



Murray-Darling Basin
Ministerial Council

Basin Salinity Management 2030 BSM2030



November 2015

Published by the Murray–Darling Basin Ministerial Council

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MDBA publication no.: 21/15

ISBN (online): 978-1-925221-40-4

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Foreword

Basin governments have been working together with their communities for almost 30 years to manage salinity in the rivers and catchments of the Murray–Darling Basin. Building on this knowledge, Basin Salinity Management 2030 (BSM2030) looks ahead to set the direction for the next 15 years.

The Salinity and Drainage Strategy of 1988–2000 and the Basin Salinity Management Strategy of 2001–2015 began the work of reducing salinity in the river system in a coordinated way, by putting limits on salt entering the river and investing in salt interception schemes and better land and water management.

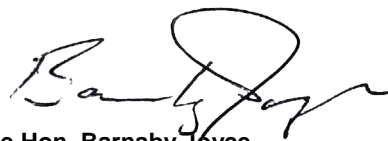
In 2015 the outcomes of these efforts are clear. River salinity levels are low and the basin salinity target at Morgan has been met for the last five years. However, basin landscapes will continue to export salt, and salinity is forecast to gradually increase due to the delayed impacts of past land management decisions. This means careful ongoing management is required to strengthen past successes, manage risks and learn about future management needs.

The BSM2030 is a strategy that meets the task during a time of transition for the basin, as water reforms continue to be implemented and become fully operational. It includes many initiatives that take salt management to a new level—such as further optimising the operation of salt interception schemes and bringing in contemporary issues relating to environmental water and Basin Plan flow management.

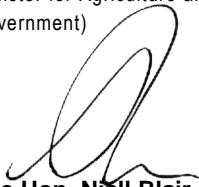
Fit-for-purpose governance arrangements are also included and take a risk-based approach to reduce the need for audits, reporting and reviews, while providing confidence in the salinity accountability framework and recognising the Basin Plan reporting requirements.

Importantly a review mechanism is included to ensure the BSM2030 continues to represent the most effective management of salinity in the basin and can adapt to new knowledge.

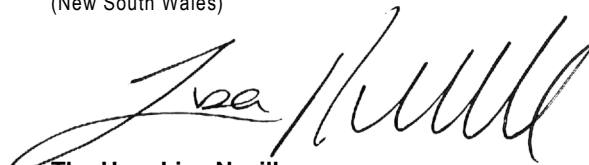
By endorsing this strategy the Murray–Darling Basin Ministerial Council recognises the ongoing need for coordinated and cost-effective joint action. It is an essential part of looking after the economic, environmental, cultural and social values that rely on a high quality water resource. These arrangements will give communities confidence in the collective effort for salinity management by basin governments over the next 15 years and beyond.



The Hon. Barnaby Joyce
Minister for Agriculture and Water Resources (Australian Government)



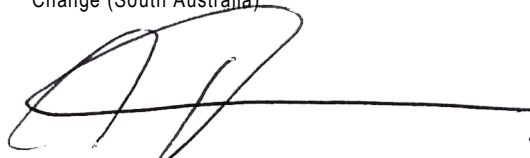
The Hon. Niall Blair
Minister for Primary Industries, Minister for Lands and Water (New South Wales)



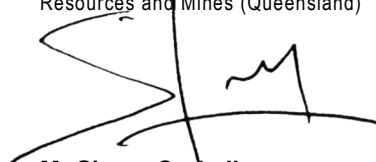
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Minister for Sustainability, Environment and Conservation, Minister for Water and the River Murray, Minister for Climate Change (South Australia)



The Hon. Dr Anthony Lynham
Minister for State Development and Minister for Natural Resources and Mines (Queensland)



Mr Simon Corbell
Deputy Chief Minister, Attorney-General, Minister for the Environment, Minister for Health, Minister for Capital Metro (Australian Capital Territory)

Salinity – managing an ongoing challenge

Salinity is a significant challenge and poses ongoing risks to the Murray–Darling Basin. If left unmanaged, salinity has serious implications for water quality, biodiversity, agricultural productivity, the supply of water for critical human needs and industry and the longevity of infrastructure.

