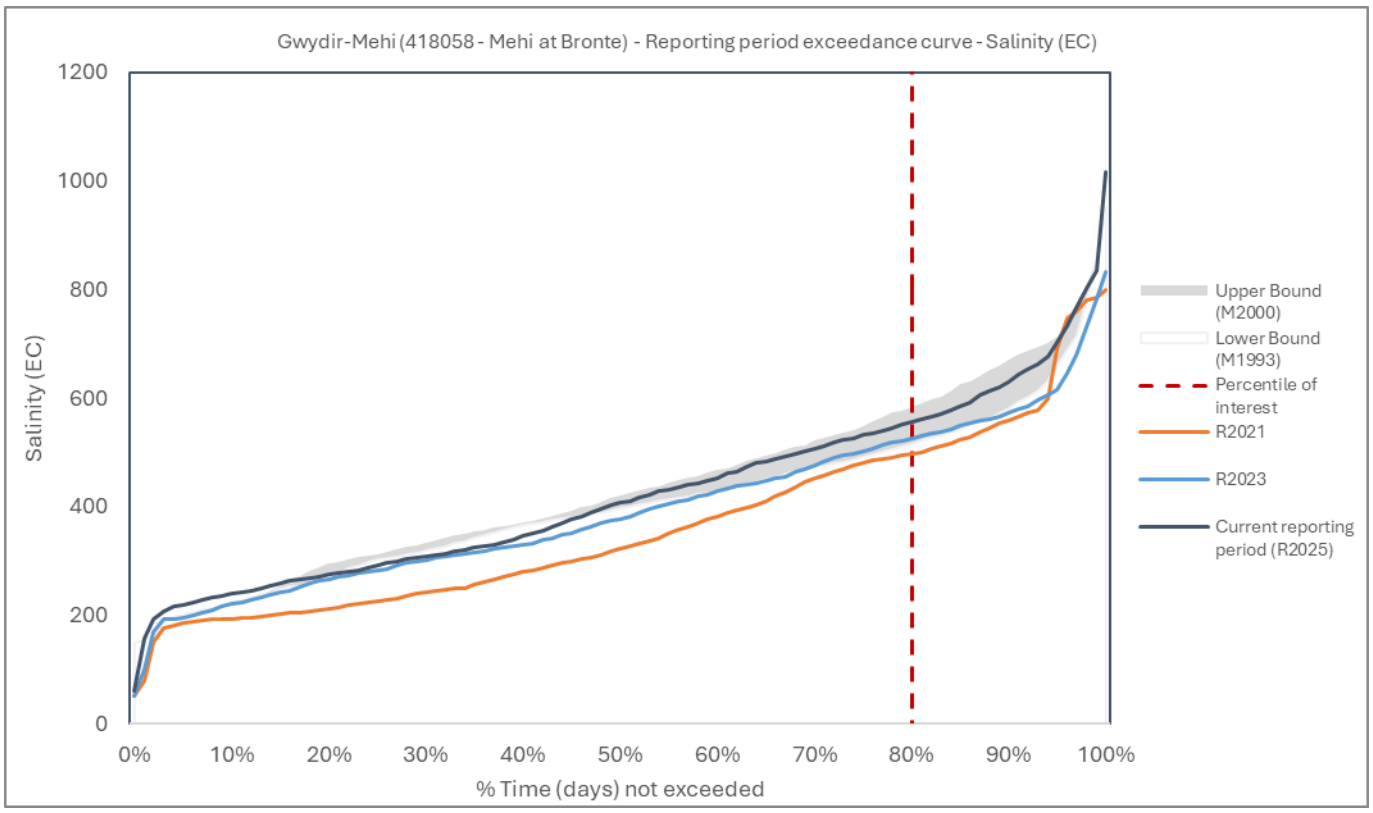


Figure 5-5: Salinity EC - Exceedance Curves for Mehi River @ Bronte (418058) for reporting years 2021, 2023, 2025.

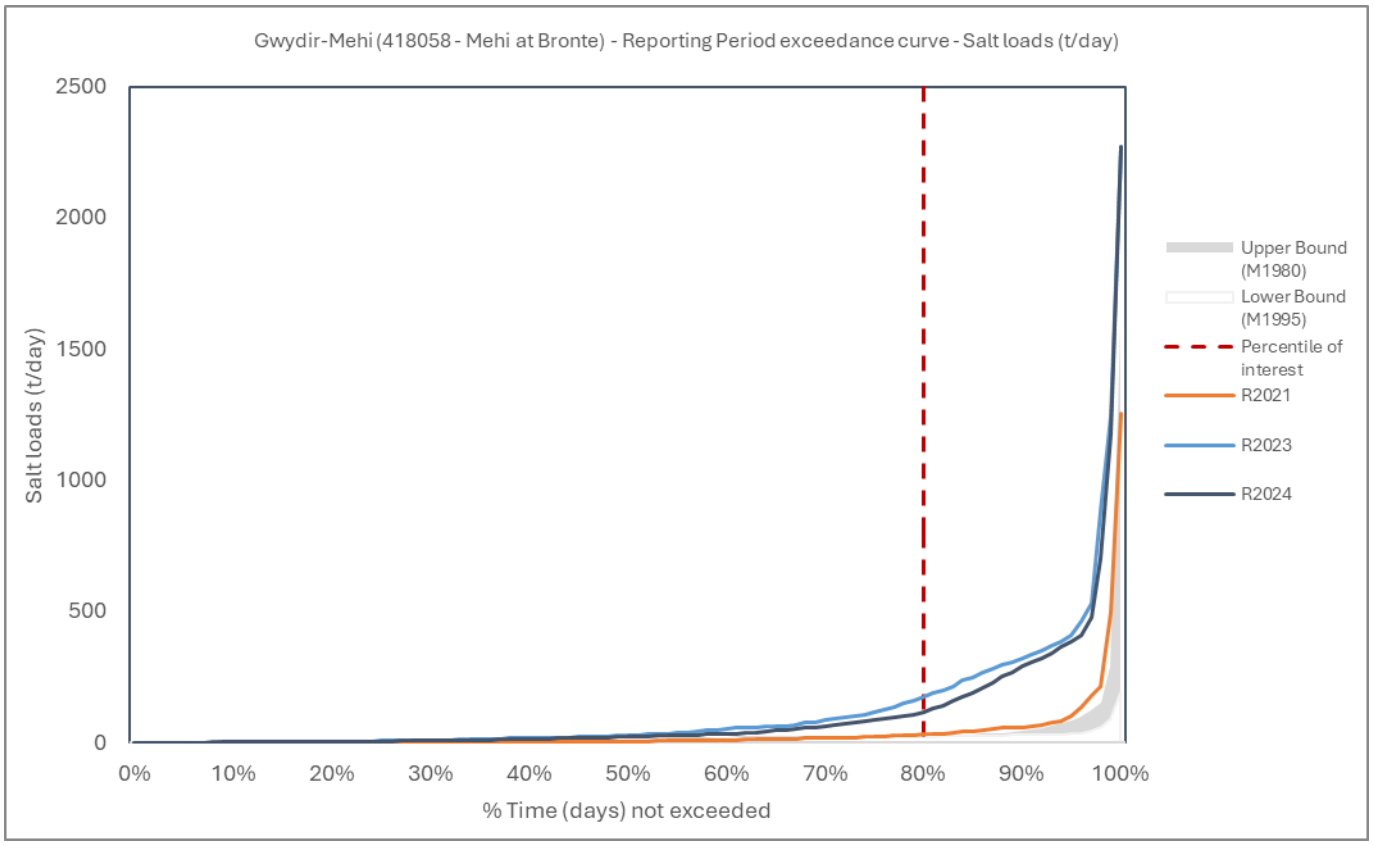


Figure 5-6: Salt Load - Exceedance Curves for Mehi River @ Bronte (418058) for reporting years 2021, 2023, 2025.

5.4.3 Namoi valley – 419026 Namoi River at Goangra

The residual mass rainfall graph (Figure 5-7) for Gunnedah shows increasing trend from 2020. The Namoi valley has experienced increasing rainfall since June 2024, with increasing flows through time and a major flood event (July 2025) with damage to major infrastructure such as bridges and low-lying areas of Tamworth. The catchment is still very wet.

The EC in the current reporting year is well below the lower bounds reflecting increased flow conditions (Figure 5-8). Results are similar to previous years where there has been flow outside the lower bound conditions. In the current year, the higher flow and higher EC have resulted in higher salt load (Figure 5-9) similar to the 2023 reporting year. This is a flow relationship influenced by increasing stream EC in mid catchments, especially the Liverpool Plains area.

Figure 5-7: Residual mass rainfall for Gunnedah airport

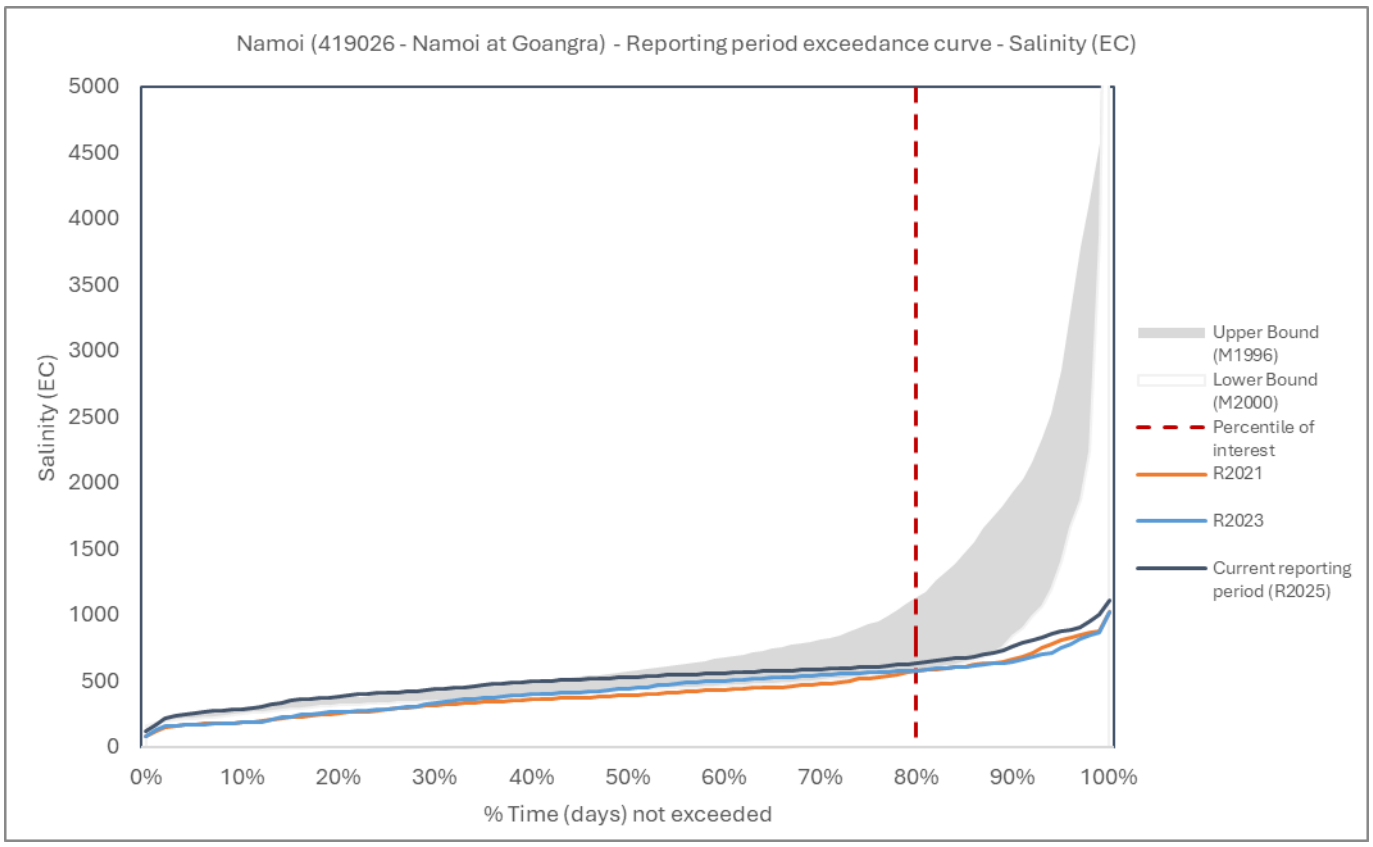


Figure 5-8: Salinity EC - Exceedance Curves for Namoi River @ Goangra (419026) for reporting years 2021, 2023, 2025.

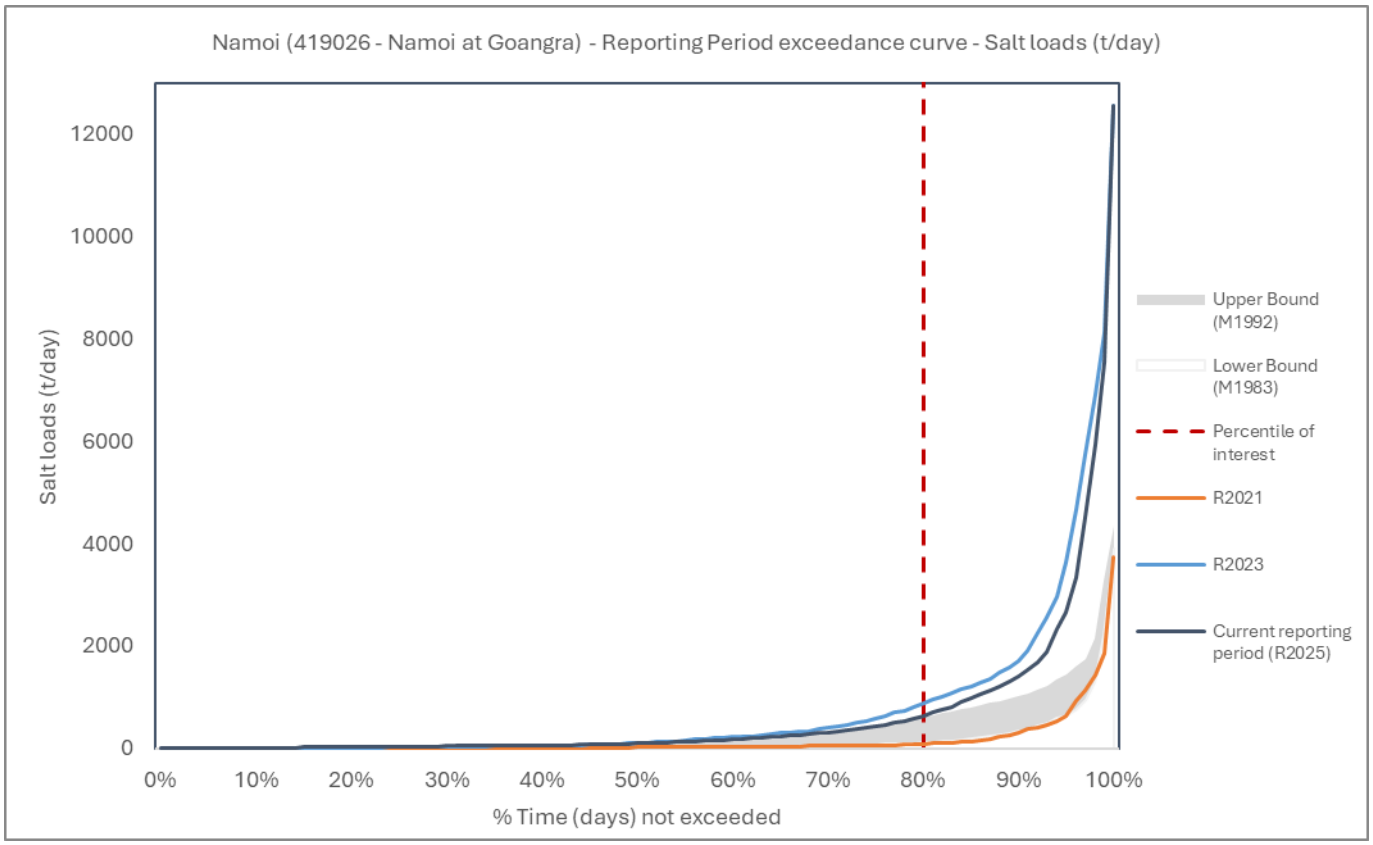


Figure 5-9: Salt Load - Exceedance Curves for Namoi River @ Goangra (419026) for reporting years 2021, 2023, 2025.

5.4.4 Bogan valley – 421023 Bogan River at Gongolgon

The residual mass rainfall graph (Figure 5-10) for Nyngan shows increasing trend from 2020. Catchment rainfall dipped in late 2023 with increased trend in late 2024.The Bogan River normally has large numbers of cease to flow events, especially in dry years. In the reporting period there has been almost a full recording period, due to the increased rainfall and runoff.

The EC in the current reporting year has exceeded the 80% threshold which is likely due to both high salinity discharge from upland catchments of Cooks Myalls and as well as mobilisation of the salt store in the mid Bogan area. In previous years, the EC has been much less (Figure 5-11). The higher flow and higher EC have resulted in higher salt load (Figure 5-12), like the previous reporting period.

Figure 5-10: Residual mass rainfall for Nyngan (The Plains)

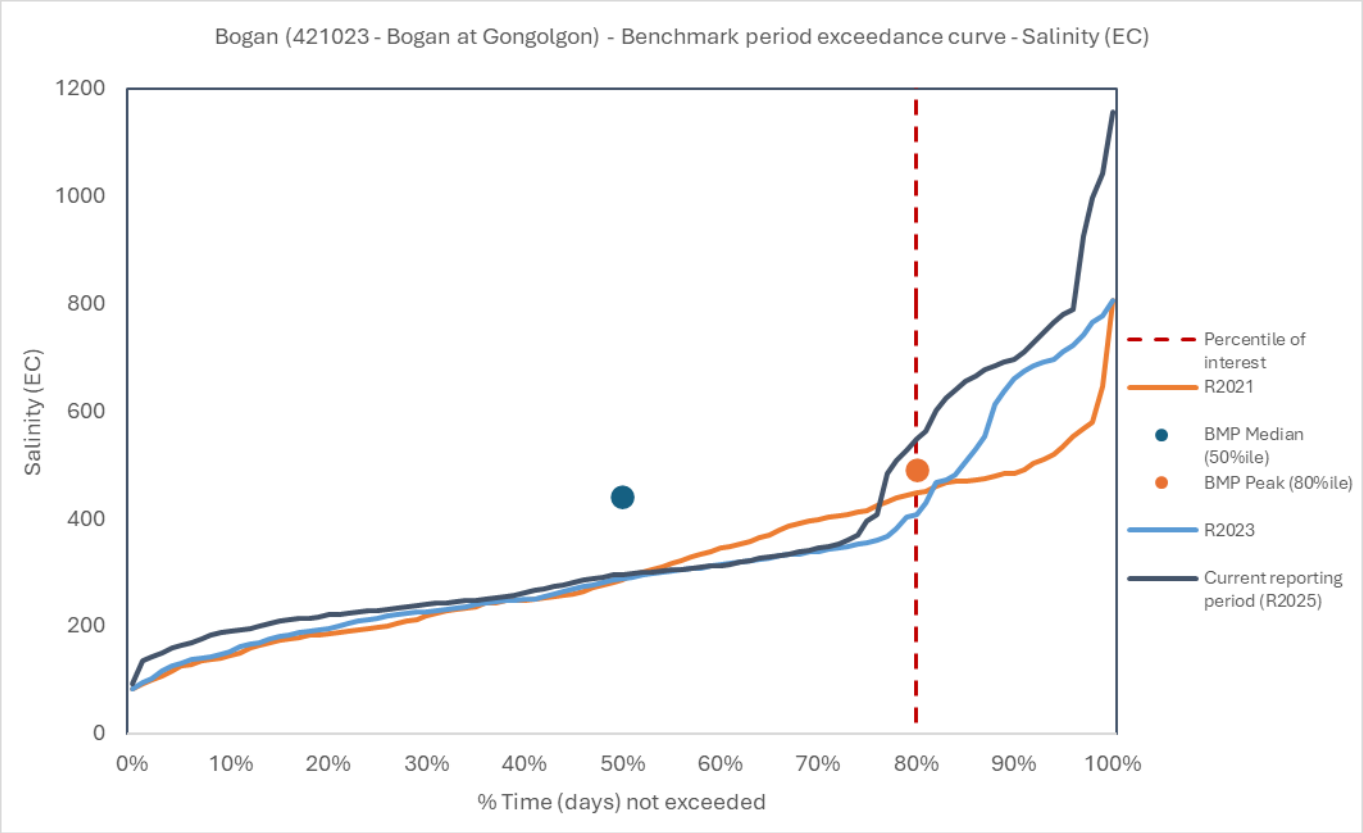


Figure 5-11: Salinity EC - Exceedance Curves for Bogan River @ Gongolgon (421023) for reporting years 2021, 2023, 2025.

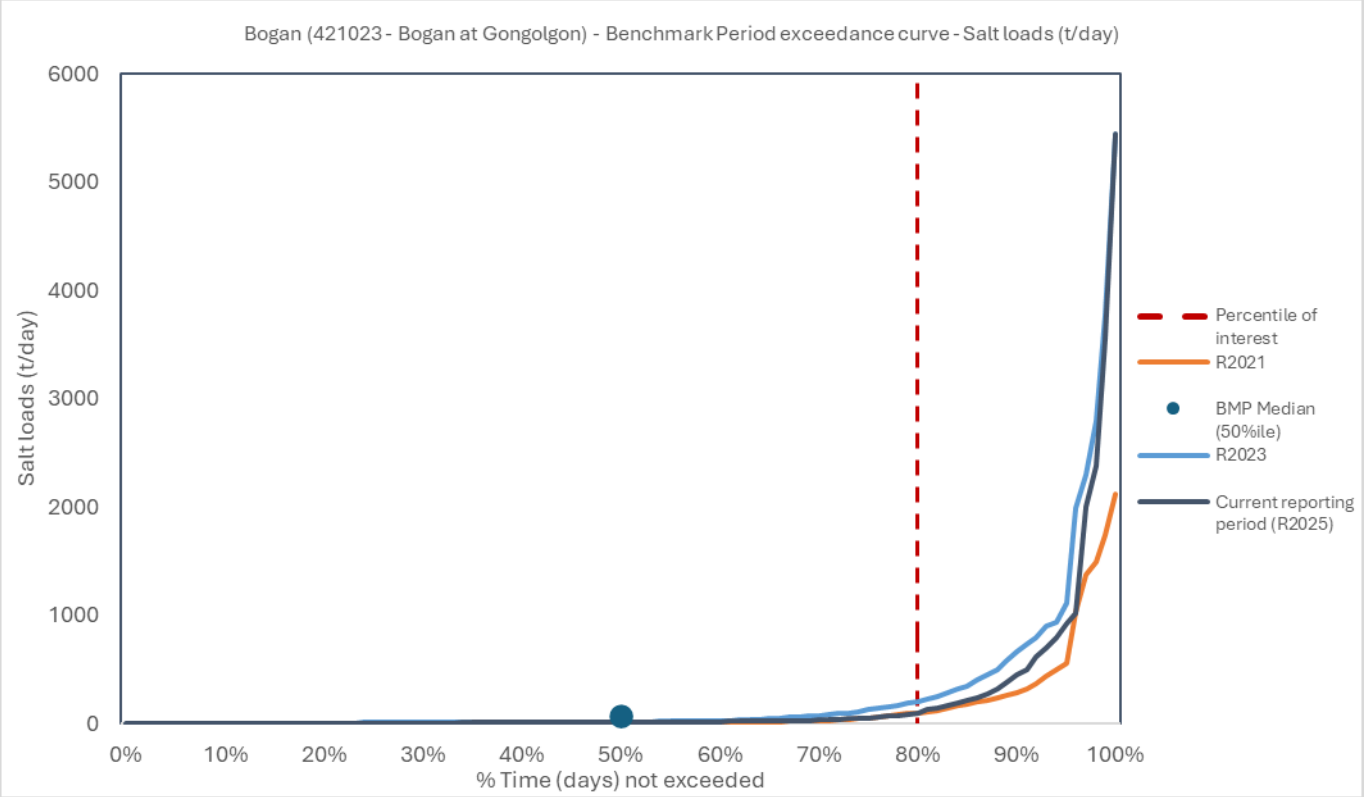


Figure 5-12: Salt Load - Exceedance Curves for Bogan River @ Gongolgon (421023) for reporting years 2021, 2023, 2025.

5.4.5 Macquarie valley– 421012 Macquarie River at Carinda (Bell's Bridge)

The residual mass rainfall graph (Figure 5-13) for Wellington shows increasing trend from 2020, with a general increasing trend from 1980. Catchment rainfall has resulted in high flows in late 2024, with a depression in EC and then a levelling out in 2025.

The EC in the current reporting year is mid-range within bounds of exceedance, but is significantly higher than the preceding reporting period, highlighting higher discharge from the mid valley sub-catchments of Little River, Bell Cudgegong and Talbragar Rivers who are all experiencing higher local EC. (Figure 5-14).For salt load (in the current year) the moderate flow and higher EC have resulted in slightly less salt load that than previous reporting period (Figure 5-15).

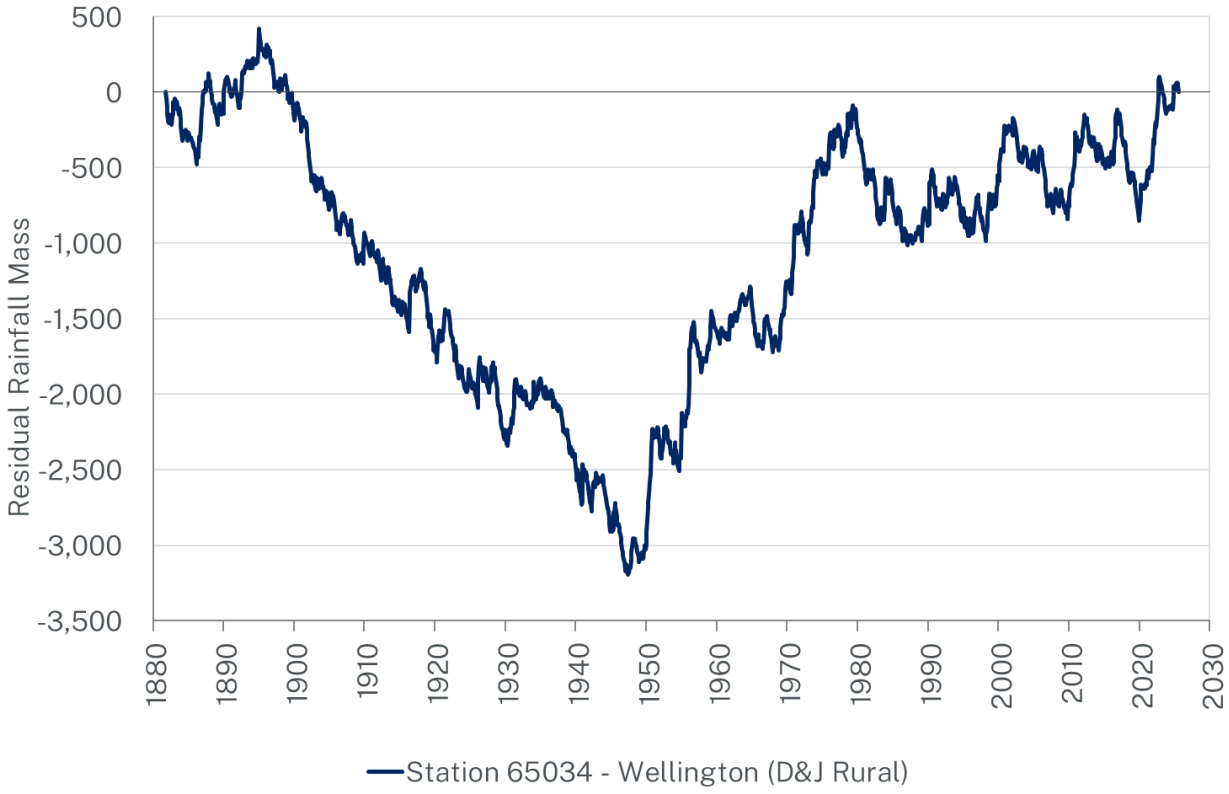


Figure 5-13: Residual mass rainfall for Wellington

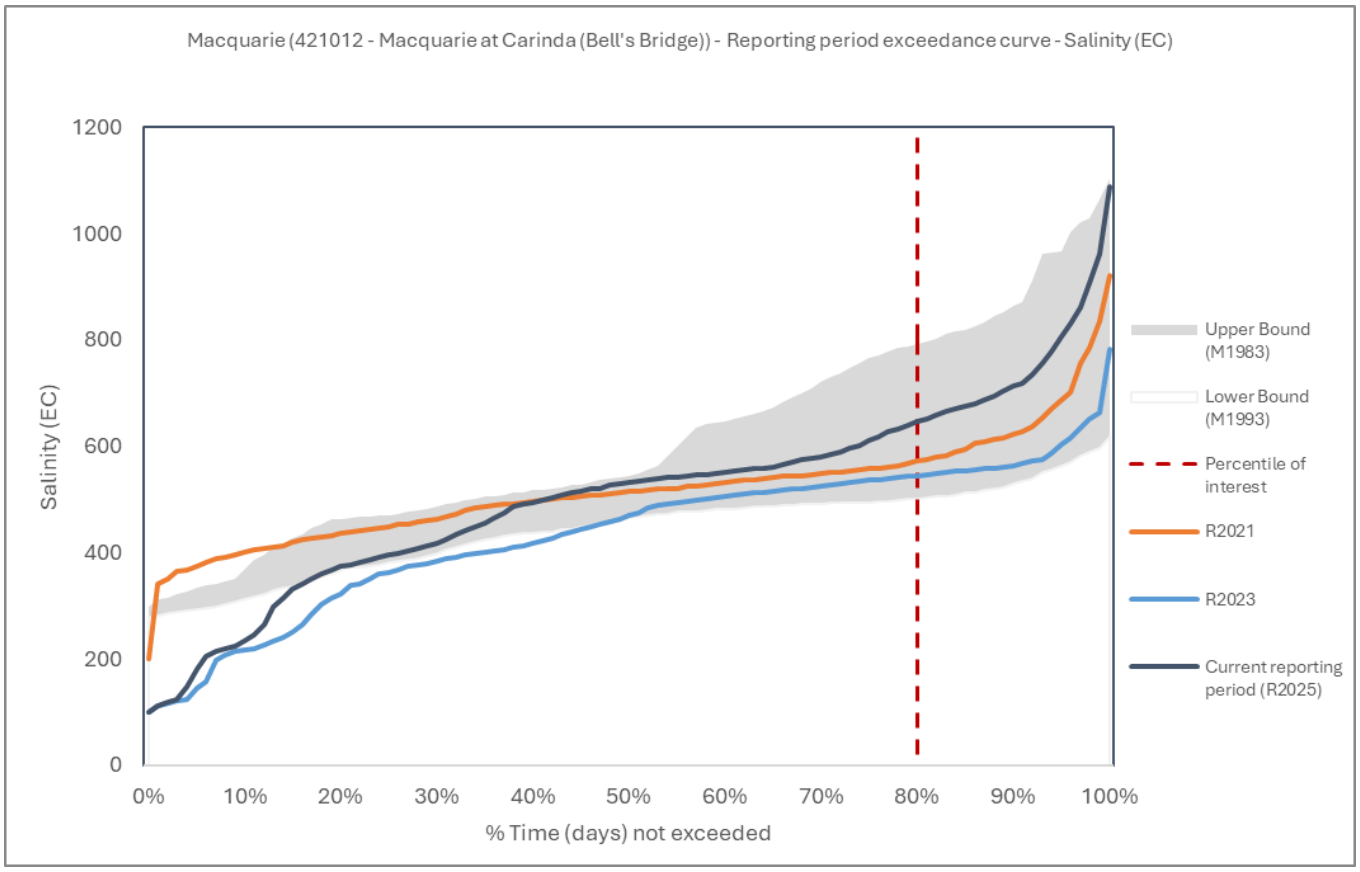


Figure 5-14: Salinity EC - Exceedance Curves for Macquarie River @ Carinda (Bell's Bridge) (421012) for reporting years 2021, 2023, 2025.