The salt of the Murray–Darling Basin derives from millions of years of rainfall deposition and the weathering of rocks and ancient ocean sediments. The flat terrain, low rainfall and high evaporation rates that typify most of the Basin favour the accumulation of salt in the landscape while the groundwater and river systems only slowly return the salt to the ocean.

With the development of agriculture and the clearing of native vegetation across the Basin, more water now drains into groundwater systems where it can mobilise the salt into surface water systems. River regulation and increasing water extraction for irrigation and other uses has also changed river flow patterns and increased river salinities.

River salinity became a persistent problem in the late 1960s when salinity rose to levels high enough to cause economic damage to irrigated crops and to exceed World Health Organisation recommendations for human consumption. In the 42 months from January 1965 to June 1968 (a period of drought and low flow), the salt concentration at the town of Morgan in South Australia was above 800 EC for 31 months peaking at 1400 EC in February 1968. Morgan is significant because it is upstream of the off-take points for South Australia's major urban water supplies.

Again in the early 1980s, in a low flow period, salinity at Morgan was above 800 EC for 18 consecutive months, with a peak of 1400 EC in July 1982. Both of these prolonged episodes of high river salinity had significant

economic consequences for river-dependent communities.

The rising river salinities in the River Murray were linked to a parallel problem becoming obvious in the irrigation districts. Irrigators were, in wet periods, confronted with rising saline water tables causing waterlogging and soil salinisation. By the mid-1980s, 96,000 hectares of irrigated land in the Basin, largely in southern NSW and northern Victoria, were showing visible signs of salinisation. It was estimated that the area affected by high water tables could increase from 559,000 hectares in 1985 to 869,000 hectares in 2015. It was also estimated that the average salinity at Morgan would increase by between 30 and 75 EC within 30 years due to these processes.

By the mid-1980s salinity was recognised as one of the most significant environmental and economic challenges facing the Murray–Darling Basin. Balancing the need to control river salinity and to rehabilitate degraded irrigated land posed a management dilemma. Protecting the irrigation areas required improved drainage to lower water tables, but this would result in increasing saline discharges to the river system. The need to resolve these inter-linked problems led to the states of NSW, South Australia, Victoria, and the Commonwealth agreeing to take significant, coordinated, long-term action under the Murray–Darling Basin Agreement (the Agreement) to reduce salinity, rehabilitate irrigation areas and protect their economies, communities and environments.

Thirty years of adaptive Basin salinity management

Phase 1 (1988 to 2000) – the Salinity and Drainage Strategy

In 1988 the Murray–Darling Basin Ministerial Council adopted its Salinity and Drainage Strategy. In broad terms it aimed to:

- improve irrigation drainage in the riverine plains
- reduce groundwater levels by improving irrigation practice through whole farm planning, improved irrigation management, drainage reuse, improved irrigation infrastructure and the establishment of deep-rooted vegetation
- reduce salt entering the river by constructing salt interception schemes in the lower reaches.

These aims were supported by state-based programs (salinity management plans and land and water management plans), through which governments and communities aimed to reduce both the onsite and offsite impacts of irrigation.

Through the Salinity and Drainage Strategy, the Ministerial Council set a target for a reduction in average in-river salinity at Morgan. Joint investment in salt interception schemes included additional salt interception capacity to provide salinity ‘credits’ each to NSW and Victoria to offset salinity impacts of improved irrigation drainage in their districts. Both South Australia and the Commonwealth allocated their share of the ‘credits’ from joint works to improve River Murray salinity and contribute to the net salinity reduction.

The Salinity and Drainage Strategy, along with the associated joint program of action and investment:

- capped future increases in salinity by requiring that adverse salinity impacts from future actions be fully offset
- aimed to reduce average in-river salinity at Morgan by a net 50 EC from joint works
- reduced salt loads entering the River Murray through the construction of salt interception schemes that achieved a benefit of up to 80 EC salinity credits. This program of joint works provided 15 EC salinity credits to each of NSW and Victoria to allow for new irrigation development and for rehabilitation of degraded irrigation land without increasing river salinity above the salinity cap
- created a salinity accountability framework in the Murray, Goulburn and Murrumbidgee Rivers (the salinity register) for managing salinity credits and debits within the salinity cap
- established clear cost sharing arrangements between strategy partners
- incorporated new arrangements for the operation of the Menindee Lakes and Lake Victoria to provide additional dilution flows to South Australia to reduce salinity
- included a process of continuous knowledge improvement.

Further, each state was enabled to undertake additional salt interception works and other ‘accountable’ actions to reduce river salinity, with their accrued salinity credits through such actions able to offset other actions that increased river salinity.

Those actions included the expansion of irrigation in the Mallee that was driven by the introduction of water entitlement trade. Victoria developed a salinity impact zoning system to guide new irrigation developments

in the Mallee away from those zones that would have the highest impact on river salinity. They used some of their salinity credits to offset the developments in the lower impact zones.

By the time the Salinity and Drainage Strategy was completed in 2000, three new salt interceptions schemes had been built, three existing schemes had been expanded, substantial improvements to irrigation drainage had been undertaken and there were significant changes in irrigation practices that reduced drainage volumes.

While the Salinity and Drainage Strategy was reducing river salinities in the River Murray and enabling sustainable irrigation, the wetter period of the 1990s revealed a potential new salinity threat in the form of rising water tables in large areas of the upstream dryland catchments of the Basin.

A 1999 audit of salinity in the Basin found that, in the absence of substantial intervention, three to five million hectares of land would become salinised during the following 100 years. This was expected to have substantial impacts on water quality, agricultural productivity, the environment, and built infrastructure. The area of salinised land was expected to increase by approximately 50 percent in the lower Murray over fifty years and to more than double in the Macquarie, Namoi, Lachlan, Loddon and Avoca catchments over the same period. The consequent salt damage to agricultural productivity, roads and buildings in the Basin was estimated to increase to \$1 billion a year over 100 years. Increasing salinity was also expected to have serious impacts on major wetlands such as the Macquarie Marshes, the Great Cumbung Swamp, the Avoca Marshes, the Chowilla wetlands and the Lower Lakes – matching with existing concerns about salinity levels in the Coorong.

The risk was that the gains made from the Salinity and Drainage Strategy would be swamped by the potential tide of salt coming

from deteriorating catchments over the following 100 years. This was the challenge for the next phase of salinity management in the Basin.

Phase 2 (2001 to 2015) – the Basin Salinity Management Strategy

In 2001, the Murray–Darling Basin Ministerial Council took a whole-of-Basin approach to salinity management and adopted the Basin Salinity Management Strategy 2001–2015 (BSMS). BSMS had four objectives, which were to:

- maintain the water quality of the shared water resources of the Murray and Darling Rivers for all beneficial uses - agricultural, environmental, urban, industrial and recreational
- control the rise in salt loads in all tributary rivers of the Basin and, through that control, protect their water resources and aquatic ecosystems at agreed levels
- control land degradation and protect important terrestrial ecosystems, productive farm land, cultural heritage, and built infrastructure at agreed levels Basin-wide
- maximise net benefits from salinity control across the Basin.

BSMS set, for the first time, a Basin Salinity Target at Morgan. The target was to maintain the modelled average daily salinity level of less than 800 EC for at least 95 percent of the time within a benchmark period that encompassed the expected long-term range of climate variability. BSMS also established a binding strategic framework for salinity management in the Basin including End-of-Valley salinity targets for the tributary catchments and valleys.