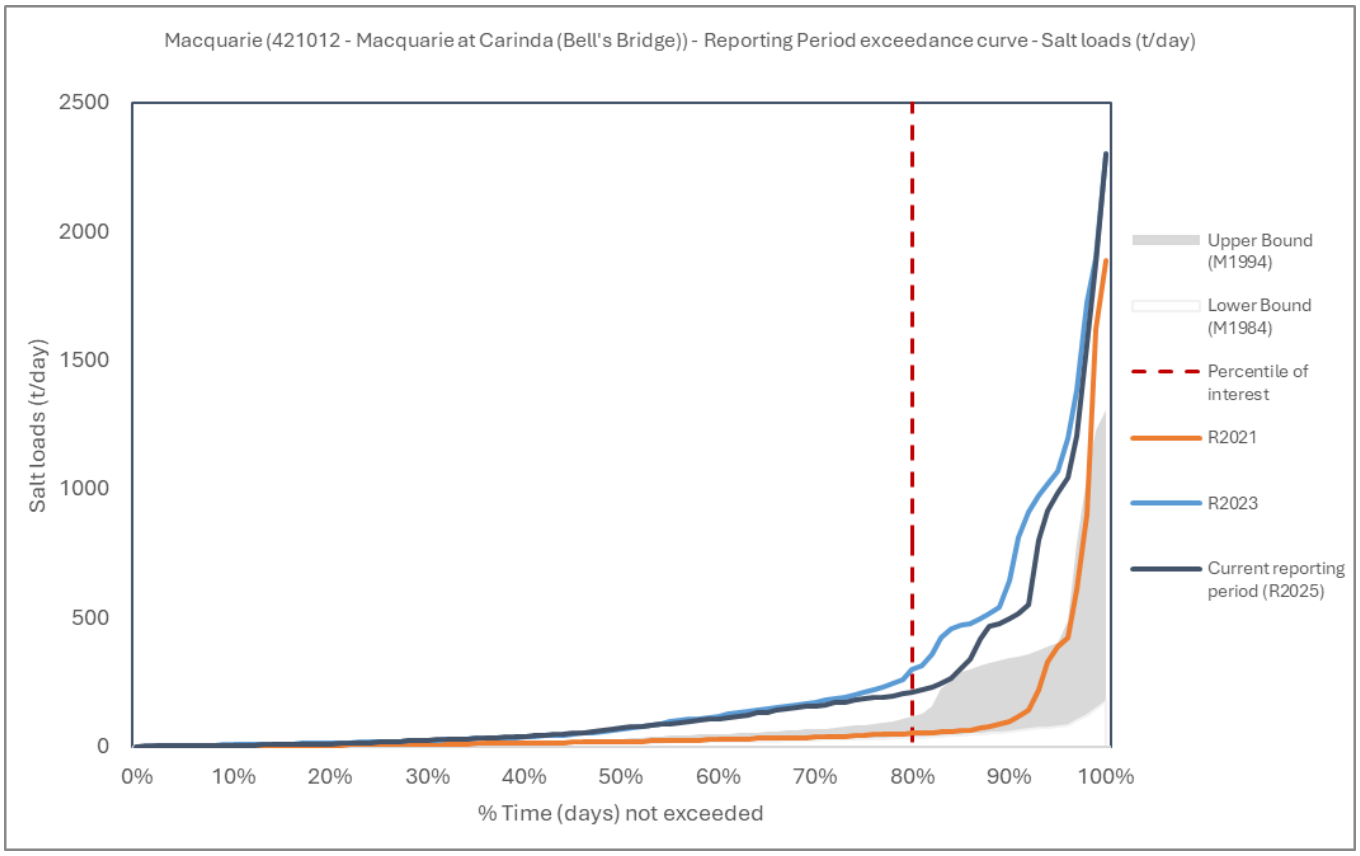


Figure 5-15: Salt Load - Exceedance Curves for Macquarie River @ Carinda (Bell's Bridge) (421012) for reporting years 2021, 2023, 2025.

5.4.6 Castlereagh valley– 420020 Castlereagh River at Gungalman Bridge

The residual mass rainfall graph (Figure 5-16) for Coonamble shows increasing trend from 2020, with fluctuations around the mean in recent years. There have been 3 high flow events during the reporting period, with some data loss in records after those events.

The EC in the current reporting year is above the upper bounds and exceeded the 80% threshold figure, reflecting increased flow conditions and mobilisation of salt from upstream flat lying saline areas (Figure 5-17). In the current year, higher flow and higher EC have resulted in higher salt load (Figure 5-18).

Figure 5-16: Residual mass rainfall for Coonamble

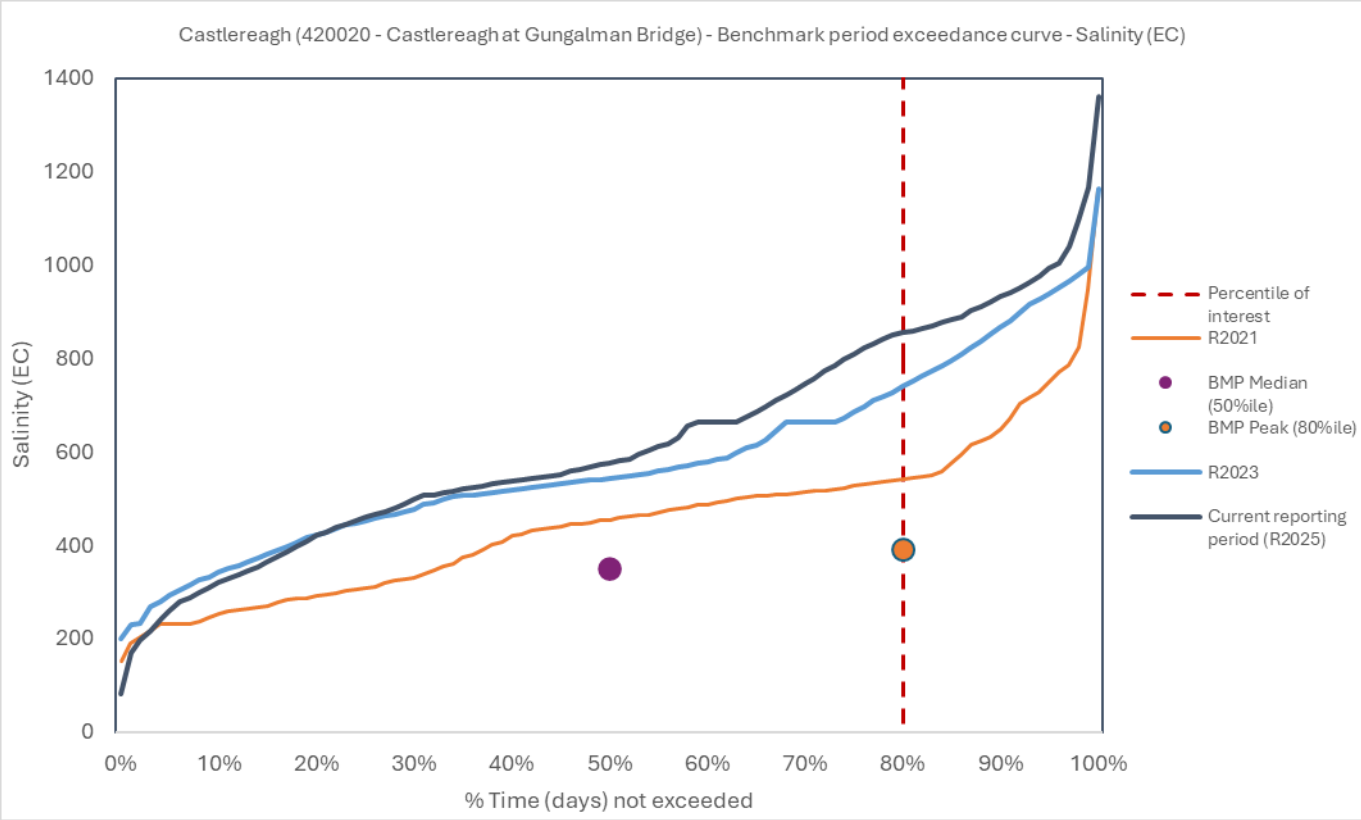


Figure 5-17: Salinity EC - Exceedance Curves for Castlereagh River @ Gungalman Bridge (420020) for reporting years 2021, 2023, 2025.

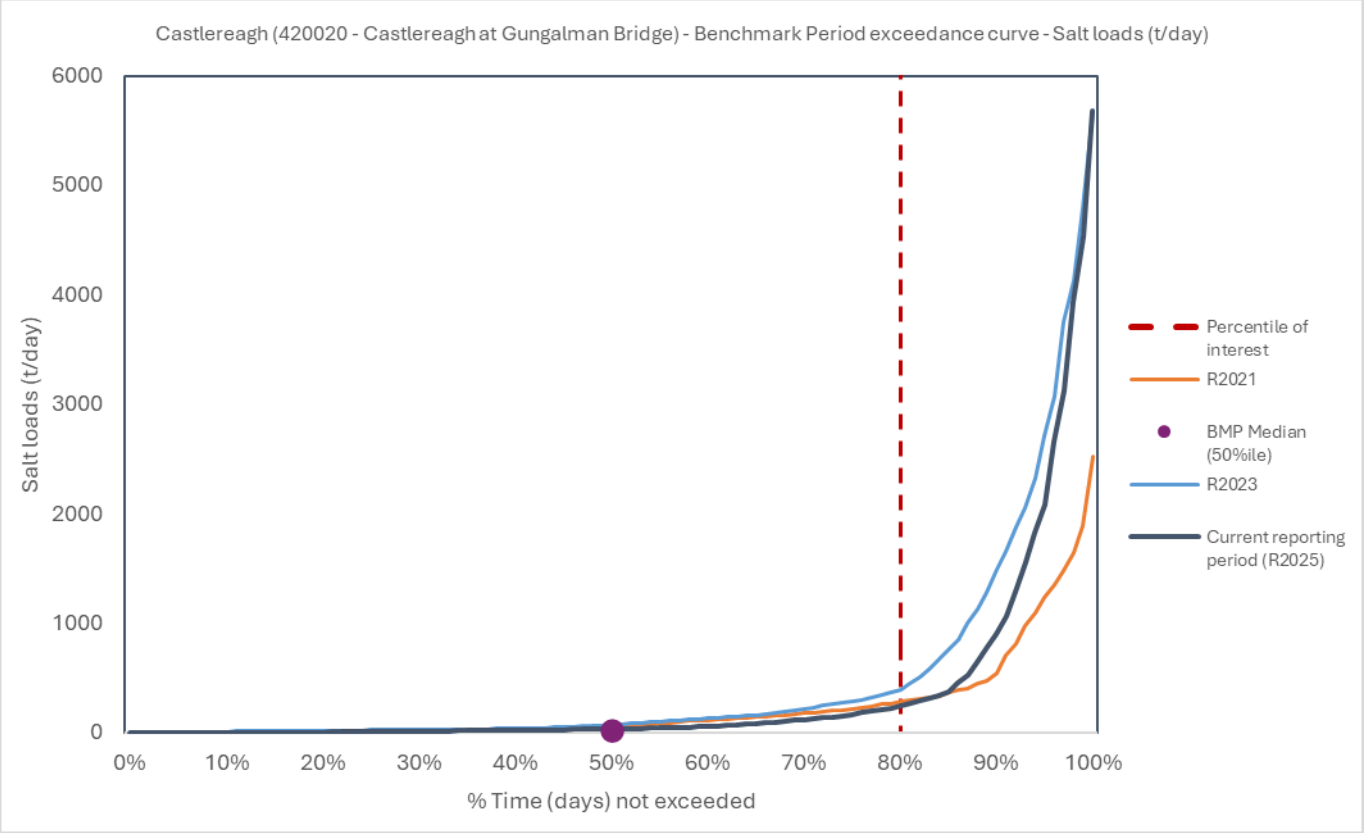


Figure 5-18: Salt Load - Exceedance Curves for Castlereagh River @ Gungalman Bridge (420020) for reporting years 2021, 2023, 2025.

5.4.7 Barwon-Darling valley– 425008 Darling River at Wilcannia (Main Channel)

The residual mass rainfall graph (Figure 5-19) for Bourke shows increasing trend from 2020. Catchment rainfall started to increase prior to June 2024.

The EC in the current reporting year is above the 80% threshold and higher than previous reporting years, due to increases in tributary catchment EC in the northern basin. There has been a series of 3 high flow events, with higher EC being recorded just prior to those events (Figure 5-20).

In the current year, the salt load above the salt load threshold ranges (Figure 5-21). This is due to higher inputs of salt from saline upstream reaches, coupled with increased flow.

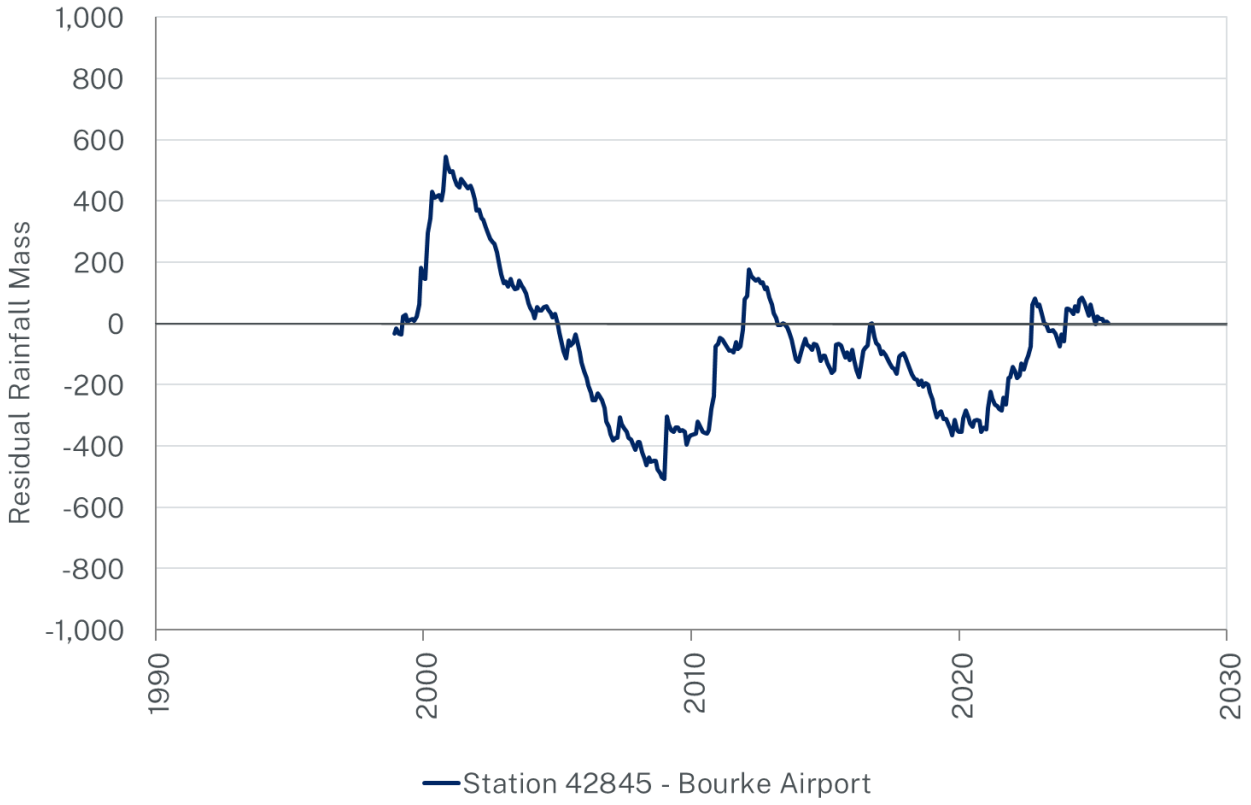


Figure 5-19: Residual mass rainfall at Bourke airport

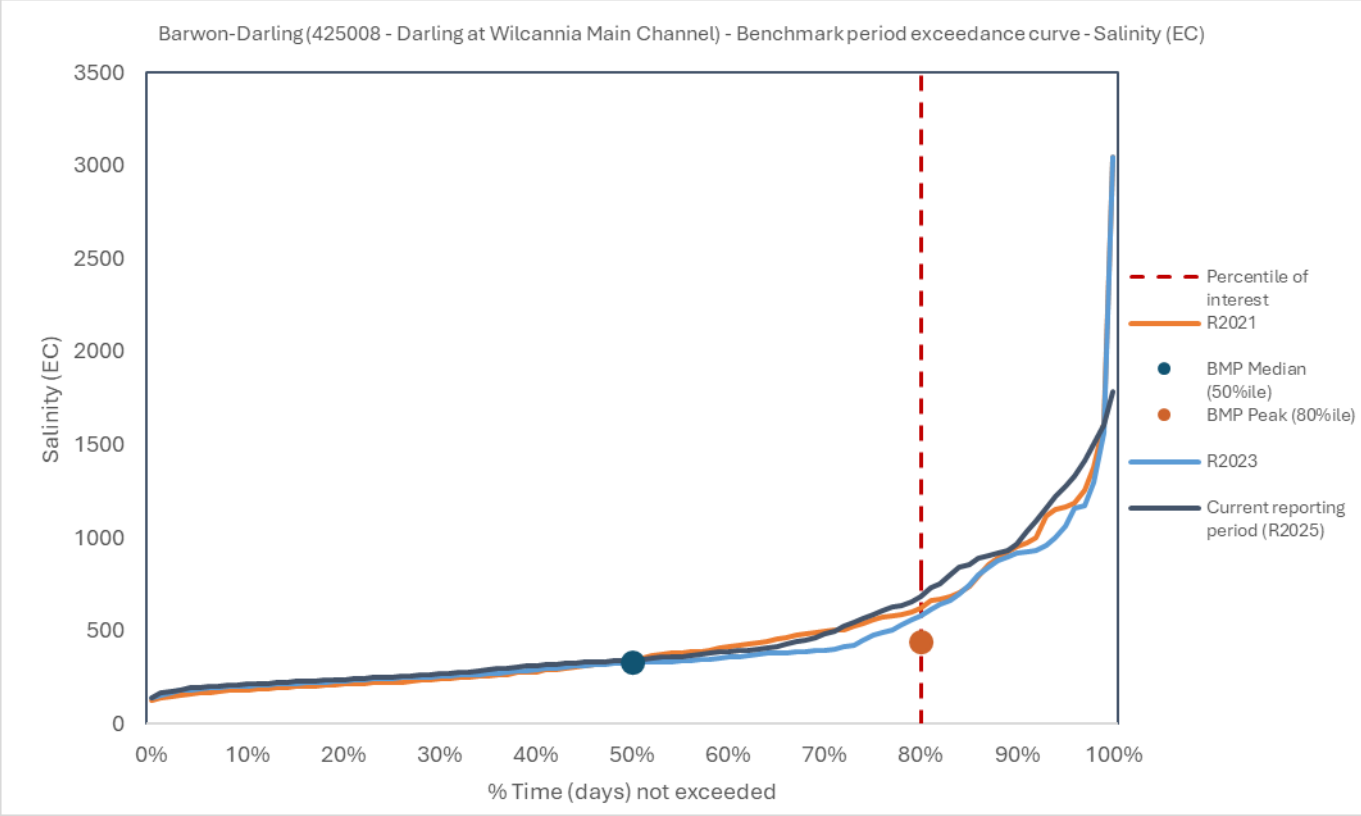


Figure 5-20: Salinity EC - Exceedance Curves for Darling River@ Wilcannia (425008) for reporting years 2021, 2023, 2025.