BSMS continued the accountability framework established under the Salinity and Drainage Strategy, and it extended the framework to enable actions that occurred in catchments to be included on the salinity

registers where they had an impact on river salinity at Morgan. It also formalised the accountability framework in Schedule B to the Murray–Darling Basin Agreement (Schedule B), and it ensured that the delayed salinity impacts from actions taken before individual states entered into the Agreement could be accounted for in the future. In addition, through BSMS, the partner governments collectively agreed to:

- generate a further 61 EC salinity credits through a joint program of salt interception works to offset development activities and delayed salinity impacts
- establish a salinity monitoring, reporting and audit process across the Basin to assure progress in meeting the Basin Salinity Target
- invest in new knowledge particularly in relation to reducing the uncertainty in the catchment salinity projections.

BSMS continued to support state-based policies and programs to improve irrigation and land management practices. The modernisation of irrigation infrastructure and the continued improvements to on-farm practices helped to significantly reduce river salinity.

Salinity impact zoning systems were introduced in South Australia and expanded in Victoria and became an important focus of BSMS. They successfully enabled continuing economic development in both South Australia and Victoria that minimised the associated increase in river salinity. For example, the total irrigated area in the Victorian Mallee increased by more than 150 percent between 1994 and 2012. A 2006 assessment showed that without the salinity impact zoning system, and the associated new irrigation development guidelines, that increase would have resulted in a salinity debit (that Victoria would have had to fully offset) of 24.8 EC compared to the actual salinity impact of 6 EC in 2006.

The status of salinity management in 2015

By 2015 at the end of Phase 2, the partner governments had fully met their salinity accountability obligations. The Basin Salinity Target was met for the first time in 2010 (Figure 1), through the combination of improved irrigation practices, catchment programs and significant investment in the construction and operation of salt interception schemes.

New knowledge also showed that salinity in the tributary catchments and valleys was cyclical in nature, and that, for most areas, the predicted maximum future impacts will not be substantially worse than was seen during the wet years of the 1990s.

In addition, modelling indicates there has been enough capital investment in salinity management to ensure that under current levels of development and management arrangements, the Basin Salinity Target can be met until about 2035.

The joint works and measures undertaken by the partner governments through the Salinity and Drainage Strategy and the BSMS delivered an approximate 150 EC average daily salinity benefit to the River Murray at Morgan (against a target of 141 EC). These joint works and measures divert, on average, about 400,000 tonnes of salt per year away from the river system.

By the end of the BSMS, it was clear that joint action on salinity had avoided the environmental and economic crisis for the Basin that appeared to be evident in the 1980s and 1990s. Salinity is now understood as an issue requiring careful ongoing management.

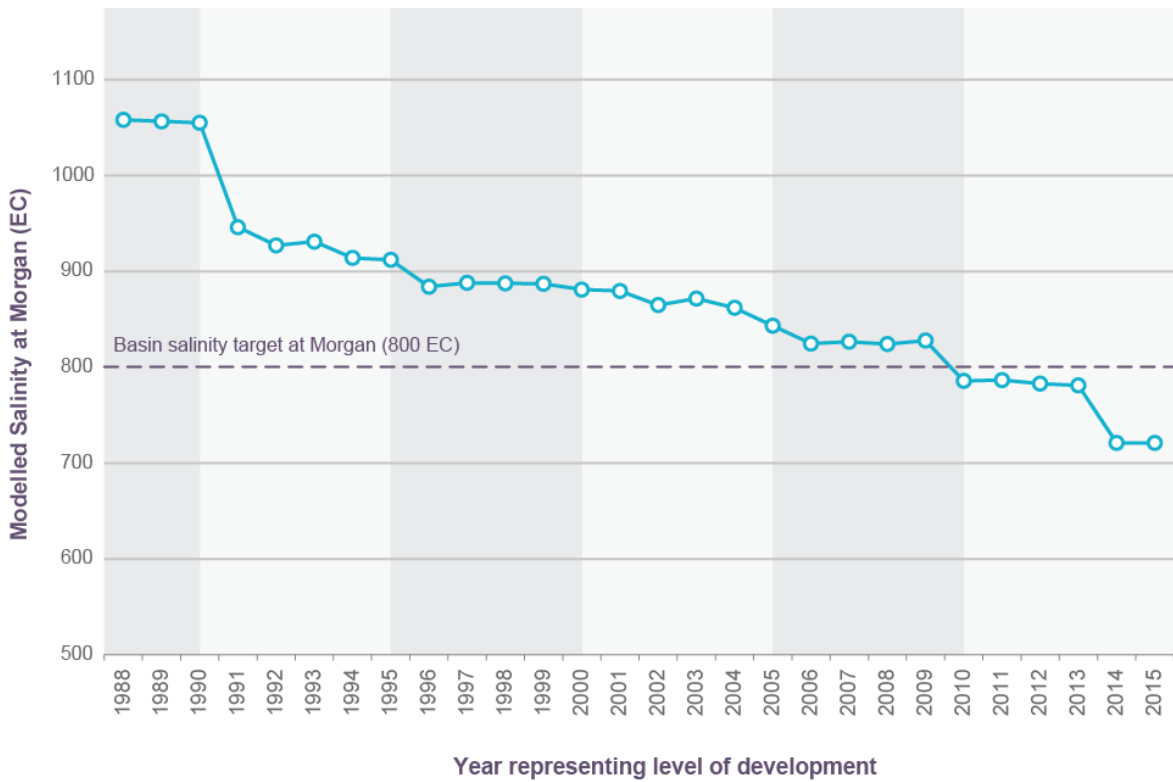


Figure 1. Modelled 95 percentile salinity over the 1975-2000 Benchmark period at Morgan in South Australia showing improvement due to the implementation of salinity management programs from 1988 to 2015.



Figure 2. Impact of salinity strategies.

Looking forward – the next phase: a Basin in transition

Basin landscapes will continue to export salt, and salinity is forecast to gradually increase as the delayed salinity impacts of land clearing and historical irrigation development manifest, but there are continued uncertainties about the projected extent and timing of these increases. Additionally, the available salinity credits may be used to offset future irrigation developments. There is therefore an ongoing need to manage current salinity levels as well as future increases.

The next phase of salinity management in the Basin will also take place in significantly changed circumstances. The Basin Plan commenced in November 2012. It will be substantially implemented by 2019 and completed around 2024. It represents a significant step in the continuous improvement in water management for the Murray–Darling Basin. The Basin Plan sets limits on consumptive water use (that is, the water used for irrigation, town water supplies, industry and other human uses). The Basin Plan also includes salinity targets for managing water flows. Observed river salinities will therefore become increasingly important as an adjunct to the Basin Salinity Target that provided the focus for the BSMS.

The next phase of salinity management, from 2016 to 2030, will therefore occur over a period when the Basin is being reset to a new sustainable state. There are a number of factors that will be in transition during this time. By the time the next phase is complete, 15 years experience in environmental watering will have provided an improved understanding of the dilution benefits and salt mobilisation impacts of environmental flows. There will also be an improved understanding of the salinity impacts of all accountable actions and delayed salinity impacts recorded in the salinity registers – including changes to the irrigation footprint in response to market

forces, irrigation system modernisation and water recovery under the Basin Plan.

Predictions of future salinity impacts from known actions on the salinity registers point to an increasing future salinity risk even with the dilution benefits provided by increased flows under the Basin Plan. While river salinity was expected to stay under the Basin Salinity Target until about 2035 with the management regime established under previous strategies and current levels of development, modelling now indicates that given the dilution benefits of Basin Plan environmental water (at current levels of development) this timeframe could be extended by a number of decades. However new accountable actions, including irrigation development, resulting in increasing salt loads to rivers will reduce this extended timeframe.

Modelling also shows that, even with the dilution benefits from the delivery of environmental water, the existing suite of salt interception schemes will continue to be required to ensure that the Basin Salinity Target can be met – and to protect the river from elevated salinity particularly during low flow periods (Figure 2). Nonetheless, the modelling suggests that it may be possible to vary the operation of salt interception schemes in response to forecast river salinity. This would involve running the salt interception schemes at full capacity only in periods of high salinity risk or when salinity is forecast to be a problem.