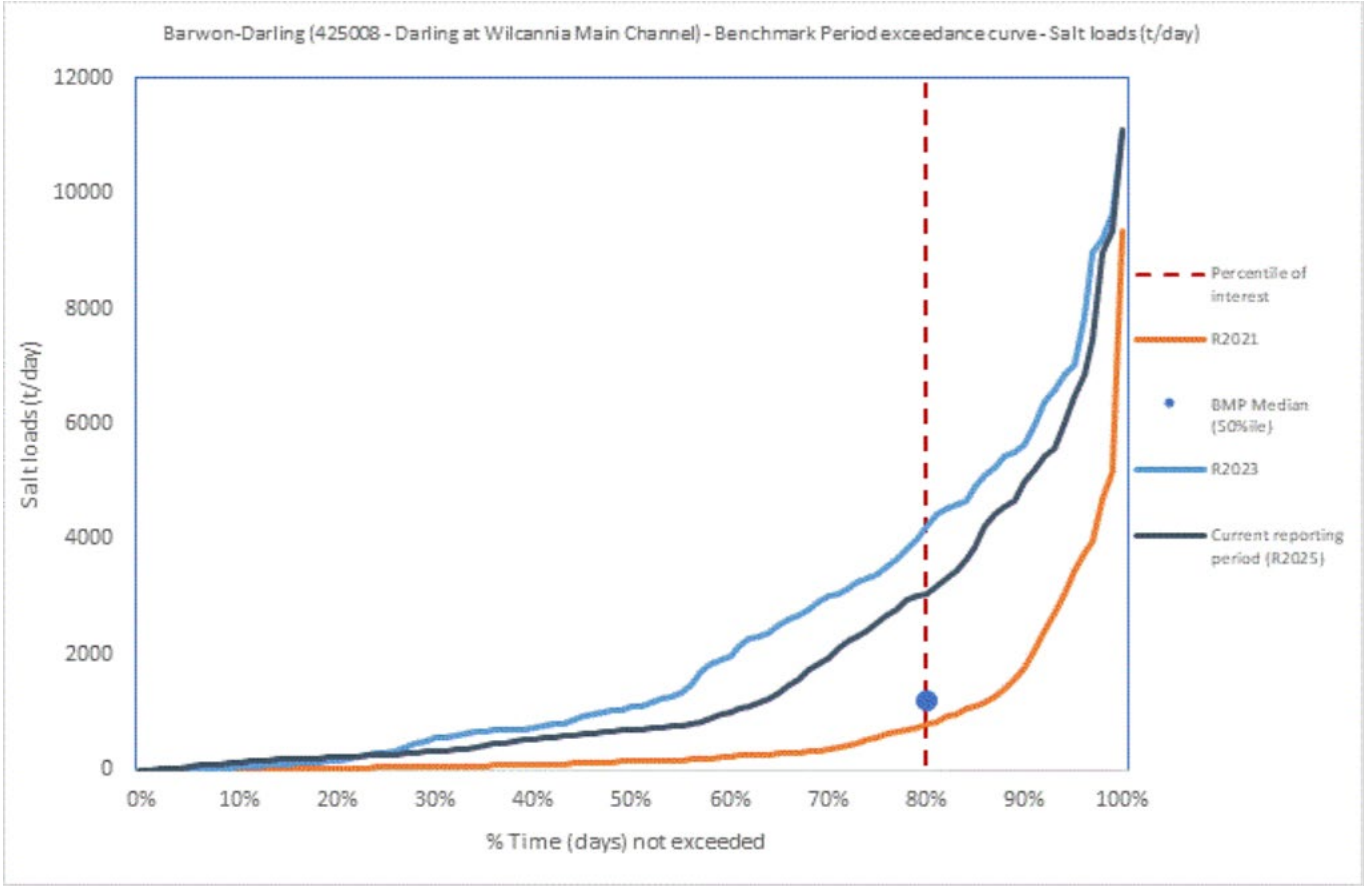


Figure 5-21: Salt load - Exceedance Curves for Darling River@ Wilcannia (425008) for reporting years 2021, 2023, 2025

5.4.8 Lachlan valley – 412004 Lachlan River at Forbes (Cottons Weir)

The residual mass rainfall graph (Figure 5-22) for Cowra shows increasing trend from 2020. The Lachlan has received relatively good rainfall since 2023.

The EC for the current reporting year is within the upper and lower bounds reflecting increased flow conditions and EC from mid valley catchments. The exceedance curve is higher than previous reporting periods (Figure 5-23).

In the current year, the higher flow and higher EC have resulted in higher salt load. This is due to higher inputs of salt from saline upstream sub-catchments, mostly the Boorowa River catchment (Figure 5-24).

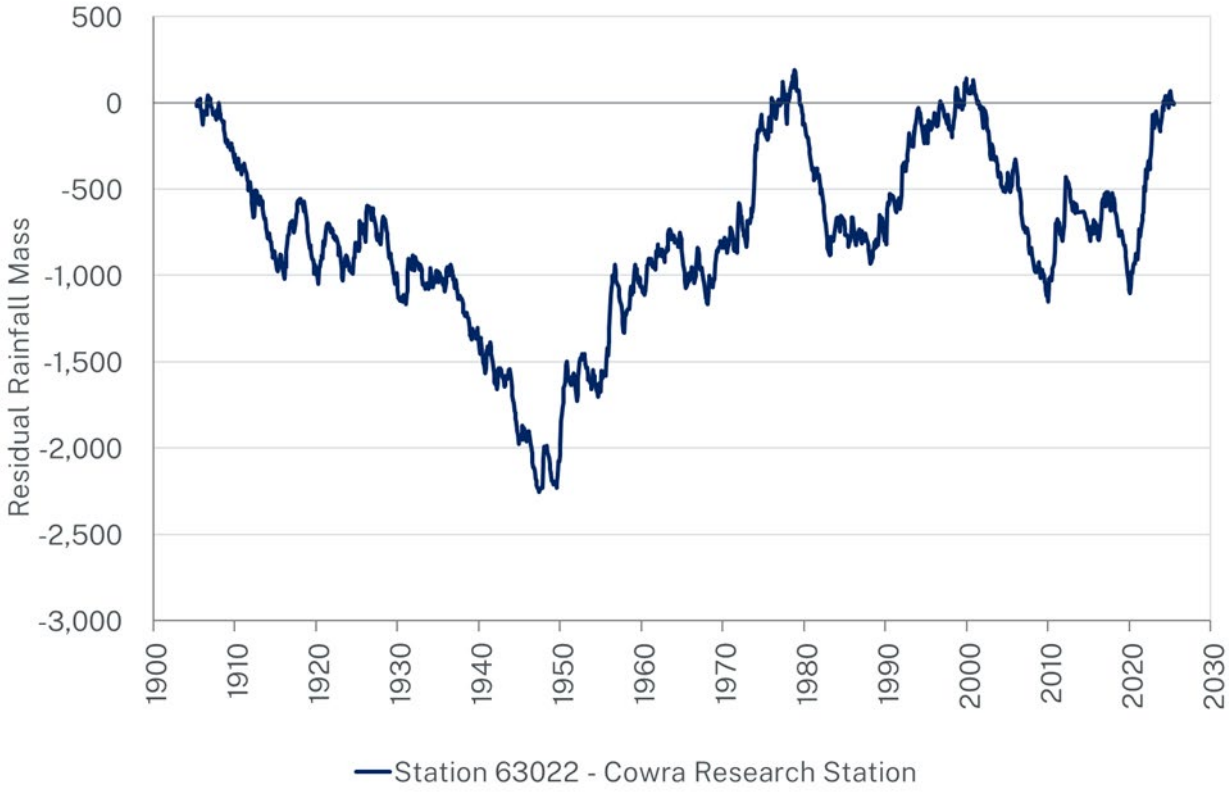


Figure 5-22: Residual mass rainfall at Cowra Research Station

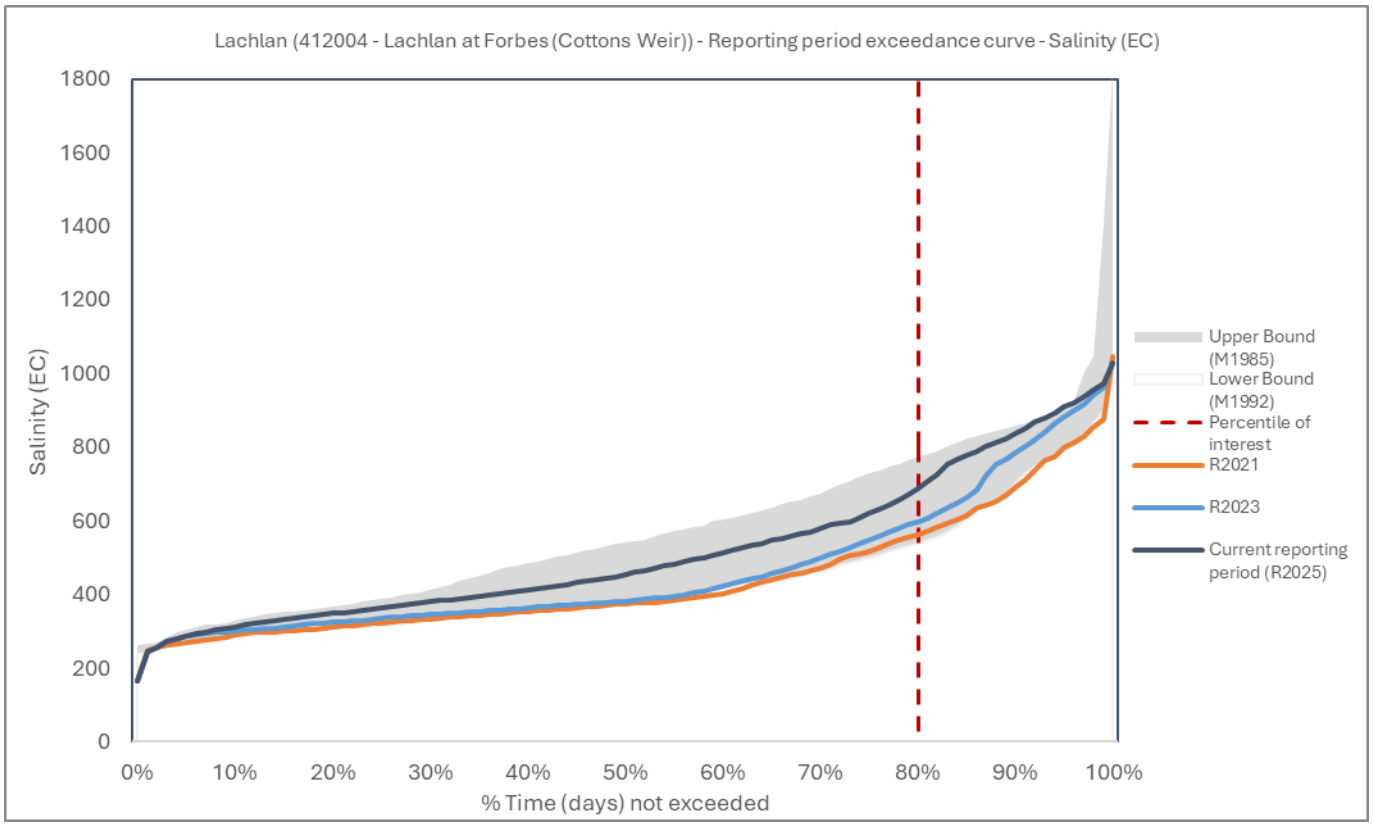


Figure 5-23: Salinity EC - Exceedance Curves for Lachlan River @Cottons Weir (412004) for reporting years 2021, 2023, 2025.

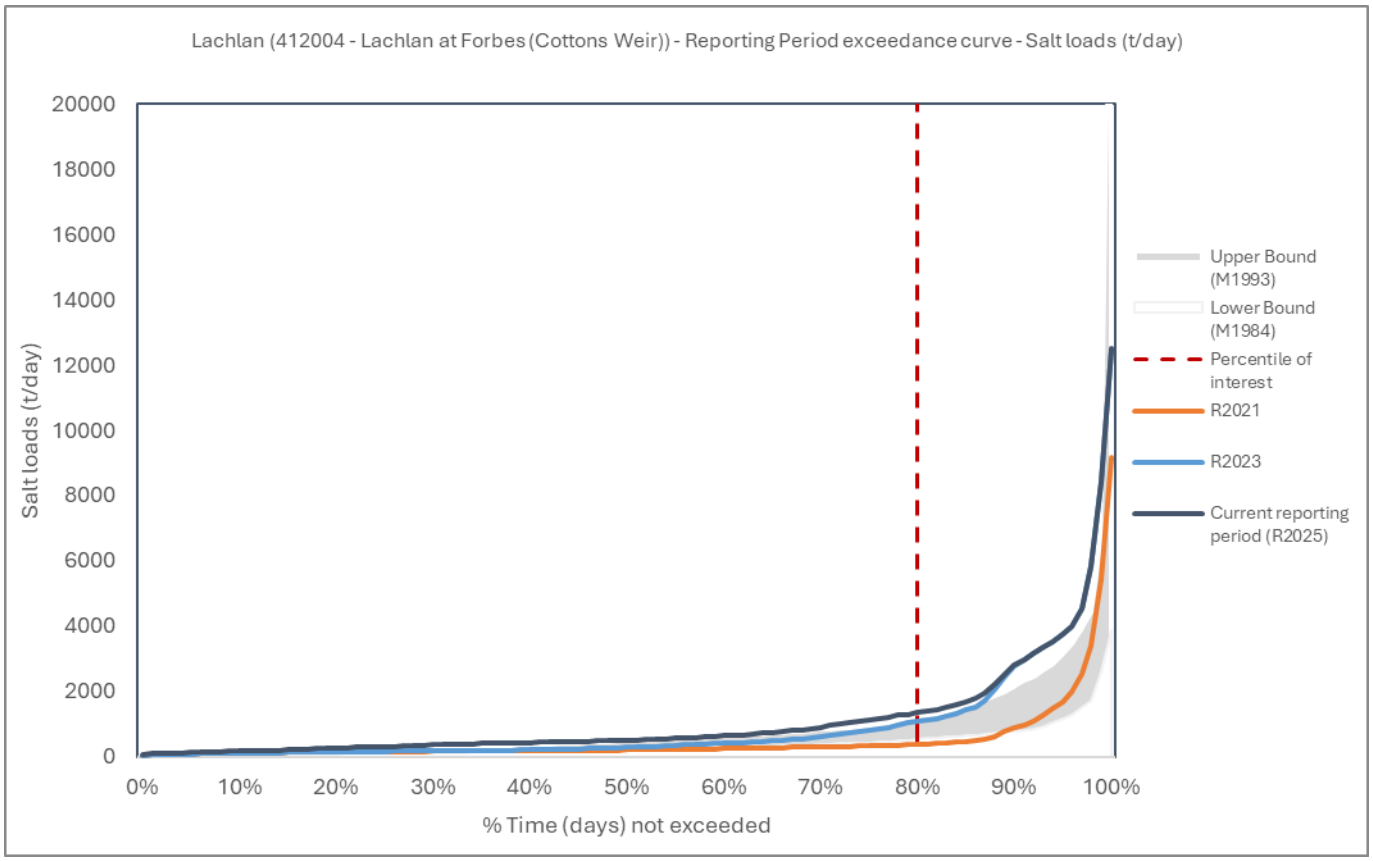


Figure 5-24: Salt Load - Exceedance Curves for Lachlan River @Cottons Weir (412004) for reporting years 2021, 2023, 2025.