Salinity will still represent a major economic cost if not managed effectively, and controlling salinity to meet the Basin Salinity Target will still require ongoing, active management. There will need to be a dynamic approach to balancing uptake of salinity credits currently held, the potential dilution benefits from the Basin Plan environmental water, and salt load management through the salt interception schemes.

Over the next 15 years, new management approaches will be explored and strategic investments in knowledge improvement will be required to help reduce the uncertainty about future salinity risks.

BSM2030 – the strategy for a Basin in transition

Salinity remains a risk to the Basin. Ongoing and proactive salinity management and accountability is required to ensure that river salinity does not exceed agreed levels and to prevent a return to the highly saline conditions of previous decades. This strategy, *Basin Salinity Management 2030 (BSM2030)*, is the Murray–Darling Basin Ministerial Council’s coordinated and cost-effective response to this need.

Schedule B of the Murray–Darling Basin Agreement and the Basin Plan collectively outline the salinity management obligations for each government that is party to the Murray–Darling Basin Agreement (the partner governments). This strategy provides a framework for how those governments will work individually and collectively to meet the obligations of Schedule B of the Murray–Darling Basin Agreement and the Basin Plan.

BSM2030 is the strategy for a Basin in transition. It reflects the contemporary understanding of salinity risk while also making strategic investments in knowledge improvement to help reduce uncertainty about future risks and to potentially avoid future capital investment in new joint works and measures. It also accommodates complementary management arrangements under the Basin Plan. Its focus is to continue to ensure salinity levels in the shared water resources are appropriate to protect economic, environmental, cultural and social values.

Given this, the key focus for this third phase of the Basin salinity management will be to:

- maintain the cap on salinity through the existing Basin Salinity Target and the existing accountability framework – this will ensure that partner governments continue to be accountable for offsetting actions that increase river salinity
- bring environmental water fully into the accountability framework
- explore opportunities to responsively manage SIS so that operations and costs can be reduced when river salinity is forecast to be low, and to learn about the operational capability of responsive SIS bores and system responses to changed operations
- support implementation of the Basin Plan to manage in-river salinity outcomes through flow management decisions by periodically reviewing and providing advice on flow management practices particularly in response to elevated salinity events in the shared water resources
- through a risk-based approach, identify changes in salinity risks from catchments to local assets and shared water resources and support implementation of cost-effective measures, where appropriate, through water resource plans, land and water management plans or other relevant statutory instruments
- develop fit-for-purpose governance arrangements which reduce the frequency of audit, reporting and reviews, taking into account risk and the need for confidence in the salinity registers while also recognising the Basin Plan reporting requirements
- invest in knowledge priorities to reduce uncertainty about future salinity risks and to potentially avoid future capital investment in new joint works and measures
- include a key review point to ensure that BSM2030 remains relevant in guiding effective management of salinity in the Basin and can adapt to new knowledge.

Inter-linkages between BSM2030 and the Basin Plan

The Basin Plan sets high-level objectives and targets for salinity. It aims to guide the Basin States in developing water quality management plans within their individually developed water resource plans. It also obliges river managers and environmental water holders and managers individually to have regard to salinity targets.

However, the Basin Plan has no mechanism for joint state action in managing the shared water resources of the Basin. Therefore BSM2030 is the vehicle by which the partner governments agree to implement individual, collective and coordinated actions in the shared water resources and where necessary in their catchments.

In endorsing BSM2030, the Murray–Darling Basin Ministerial Council establishes it as an agreed program under the Murray–Darling Basin Agreement (Schedule 1 of the *Water Act 2007* (Cth)). The strategy provides for:

- joint and individual state investment, accountability, management and monitoring of the individual and cumulative salinity impacts of actions that affect the shared water resources
- a coordinated approach to meeting the salinity objectives of BSM2030 and the Basin Plan and the requirements of the Murray–Darling Basin Agreement.