5.4.9 Murrumbidgee valley– Murrumbidgee River at Balranald (410130)

The residual mass rainfall graph (Figure 5-25) for Wagga Wagga shows increasing trend from 2020, with fluctuations above the mean. The catchment has been drying out since late 2024 with reduced rainfall in southern NSW.

The EC curves for the current reporting year is within the upper and lower bounds (Figure 5-26). The EC is higher than previous reporting years, reflecting increased flow conditions and impact of increased stream EC from mid valley Jugiong and Muttama creeks. Fresh flows from Snowy Scheme aid in dilution of those saline sub-catchments, maintaining good water quality to irrigators.

The higher inputs of salt from saline upstream sub-catchments coupled with larger flows have resulted in higher salt load than previous periods (Figure 5-27).

Figure 5-25: Residual mass rainfall at Wagga Wagga AMO

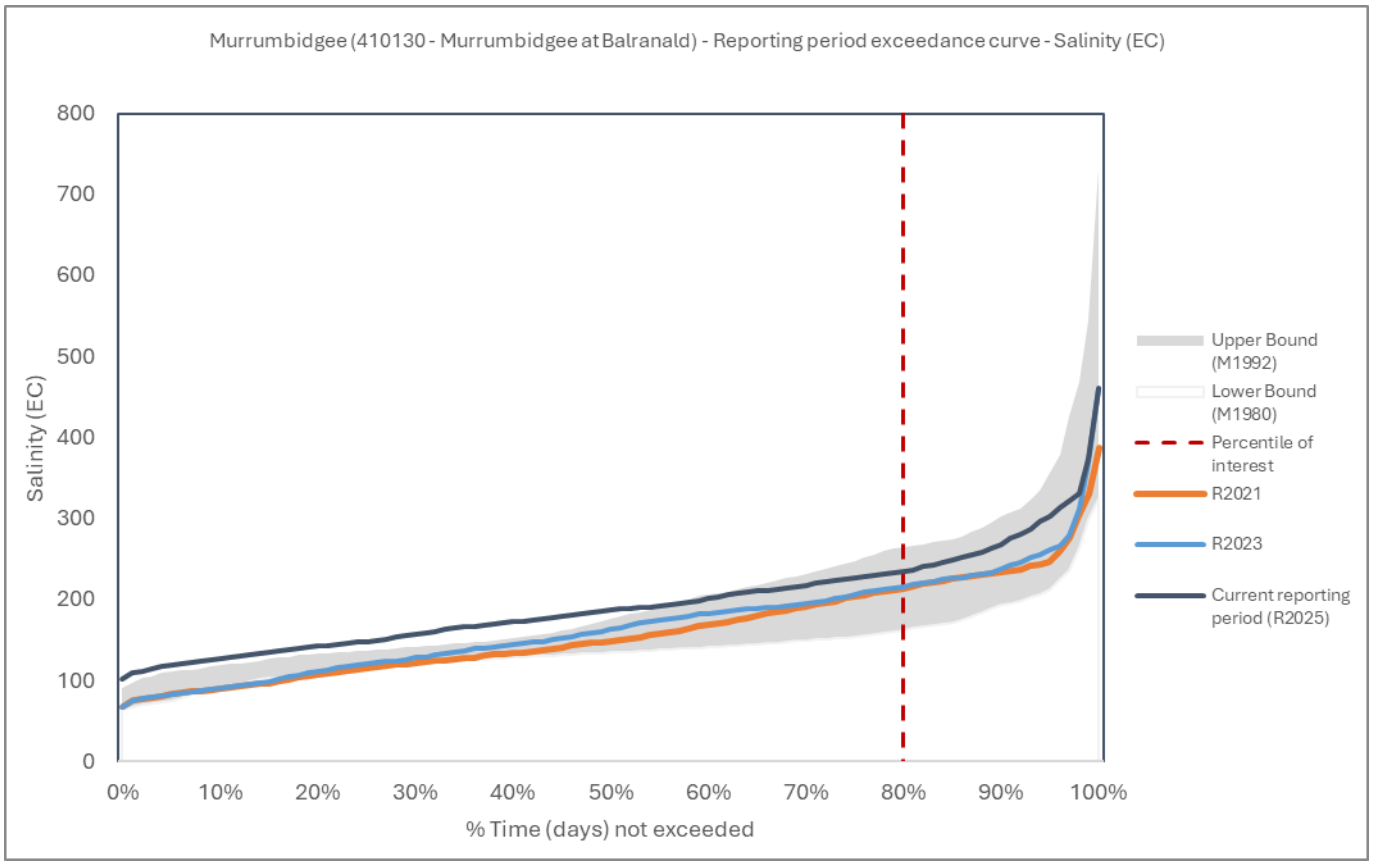


Figure 5-26: Salinity EC - Exceedance Curves for Murrumbidgee River @ Balranald (410130) for reporting years 2021, 2023, 2025.

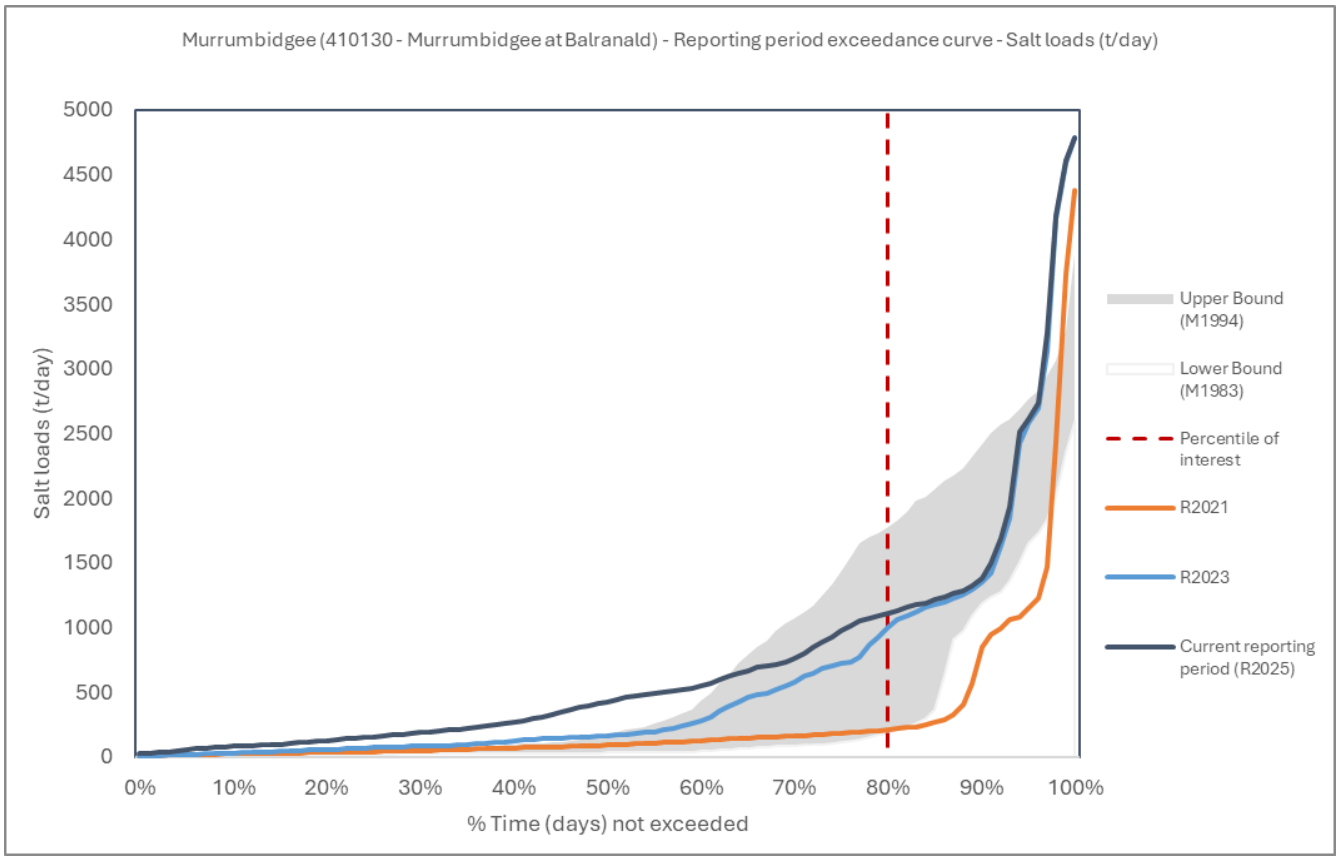


Figure 5-27: Salt Load - Exceedance Curves for Murrumbidgee River @ Balranald (410130) for reporting years 2021, 2023, 2025

5.4.10 Upper Murray – 409016 River Murray at Heywoods

The residual mass rainfall graph (Figure 5-28) for Albury shows increasing trend from 2020, and slight reduction back to the mean in 2024.

The EC exceedance curve in the current reporting year is very similar to the previous reporting period, with very low EC that reflects 80% threshold (Figure 5-29) for the site. In the current year, there is only a minor increase in salt load (Figure 5-30) compared to 2023.

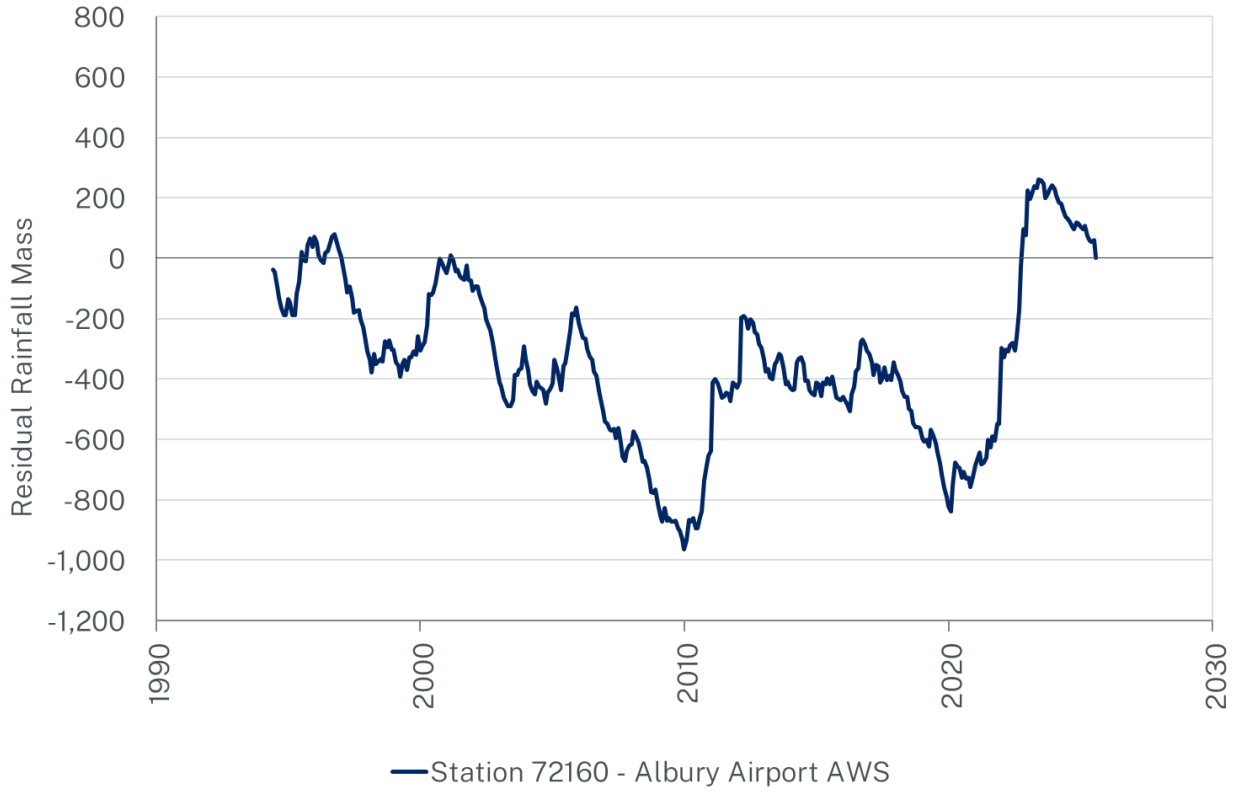


Figure 5-28: Residual mass rainfall for Albury airport

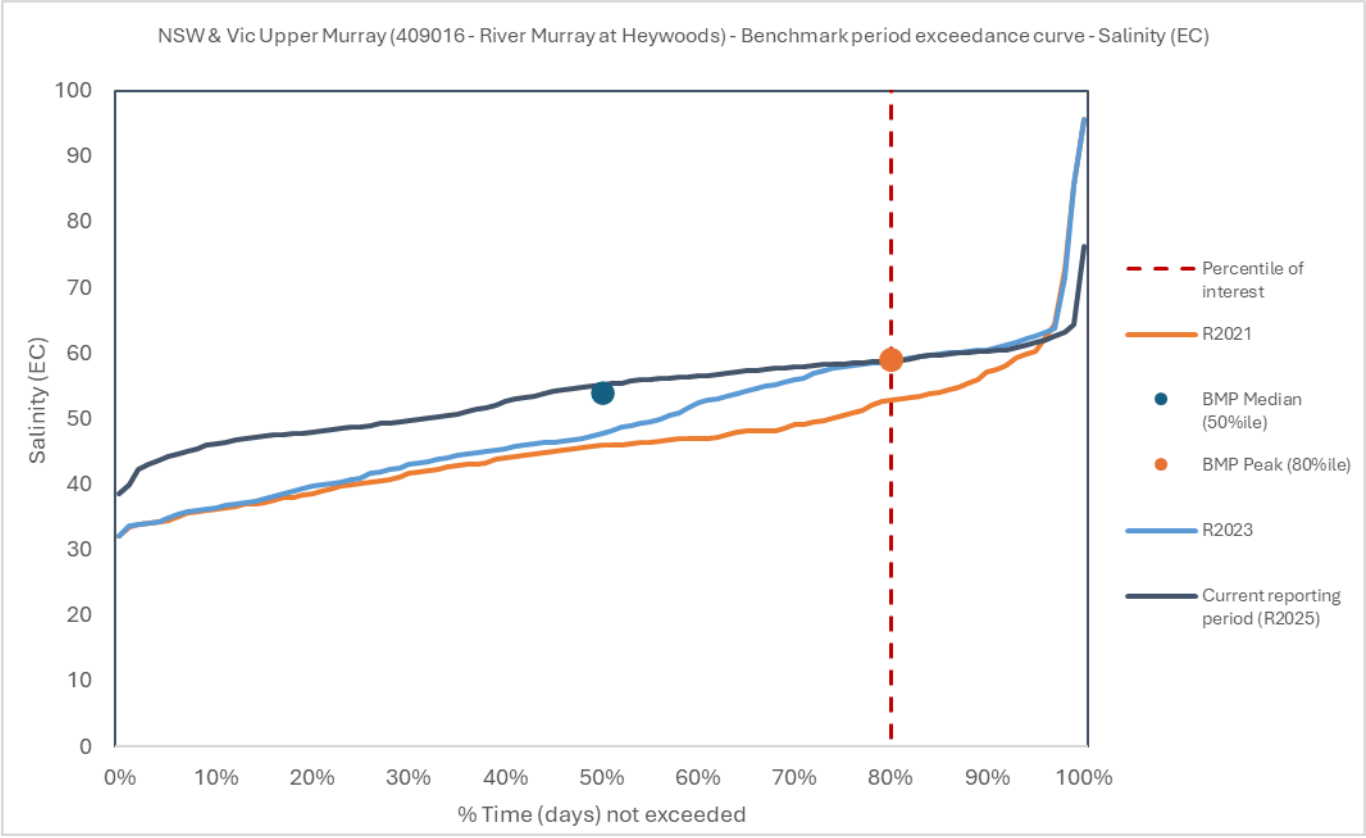


Figure 5-29: Salinity EC - Exceedance Curves for River Murray @ Heywoods (409016) for reporting years 2021, 2023, 2025.