BSM2030 and the Basin Plan are consistent and complementary. Together they link the states' catchment-based arrangements for salinity management with their Basin Plan water resource plan obligations, their obligations to have regard to the Basin Plan salinity targets for managing water flows and their mutual commitment to the Basin Salinity Target.



*River Murray near Renmark, South Australia
Photo: Asitha Katupitiya, MDBA*



*Pike River and floodplain at Lyrup, South Australia
Photo: Kathryn Kenny, MDBA*



*Psyche Bend Lagoon on the River Murray floodplain,
near Mildura, Victoria
Photo: Asitha Katupitiya, MDBA*

Objectives, Principles and Targets

Through BSM2030, the Murray–Darling Basin Ministerial Council commits the partner governments to accept shared responsibility for continuing action to manage salinity in the shared water resources of the Basin. It also commits them to taking action in their catchments and valleys where such actions are necessary to help achieve this.

Objectives of BSM2030

1. To ensure salinity levels in the shared water resources of the Murray–Darling river system are appropriate for the protection of economic, environmental, cultural and social values.
2. To manage salinity in the shared water resources through agreed works and measures implemented by partner governments with their communities.
3. To monitor and assess salinity levels and salt loads across the Basin to identify salinity risks and to support the implementation of cost-effective measures to protect the shared water resources and local assets.
4. To identify salinity risks and, where appropriate, contribute to the maintenance of appropriate salinity levels for the protection of local assets and downstream water resources through water resource plans, land and water management plans or other relevant statutory instruments.
5. To facilitate continuous improvement and provide assurance that flow management that affects the shared water resources is collectively undertaken in ways that have regard to the Basin Plan salinity targets.
6. To optimise the benefits of salinity control for economic, environmental, cultural and social values across the Basin.

Guiding Principles

The following principles will underpin and guide the implementation of BSM2030:

Building on the legacy of BSMS: BSM2030 will build on the successful elements of BSMS, and refine and improve them, as required, for consistency with contemporary policy settings and salinity risks.

Shared responsibility: partner governments will share responsibility for continued action to manage salinity impacts consistent with agreed cost sharing and benefit allocation arrangements under BSM2030 and Schedule B.

Accountability and transparency: partner governments will demonstrate accountability by recording the salinity impacts of accountable actions and delayed salinity impacts on the salinity registers and adopting robust monitoring, review, reporting and audit arrangements. The outcomes of monitoring, reporting, reviews and audits will continue to be publicly available.

Consistency and coordination with the Basin Plan: a consistent and coordinated approach will be undertaken to meet the salinity management requirements of BSM2030, Schedule B and the Basin Plan.

Cost-efficient and cost-effective management: efforts to manage salinity will seek to optimise benefits while minimising costs.

Balanced decision-making: decisions about salinity management will consider, integrate, and balance long-term and short-term economic, environmental, cultural and social costs and benefits.

Risk-based approach: management actions and investigations will be targeted to address significant salinity risks and take into account the potential for cumulative and future

impacts. Monitoring will be undertaken to identify changes in salinity risks and enable further investigation and action.

Adaptive management: by setting clear objectives, by investing in improved science and knowledge to support decisions and actions, and by monitoring, evaluating and reporting, Basin salinity management will be adapted to changes in the understanding of the magnitude, location and trends of salinity risks and impacts across the Basin.

Streamlined and fit-for-purpose

governance: governance arrangements (decision making, implementation, reporting, reviews and audits) will be flexible, efficient and fit-for-purpose, and they will consider risk in prioritising effort. Collaborative decision-making and advisory arrangements will enable partner governments and agencies to implement BSM2030 in an effective manner.

Targets

BSM2030 makes use of the salinity targets in Schedule B and in the Basin Plan to support implementation and help assess whether the objectives of the strategy are being achieved.