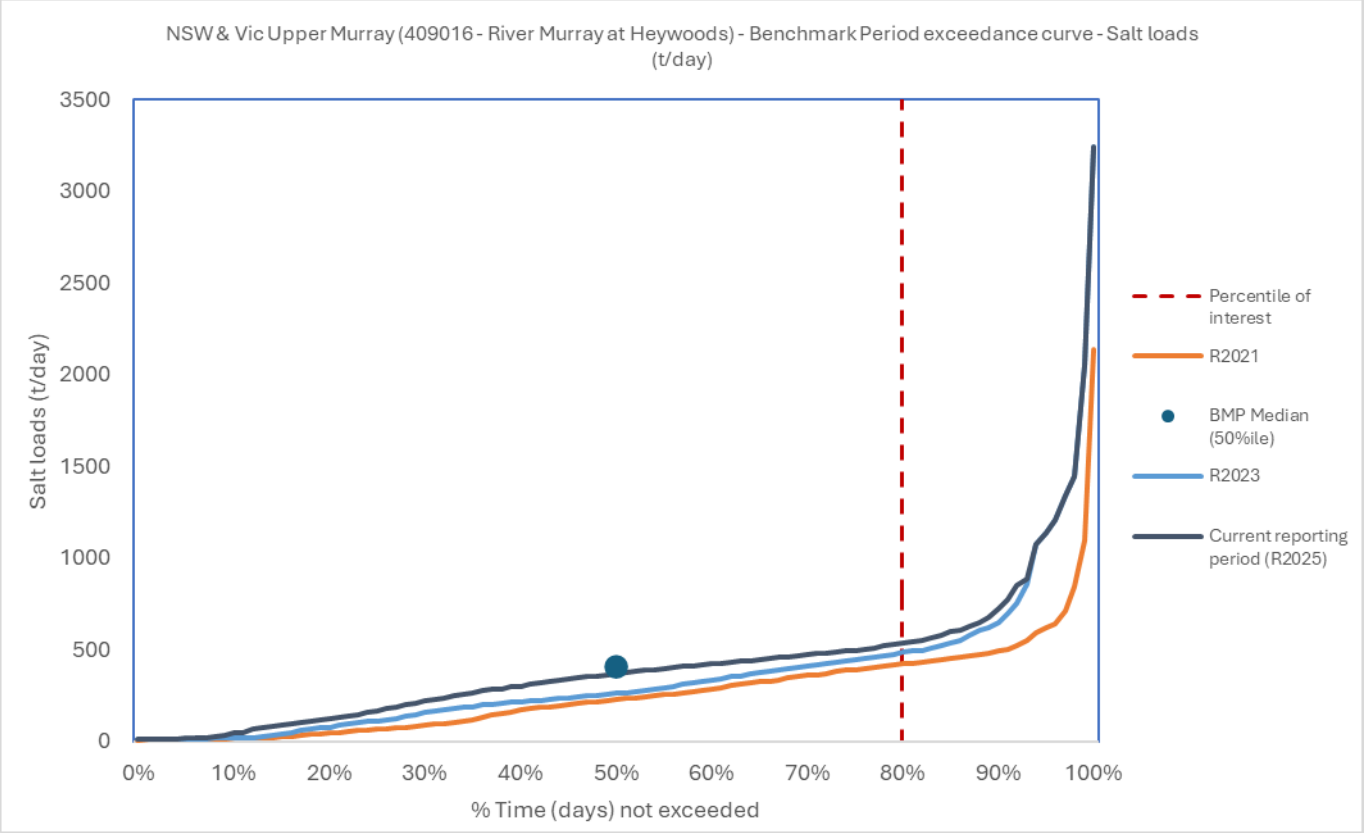


Figure 5-30: Salt Load - Exceedance Curves for River Murray @ Heywoods (409016) for reporting years 2021, 2023, 2025.

6 Efficient Governance

There has been significant progress during the reporting period to ensure NSW Government's obligations, as set out in BSM2030, are met with a particular focus on commencing review of NSW groundwater monitoring network, progressing the delivery of NSW accountable action register reviews, assisting the MDBA address previous audit recommendations and preparing for the strategic review.

6.1 Basin-wide Core Salinity Monitoring Network

The BSM2030 Strategy has made a commitment to the operation, maintenance and reporting of key salinity monitoring sites. Collectively, these sites form the Basin-wide CSMN providing critical information that:

- underpins groundwater and surface water models
- informs Accountable Action reviews and delayed salinity impacts
- supports river operations, SIS and environmental flow management
- enables an evaluation of outcomes at EOV and Basin Plan reporting sites.

In late 2024, a census of all available groundwater bore data was completed in preparation for the 5-year review of the CSMN. This initial review collated a wide range of bore data from various sources including Landcare groups, old salinity research sites and departmental records. This is a preliminary step to recommendation and update to the CSMN, and to highlight any data gaps.

6.2 NSW Accountable Action (Register) Reviews

Based on the Basin Officials Committee approved Review Plan there are currently 12 outstanding (NSW led) Register and 3 model reviews, noting that:

- review of the existing Murray Irrigation LWMP accountable action is in progress and due to be completed in 2026
- Sunraysia Irrigation Development (1997 – 2006) and provisional entry for Sunraysia Irrigation Development (2007 – 2021) is in progress and due to be completed in 2026
- review of the Rufus River salt interception scheme (baseline action) is being undertaken by MDBA and due for completion by the end of 2025.

The remainder of the reviews have been staggered based on their inherent risk profile, existing internal priorities, and concurrent knowledge priority work.

- The Pindari Dam Enlargement and Boggabilla Weir reviews have been assigned as next priority following completion of the current register reviews and due to commence in 2026. Update of these register entries is likely to be subject to a review needs assessment.
- The regional scale assessment of risks for Murrumbidgee (70), Darling Catchment (62-68) and Lachlan (69) Legacy of History Register Entries will be evaluated as part of the Basin Salinity Management Advisory Panel (BSMAP) endorsed valley risk assessment process.

Proceeding to a formal review of these will be subject to risk evaluation as they are considered of lower risk (cumulatively they equate to <0.5 EC debit on Register B) when compared to other register entries. Note: these reviews are required once within a 15-year period.

6.2.1 Murray Irrigation Limited Land and Water Management Plan

The Murray Irrigation Limited (MIL) LWMP was implemented in 1995 after a prolonged period of wet climatic conditions created extensive shallow water tables and waterlogging across the Murray Irrigation Districts of Berriquin, Denimien, Cadell, and Wakool. The LWMP introduced groundwater pumping, sealing of supply channels, improving on-farm management, construction of new shallow surface drainage, and upgrading of existing systems.

The original bespoke modelling suite was developed by NSW in the mid-2000s to enable the assessment of potential River Murray salinity impacts resulting from the implementation of the MIL LWMP. The salinity register review was endorsed by BSMAP in late 2010 and Register A updated in 2011 as a 4 EC credit.

The climate period following the implementation of the MIL LWMP was dominated by the Millennium drought which, when coupled with Basin Plan water reforms, created difficulties in validating the predicted runoff over the wetter Benchmark Period with the extended dry conditions and resulting drain flow behaviour.

In the current reporting period, NSW has revised the delivery plan and methodology based on the outcomes of an independent review of issues and recommended improvements to the existing model to be implemented in the immediate and longer term as part of a process of continual improvement.

NSW has prioritised the completion of the review of the MIL LWMP register entry for the 2026 Salinity Registers.

6.2.2 Sunraysia Irrigation Development 1997-2006 and (provisional) 2007-2021

Significant progress has been made in this reporting period towards providing a robust estimate of the salinity impact on the Murray River from irrigation developments in the NSW Sunraysia region through development a numerical groundwater model. The model is being delivered in a staged approach.

- The conceptual geological model for the NSW Sunraysia region consisting of surface terrain, stratigraphy, geology, structural features, surface water – groundwater interactions, aquifer properties and water quality was completed in 2024.
- The numerical model and initial calibration were completed in 2025 including complete model construction and reporting of methodology, including the selection of numerical code, spatial and temporal discretisation, boundary conditions, hydraulic parameterisation and zoning of groundwater salinity. Initial calibration was undertaken with reporting of results, including calibration methodology, parameter settings and calibration performance.

The limitations in model construction and initial calibration are currently being refined as part of the third and final modelling stage which is due for completion in 2026.

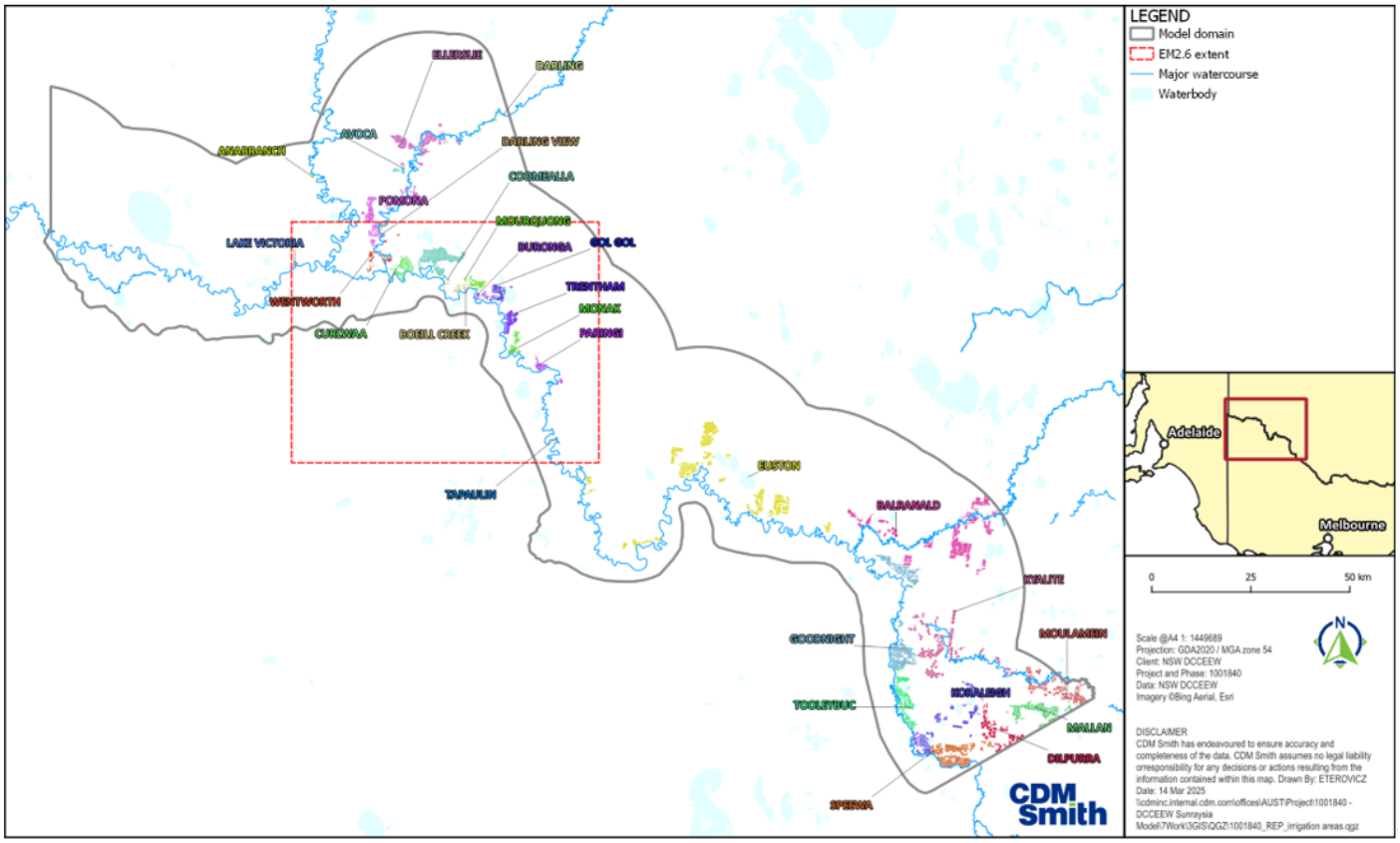


Figure 6-1: Irrigation districts within NSW Sunraysia model domain (CDM Smith, 2025)

6.3 NSW Response to 2021 – 2023 IAG-Salinity Audit Recommendations

NSW responses to the previous IAG-Salinity audit (2021-23) were formally submitted to the MDBA in January 2024. An update on progress and actions undertaken to address IAG-Salinity recommendations is included in Table 6-1.

Table 6-1: NSW response to the 2021 - 2023 IAG-Salinity audit recommendations and update on progress

IAG-Salinity recommendation	Status update
Recommendation 1: **The IAG-Salinity recommends that a focus of the 2026 review be to simplify the Registers and their presentation.**	NSW continues to support this recommendation and will be looking to simplify NSW's register entries where this is possible as register reviews are progressed.
Recommendation 2: **The IAG recommends that the MDBA in consultation with BSMAP develop a streamlined process for certifying that reviews and assessments have followed the BSM Procedures.**	NSW has supported the MDBA via the BSMAP to amend the relevant procedures to integrate this requirement.

IAG-Salinity recommendation	Status update
Recommendation 3: The IAG recommends that future comprehensive reports include estimates of the area and locations of new irrigation developments and their potential salinity risks.	NSW has included a short description of new irrigation development activity in the high-risk landscapes of the Murray and Baaka - Lower Darling in this comprehensive report.
Recommendation 4: The IAG 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.	NSW supports this recommendation and has completed two projects in the reporting period that contribute to this recommendation – preliminary catchment risk assessment and EOVT trend analysis. These are further described in Section 7 of this report.
Recommendation 5: The IAG recommends that the MDBA in consultation with BSMAP investigate the effects of climate change on the severity and frequency of extreme wet events and their salinity impacts.	NSW continues to support this recommendation and the incorporation of climate change into the future BSM framework through its participation in BSMAP.
Recommendation 6: The IAG recommends that the 2023 draft Review Plan be adopted after confirming the costs of the proposed reviews can be funded.	NSW supports the adoption of the trial procedure (Developing and updating the Review Plan, 2023) to focus resource and effort to highest priority actions. NSW has confirmed its priorities based on current available resources.
Recommendation 7: The IAG recommends that both the MDBA and the jurisdictions develop and prioritise indicative budgets for the tasks identified in the Roadmap.	NSW budget for the BSM Program has been developed based on prioritised tasks in the Review Plan and Roadmap. Further detail on the scope and timing of tasks within the Roadmap and scope for the strategic review would assist NSW prepare future workplans and secure resources required to fully participate in the process.
Recommendation 8: The IAG recommends that the MDBA prepare adequate documentation for each Register entry following the transition to Source.	NSW continues to support this recommendation through participation in the Technical Working Group for Salinity Modelling.
Recommendation 9:	NSW continues to support this recommendation through participation in the

IAG-Salinity recommendation	Status update
The IAG recommends that the MDBA develop a Procedure to manage future updates of the Source model.	Technical Working Group for Salinity Modelling.
Recommendation 10: The IAG 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.	NSW continues to support this recommendation through participation in the Technical Working Group for Salinity Modelling and BSMAP.
Recommendation 11: The IAG 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.	No update.
Recommendation 12: The IAG 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.	No update.
Recommendation 13: The IAG recommends that the MDBA assign a high priority to repairing flood damaged salt interception schemes.	NSW Salt Interception Schemes are operational with flood damaged assets repaired.
Recommendation 14: The IAG recommends that the management of salinity peaks be considered as part of the Enhanced Environmental Water Delivery project.	No update.

7 Strategic Knowledge Improvement

During this reporting period, NSW has invested in new and continuing knowledge generation projects with the aim of improving our understanding of key salinity processes, improving our knowledge of salinity risks and overcoming critical information gaps and uncertainties to inform ongoing management and the BSM2030 strategic review.

Key projects and innovations include:

- Responsive Management Trial
- Hydrogeological Landscapes (HGL) program
- Profiling Catchment Salinity Risk project
- EC Trend Analysis
- Salinity risk assessment of NSW Murray Darling Basin Catchments
- Landcare Water quality and Saline site mapping (see Section 8.1.1.1)
- Salinity impacts from environmental watering (see Section 3.3.1).

7.1 Responsive Management Trial

Responsive management of salt interception schemes is one of the key elements to be delivered under the BSM2030. The aim of responsive management is to reduce operating costs by optimising the operation of salt interception bores during periods of low in-river salinity. It has the potential to provide an acceptable trade-off between operational cost savings and minimising actual in-river salinity. At the end of the responsive management trial (RMT), the review will analyse and document impacts, benefits and costs and make recommendations on the future operation of SIS to achieve optimal outcomes. The policy settings of any proposed management regime change would need to be modelled to assess the overall impact on the salinity registers

The following Knowledge Gap Initiatives (KGI) were identified at the start of the RMT:

1. Direct discharge to River during periods of high flow
2. How long does groundwater and salt inflow to river take to respond to changed scheme operations?
3. History of vegetation benefits of SIS
4. Relationship between pumped volumes and extent of Low Salinity Lenses
5. For a given budget reduction, optimise pumping regimes to minimise loss of salinity benefits
6. Evaluate risk profile across all SIS and across all bores within schemes
7. Relationship between groundwater salinity and vegetation health.

Mallee Cliffs SIS was chosen as a trial site due to its extensive monitoring network and history of data collection, with the NSW research program to address KGI 2 and 4 through a Freshwater Lens Study, Transpiration of Blackbox Study and Normalized Difference Vegetation Index Analysis.

In this reporting period:

- all 3 research studies were completed and awaiting final reports
- NSW has been collaborating with the MDBA to progress the review of the RMT for Mallee Cliffs SIS with a view to using this as a template for other jurisdictions to follow
- the above research projects were evaluated to assess whether they adequately address the relevant KGI and confirm whether the KGI remain fit for purpose.

A report will be prepared that details outcomes of the analysis in relation to targeted knowledge gaps. The report will also make recommendations for additional monitoring strategies that may be implemented if there is a future SIS reduction in pumping and include analysis if a revised management regime is implemented.

Although the current requirement is to complete the review of the Mallee Cliffs SIS trial and address KGI 2 and 4 before the BSM2030 strategic review, there is potential that all other KGIs can be addressed across the other NSW operated schemes in the future as well.

7.2 Hydrogeological Landscapes program

Hydrogeological Landscape (HGL) mapping has been conducted since 2007 across NSW, at various scales. The work has informed rural and urban salinity management plans, catchment action plans, natural resource management plans, Landcare Network plans and landholder property plans. This innovative program has increased understanding of the landscape, how it works and how to select best management approaches.

The project has utilised several HGL datasets at a range of scales, to develop an integrated overall state-wide salinity hazard map that:

- provides a data capture mechanism for all HGL work
- provides a resource for salinity and landscape planning
- provides a framework for salinity monitoring and project activity
- informs various state-response modelling initiatives.

The state-wide HGL spatial dataset has been made available to guide salinity decision making where no detailed mapping exists. The current focus of the HGL mapping is to provide more detailed project level coverage across the Murray-Darling Basin focussing on very high and high salinity hazard areas, mostly within the mid valley locations of catchments. This data provides a key input to the Profiling Catchment Salinity Risk Project (see Section 7.3), and is utilised in salinity training, planning and extension. Comprehensive management ‘templates’ have been developed to guide appropriate salinity management activities for each landscape.

In the reporting period, an innovation in the Western Land Systems project makes use of the existing Western Land Systems mapping, developed by the Soil Conservation Service prior to 2000, to a modified product including a landform attribution detailing likely salinity occurrences. Staff who developed the initial product, are now assisting in this project. This will give greater definition to

salinity processes in the Western Division of NSW and aid planning and native vegetation management.

Table 7-1: Current status of project scale Hydrogeological Landscapes (HGL) mapping

Completed – awaiting upload to eSPADE	Final to edit stage	Final – minor revision & cross section updates	Commenced
Central West Revision	Lower Murrumbidgee	Namoi	Lower Murray
Upper Lachlan			Lower Lachlan
Upper Murrumbidgee			Gwydir
			Border Rivers
			Western Land Systems

7.3 Profiling Catchment Salinity Risk project

This major project was initiated in October 2020 as a mechanism to:

- develop an integrated salinity risk framework which considers catchment and sub-catchment salinity impacts and processes
- consolidate past investment and outcomes whilst capitalising on and extend new work, bringing together activity from a range of disciplines to develop and inform the salinity risk management framework
- inform the review end of valley targets and their appropriateness to give a true picture of catchment performance
- highlight sub-catchment salinity risk and appropriate management measures for those high-risk landscapes within upper catchments.

Major achievements have been the production of spatial mapping of landform elements in the high and very high risk HGLs across valley catchments. This identifies the component areas of landscapes which contribute to salinity within a sub-catchment. Matching landform modelled outputs (LF7 modelling) into conceptual management areas of HGL's, then spatial mapping, allows targeting of action. This work has been undertaken for:

- Macquarie, Bogan and Castlereagh catchments
- Lachlan Catchment
- Murrumbidgee Catchment
- Namoi Catchment (underway).

The output has been innovatively used to determine areas of salinity source for prospective EC trend and EOV site analysis work. Additionally, the data is being used to add to co-benefit value mapping of landscapes for carbon abatement projects.

7.4 Electrical Conductivity Trend Analysis

In the past, the review of EOV targets has been achieved using catchment numerical modelling, requiring a large resource effort that is now difficult to obtain. Over the reporting period, work has progressed on developing an alternative analytical approach that is less resource intensive. Activity has progressed iteratively through the following steps:

Step 1 –Remodelling of NSW Salinity Audit Approach

Initially an internal approach was undertaken with expertise of the Manly Hydraulics Laboratory to repeat and update the approach taken in the NSW Salinity Audit of 2009 for EC trend and salt load using both discrete and continuous data. A panel of modelling and salinity experts in NSW determined that a statistically sound approach was needed that quantified the EC trend at sites, with the Weighted Regression of Time, Discharge and Season (WRTDS) model suggested for use.

Step 2 – An initial test pilot in the Murrumbidgee Catchment

The department partnered with the Fenner School of ANU to investigate a statistical approach for determination of salinity trends and risk.

This pilot project was delivered with the following objectives for 2 high salinity risk catchments (Jugiong/ Tarcutta) in the Murrumbidgee Catchment:

1. Assess the trend in EC at 2 river monitoring sites within NSW, using the Weighted Regression of Time, Discharge and Season (WRTDS) model
2. Provide recommendations on the utility and suitability of the WRTDS model for a state-wide assessment of long-term trends in EC across NSW rivers.

The results (Guo, 2024) for EC indicated:

a) At 410025 (Jugiong), between 1971 and 2024 water years, the flow-normalized EC is trending upwards (increasing) at an average rate of 0.88% (or 7.70 µg/cm/yr) per year relative to the 1971 level. The upward trend is statistically significant at a 0.1 level (with p = 0.03) and has a 99% likelihood, indicating the upward trend is highly likely.

b) At 410047 (Tarcutta), between 1969 and 2024 water years, the flow-normalized EC is trending upwards (increasing) at an average rate of 0.2% (or 0.41 µg/cm/yr) per year relative to the 1969 level. The upward trend is not statistically significant at a 0.1 level (with p = 0.22) and has an 89% likelihood, indicating the upward trend is likely.

For salt load:

a) At 410025 (Jugiong), between 1971 and 2024 water years, the flow-normalized salt load is trending upwards (increasing) at an average rate of 1.39% (or 0.35 kt/yr) per year relative to the 1971 level. The upward trend is statistically significant at a 0.1 level (with p = 0.02) and has a 100% likelihood, indicating the upward trend is highly likely.

b) At 410047 (Tarcutta), between 1969 and 2024 water years, the flow-normalized salt load is trending upwards (increasing) at an average rate of 0.39% (or 0.07 kt/yr) per year relative to

the 1969 level. The upward trend is statistically significant at a 0.1 level (with p = 0.09) and has a 96% likelihood, indicating the upward trend is highly likely.

A further meeting of the expert panel was convened to review the modelling approach and results and concurred that the approach had utility for the required determination of trend and risk at EOV sites.

Step 3 – Salinity Trend and Analysis for 10 End of Valley Sites

The successful proof of concept from Step 2 informed an expansion of the project to analyse the 10 EOV sites within NSW. This was undertaken in partnership with the Fenner School of ANU, further refining the statistical approach using the WRTDS model (Gou, 2024).

A summary of this Flagship project – Salinity Trend and Analysis for 10 End-of Valley Target Sites is provided on the next page.

Step 4 - Salinity Trend and Analysis for 10 End of Valley Sites

Commencing in 2024 and continuing into 2025, ANU received funding (a Hilda John Bequest project) to enable further investigation into a range of new activities in partnership with the department to develop an evidence-based, adaptive framework to inform ongoing river salinity risk.

Current work includes:

- Development of a Bayesian Modelling Network to analyse mid valley sub catchments trends on 20 selected sites across the NSW Murray Darling Basin. This work is preliminary to the establishment of possible mid valley and sub -catchment indicator sites.
- looking at the impact of land use change on EC and flow relationships
- optimisation modelling approach to guide the location of key indicator catchment sites.

Flagship project – Salinity Trend and Analysis for 10 End-of Valley Target Sites

The objective of this study is to assess the river salinity at 10 End-of-Valley (EOV) target sites within NSW Murray-Darling Basin (MDB), over two periods (Benchmark: approx. 1975-2000; Reporting: approx. 2000-2024), for:

1) the long-term trends in electrical conductivity (EC) and salt load, using the Weighted Regression of Time, Discharge and Season (WRTDS) model
2) the risks in EC and salt load in exceeding the target levels set out for individual EOV sites as set out in Schedule B of *Water Act 2007*.

The methodology was able to show the trends of flow-normalized EC and salt load estimated from the WRTDS model with their directions, magnitudes and likelihoods. It was also able to assess what percentage of trends could be attributed to long terms trends in streamflow or non-flow related drivers.

The key findings were discussed to draw recommendations for further analyses for in-depth trend attribution and identification of potential sites for reviewing the existing EOV target approach. The key findings were:

The strongest and most consistent trend signal is the increasing salt loads for the Reporting Period, with 8 out of 10 sites with highly or very likely increases.

- Most of the highly likely trends of EC are due to changes in relationship between EC and streamflow, as opposed to long-term trends in flow. In contrast, most of the highly likely trends in salt loads are due to long-term trends in flow.
- The consistent increasing trends in salt load for the Reporting Period is likely related to the increasing trend in flow over this period.
- Sites 418058 and 416001 generally have the greatest risks of exceeding the EOV targets for both EC and salt loads.

Potential future works are recommended along the lines of in-depth trend attribution and investigation into sub-valley salinity trends and risks, which are expected to inform the NSW Department of Climate Change, Energy, the Environment and Water's review of the existing EOV target approach.

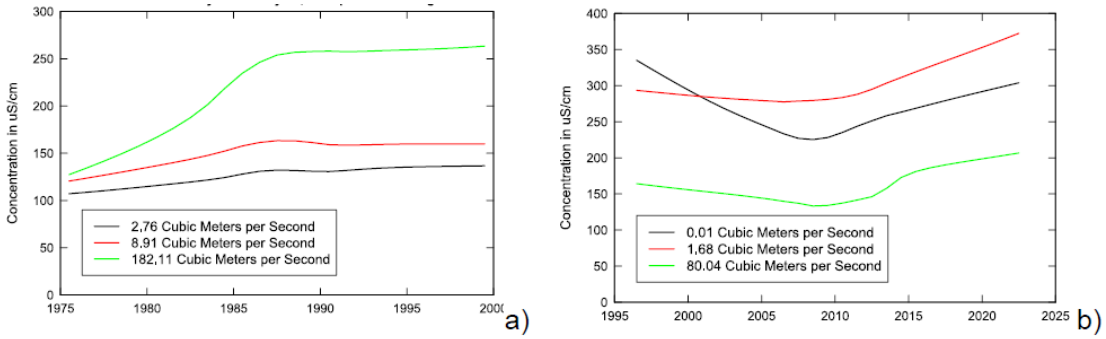


Figure 8. WRTDS modelled EC for July 1st of each year in the analysis period for the Benchmark Period of 410130 (a) and the Reporting Period of 416001 (b). For each case, three lines are presented representing the simulations for low, median and high flows of each site and analysis period.

7.5 Salinity risk assessment of NSW Murray-Darling Basin Catchments

Jurisdictions are required to undertake a review of EOV targets, associated models, baseline data set, and projected salinity trends to ensure a contemporary understanding of the salinity risk to the shared water resources from valleys for input into the review of the BSM2030. In the reporting period, NSW completed a significant first step through the development of narratives and qualitative risk assessment for its ten catchments in the Murray-Darling Basin. The approach considered the requirements of the BSM procedures, salinity audit recommendations and risk to fresh water-dependent ecosystems (for Basin Plan purposes).

Project objectives were to:

- support the prioritisation of valleys that may warrant more detailed assessment of salinity risks
- assess if current target is effective in assisting management decisions of BSM and Basin Plan, and assist in considering resource condition indicators for reporting requirements
- guide the development and improvement in future monitoring programs
- provide a consistent and repeatable methodology to enable future assessment of salinity risks in the NSW Murray-Darling Basin region to be undertaken.

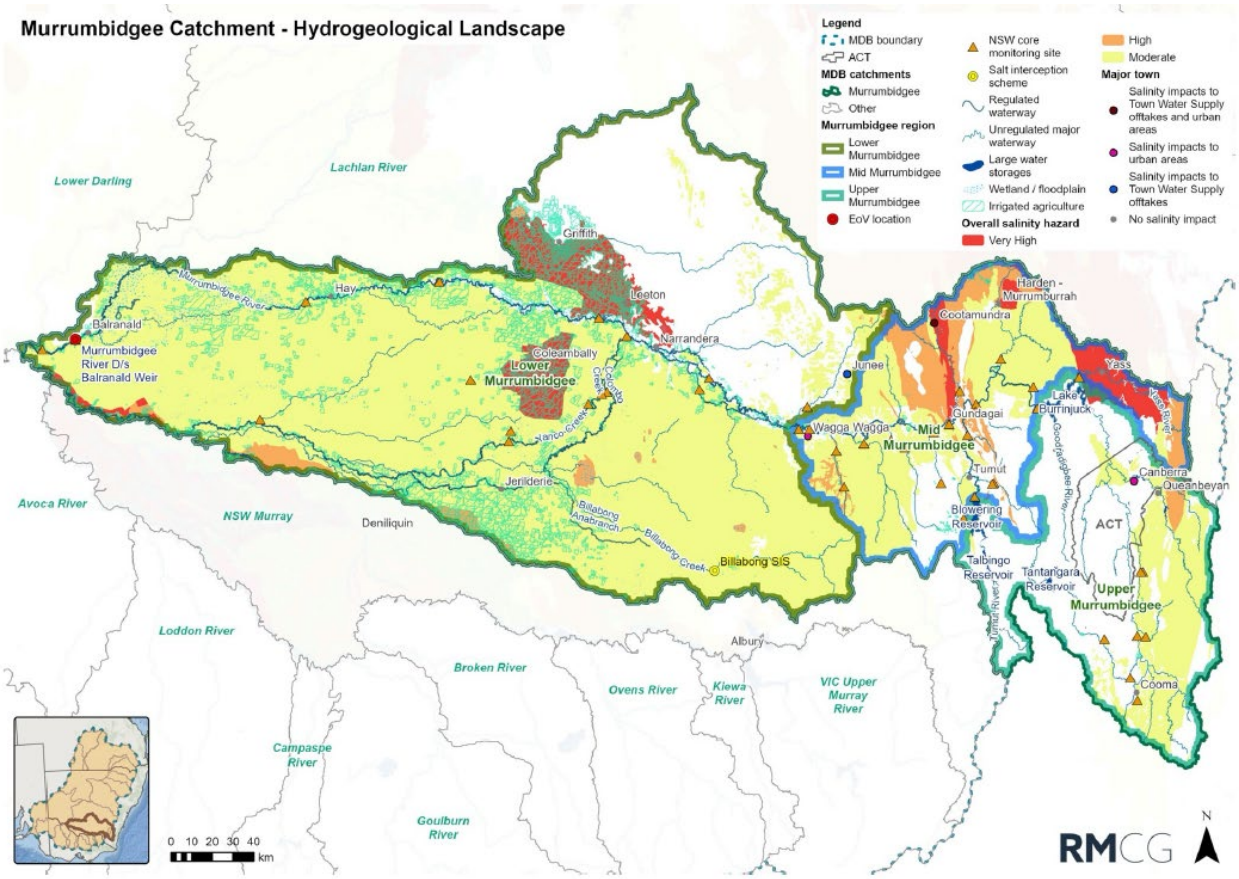


Figure 7-1: Overall salinity hazard for Murrumbidgee catchment

Each catchment was divided into regions to evaluate risks at sub-catchment, catchment and whole of basin to understand risk and management options at appropriate scale (Figure 7-2). The project was structured to assess risk by use of a standard risk framework considering likelihood and consequence in a Land Use Impact Model. Qualitative information was complemented with quantitative analysis of EOV monitoring data using both 5-year exceedance reporting method and results from ANU longer term analysis. (Guo, 2024)

- Risk to the shared waters: At the valley scale, the Murrumbidgee and Murray and Baaka - Lower Darling were identified as posing the greatest risk to the shared waters
- The assessment noted that regions within the Murrumbidgee and Murray and Baaka - Lower Darling Valleys are key contributors to the moderate to high-risk ratings at the Valley scale

Risks across /within NSW valleys

- Risk rankings at the regional scale were documented in catchment narratives and summarised in the table below, where it is noted that mid valley locations usually provide the highest salinity risk within catchments.

Valley	Upper	Mid	Lower
Barwon Darling	L		M
Macquarie	M-H	H-VH	M
Bogan	VL-L		
Castlereigh	L		L
Gwydir	L	M-H	M
Lachlan	L	H-VH	M
Murrumbidgee	VL	M	M
Namoi	L	M-H (Peel) H (Liverp'l Plains)	M
Border Rivers	L	M-H	M
Murray & Lower Darling	L	M-H	H

Figure 7-2: Summary of salinity risk assessment outcomes within NSW catchments

The catchment profiles developed for each catchment have already been very effective in recent extension, planning and salinity training activities.

Monitoring recommendations include:

- maintain EOV monitoring as part of CSMN
- phase out references to EOV target values in policy and planning documents
- no cost-effective justification for reviewing or revising the values of EOVT, recommended not included in scope for detailed assessment
- use detailed assessment of Murrumbidgee to investigate mid valley Resource Condition Indicators (RCI) where they are contributing to impacts in shared waters
- review sites on CSMN to manage risk to shared waters
- develop integrated monitoring and RCI framework –efficient and cost effective.

8 Community Engagement and Communication

The department's Water Group have continued to provide salinity technical support to a range of partner groups in the form of:

- formal salinity training and support to landholders, Landcare groups, LLS, agencies, universities, Local Government, industry groups and schools including:
    - HGL training and specific expert soils/ salinity advice to LLS and Landcare co-ordinators
    - support to Landcare groups and networks including participation in delivery of training, field days and education programs targeted at grazing, salinity and soils management.
- support to regional and local Landcare NRM programs jointly undertaken by LLS and Landcare
- support to planning systems of agency and Local Government regarding urban and rural salinity (Wagga Wagga, Dubbo, Scone and Western Sydney)
- project involvement in delivery of LLS projects, departmental projects, Biodiversity Conservation Trust projects, NSW Soil Knowledge Network projects, ANU projects and Geoscience Australia.

Community engagement activities are varied and wide-ranging, dealing with a number of partner groups in both training and support. Salinity management advice increased over both reporting years due to 3 wet years and impacts from increased cropping leading to higher demand. The involvement in Landcare Water Quality Program has increased activity along with university engagement. There has been a decline in direct support to LLS from previous reporting periods.

Figure 8-1: Salinity Training at 'Fairview' Burrumbuttock for West Hume Landcare Group (Photo Rob Cook, 2023)

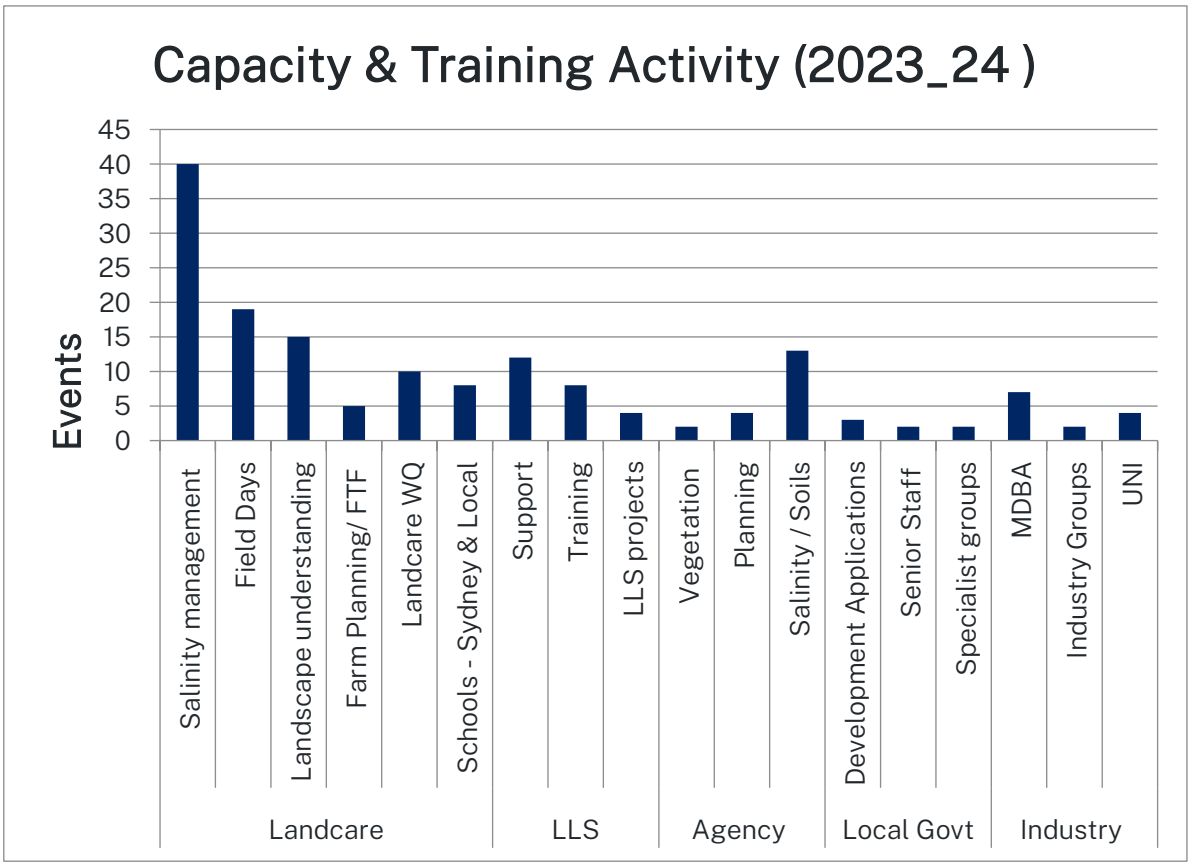


Figure 8-2: Salinity capacity building summary – 2023-2024

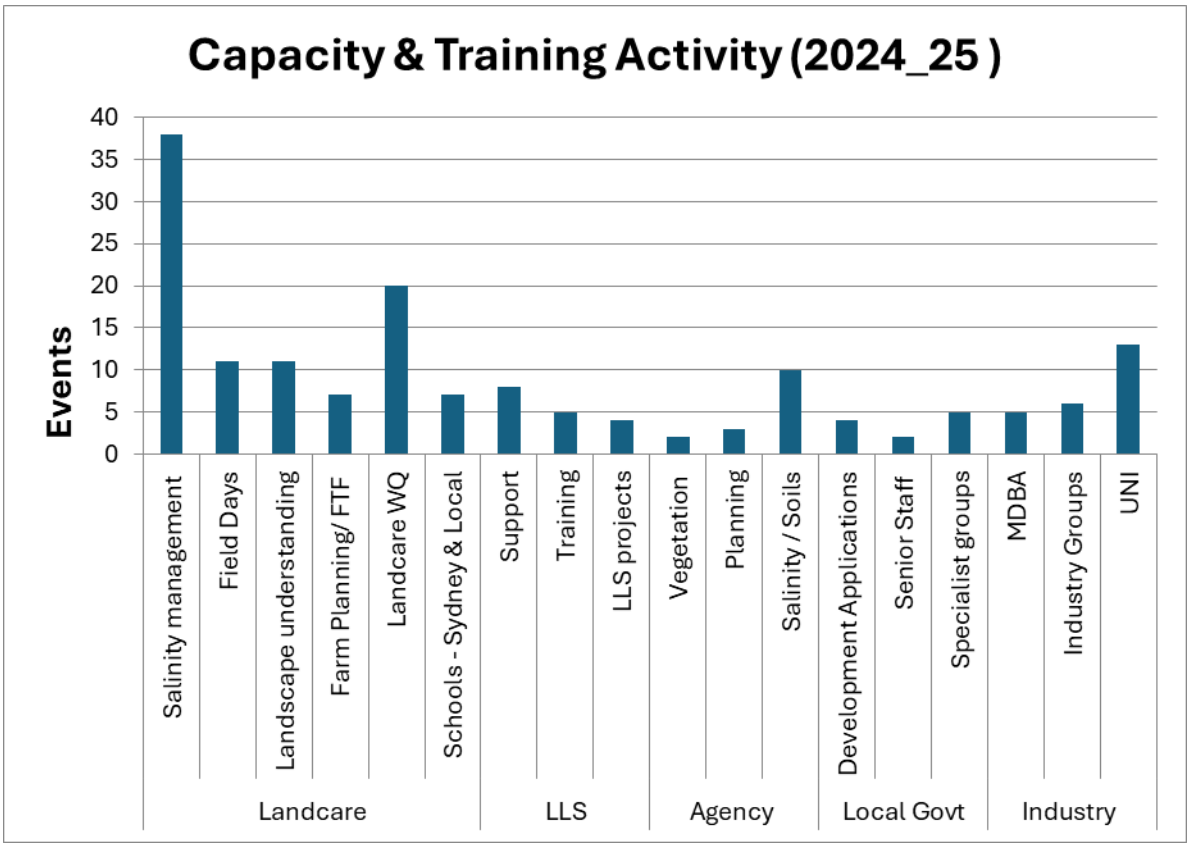


Figure 8-3: Salinity capacity building summary – 2024-25

8.1.1 Partnering with Landcare Organisations

8.1.1.1 Landcare Water Quality Program

A program to spatially capture EC data from streams, creeks and rivers using Landcare staff to sample a large number of waterways across local Landcare districts has been expanded due to its effectiveness in data collection, engagement, training and extension. The following summary of the Flagship projects – Landcare Water Quality sampling and Saline Site Mapping illustrates the activity.

There has been a significant increase in stream EC and salt land expansion from the recent 3 years of increased rainfall and change in land use to continuous cropping.

The activity has been a great data source, has rekindled salinity interest in Landcare groups and provided a platform for Basin Salinity Staff to brief committee members and train local staff. As part of the program, Landcare staff have been able to re-engage with farmers who have completed successful salinity work, as well as provide advice to engage in an emerging salinity problem.

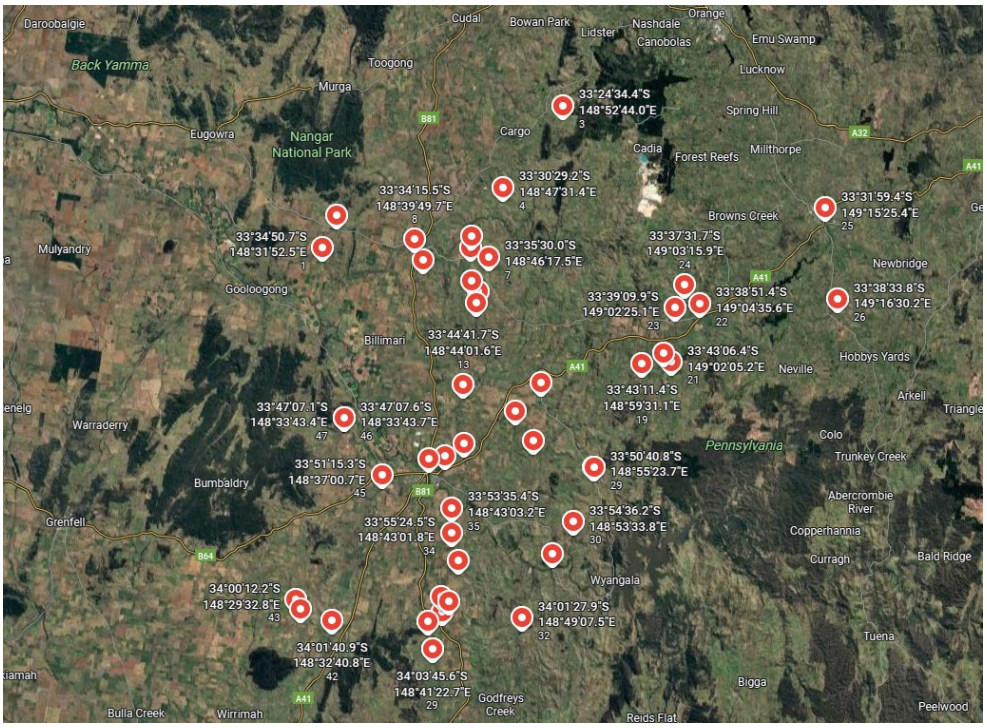
8.1.1.2 Soils and Salinity Projects

Partnership in soils projects with Landcare, LLS, Soils Knowledge Network and the department has increased the reach of salinity programs. Projects in the following areas have been undertaken widely across central and southern regions of NSW:

- Soil's "Pits & Kits" workshops
- Soil testing and sampling projects including use of MIR & NIR technology
- Co-benefit of salinity management with soil carbon programs
- Soil erosion and salinity demonstrations and workshops
- Soil Landscape mapping
- Western Lands System mapping
- Urban salinity investigations.

Flagship projects – Landcare Water Quality sampling and Saline Site Mapping

The Basin Salinity Management team have undertaken effective partnerships with 11 Landcare groups across the slopes of NSW, from Coolah to Wagga Wagga in the catchments of Macquarie, Lachlan and Murrumbidgee, conducting strategic water quality survey loops in streams and rivers looking at stream electrical conductivity.



Additionally, a number of groups are mapping and characterising saline sites utilising a *Salinity Survey 123* app where site details regarding salinity and management are recorded. The intention is to use this data to update land salinity outbreak data, that has not been effectively undertaken since 2000.

8.1.2 Salinity resources

8.1.2.1 Webpage development

In the reporting period the NSW BSM Program webpage was launched with publication of the 2021-2022 to 2022-2023 Comprehensive report and 2023-24 Status report.

The department's Salinity webpages remain the main repository for salinity information. The NSW Soils Knowledge Network (new Salinity page) and Landcare groups have added localised data to their websites.

NSW has contributed to the MDBA Floodplain Body of Knowledge (FPBoK) webpage with a range of salinity information linked from NSW sources.

8.1.2.2 eSPADE - salinity information delivery platform

Delivery of HGL information to eSPADE, within the department's online soil data viewer platform, has very significant outcomes with very high use by a wide range of stakeholders (including LLS, Landcare groups, consultants, agencies, universities and individual landholders). It has also become an invaluable salinity training resource, including in the field as well as in the university classroom.

8.1.3 Training and Education

In the reporting period, the types of expert salinity training included:

8.1.3.1 Online training

Since COVID-19 restrictions, the BSM team have adapted to a structured component of online information session delivery mechanisms as a prelude to field activity to imbed and localise training. This has proven to be well received and effective.

8.1.3.2 Linked education programs

Partnerships with Landcare networks have allowed education programs for school groups across NSW to be undertaken with salinity staff providing expert input to program designs which are then run by Landcare groups, using part time skills of local teachers and Landcare staff.

The proximity to, and relationship with, ANU and University of Canberra, has led to some course components and field trip study units being undertaken in the Lachlan catchment. This has expanded the partnership between the BSM team and ANU in supporting student salinity course work, master's and PhD activity. A recent salinity project looking at microbiological variability across various salt sites with different soil chemistries has commenced. This is in addition to the EC Trend Analysis work being undertaken by ANU Fenner School.

9 Priorities for Future Work

Future priorities in NSW are focused on building on previous successes, delivering on BSM2030 key tasks and objectives and being a valuable contributor to the strategic review.

Other key initiatives are:

- completion of priority register reviews
- initiating a detailed assessment of risk for the Murrumbidgee catchment
- developing a robust approach to catchment monitoring and reporting utilising trend analysis coupled with Profiling Catchment Salinity Risk data
- exploring the potential for risk assessments and other analysis methods to replace detailed technical assessment for lower order salinity risks
- moving toward detailed HGL resources for the NSW MDB.
- completing 5-year review of CSMN.

In addition, NSW will continue working with the MDBA and other Basin states on key priorities such as:

- review and improvement of BSM Procedures
- assisting with the transition to Source River model
- the review of the Responsive Management Trial
- bringing environmental water actions (such as SDLAM) into the Salinity Accountability Framework
- assisting with the review of elevated salinity events.

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