*Irrigated viticulture near Paringa, South Australia
Photo: John Baker*

Key Elements of BSM2030

BSM2030 comprises eight interlinked key elements. The core element is the continuation and refinement of the accountability framework that has been at the heart of Basin salinity management since 1988. That core is complemented by elements designed to bring contemporary and emerging issues into the accountability framework. Other elements are designed to draw on 30 years of knowledge and experience to streamline the management of mature processes and procedures. The key elements are:

- Accountability framework
- Salinity accountability for environmental water management
- Responsive management of salt interception schemes
- Flow management
- Salinity management in catchments
- Efficient governance
- Strategic knowledge improvement
- Community engagement and communication.

Action on each of these elements will ensure that, during the life of BSM2030, salinity management to deliver the strategy objectives and meet the agreed targets will be efficient and cost-effective. It will also ensure that knowledge is generated in areas of current uncertainty to inform future management and capital investment.

The policies outlined below for each of the key elements are supported by more detailed arrangements between the partner governments regarding the implementation of this strategy.

Accountability framework

BSM2030 retains the accountability framework of BSMS, which is established by Schedule B. This framework commits the partner governments to maintain agreed salinity levels and ensure that their actions that increase river salinity are offset by investing in actions to reduce salinity.

BSM2030 also retains the Basin Salinity Target to maintain modelled average daily salinity at Morgan at less than 800 EC for at least 95 percent of the time over the benchmark period. This target provides a single metric to assess the Basin-scale outcomes of improved land and water management practices and salt interception schemes.

The framework provides for the registering of all actions that are assessed to have a significant effect on River Murray salinity. The salinity impacts of actions will continue to be assessed with models using an agreed climatic-hydrologic sequence (otherwise known as the 'benchmark period'). The current benchmark period is from May 1975 to April 2000. An action will be considered significant, and it will be defined as an accountable action for inclusion in the salinity registers, if it is assessed as causing a change in average daily salinity at Morgan of 0.1 EC or more by 2100 (retaining the same salinity forecast end date as applied under BSMS).

Accountable actions and delayed salinity impacts will continue to be recorded in two salinity registers. Register A will record all actions taken after the date from which the partner governments agreed to accept individual responsibility for accountable actions (1988 for NSW, South Australia and Victoria, and 2000 for Queensland and the ACT). Register A also brings forward information about works carried out under the

former Salinity and Drainage Strategy. Register B will record the delayed salinity impacts of actions and decisions taken before 1988 for NSW, South Australia and Victoria, and 2000 for Queensland and the ACT, but whose impacts occur after 2000. It will also record the predicted future effects of actions aimed at specifically addressing delayed salinity impacts. The units of account for both registers will continue to reflect the economic costs of salinity.

BSM2030 continues and enhances support for the land and water management plans initiated under preceding Basin salinity strategies. In that context, the accountable actions arising from those plans will continue to be recorded on the salinity registers and new actions will be brought on to the registers where there is a significant salinity impact. The requirement to offset the impacts of future irrigation development and the need to maintain a net credit balance in salinity register accounts will continue to provide the incentive to implement and review land and water management plans.

Partner governments will continue to maintain their Register A and the sum of their Register A and Register B accounts in a net credit balance. However if any partner governments Register A accounts or net register balance is trending towards a net debit, then prior to any decision on increased investment in salinity mitigation, the MDBA will initiate policy discussions between partner governments. Recommendations arising from these discussions will give due consideration to the contemporary salinity risk, and the appropriateness of the modelling assumptions and policies that give rise to the predicted impacts. If the issues are deemed significant, it may be necessary to bring forward some aspects of the BSM2030 Strategic Review (outlined in the *Review* section on page 19).

Strategy: Under BSM2030, the partner governments will:

- accept that the starting position for BSM2030 will be Registers A and B as they stand at the end of BSMS
- define accountable actions as actions causing a change in average daily salinity at Morgan of 0.1 EC or more by 2100
- continue to accept individual accountability to maintain a net credit balance in Salinity Register A and the sum of Registers A and B
- continue to accept shared responsibility for the actions required to offset the delayed salinity impacts that occur after 2000.

Salinity accountability for environmental water management

The recovery and use of significant volumes of water for the environment is a relatively new issue in salinity management. Environmental watering will provide long-term substantial dilution benefits, but it can also mobilise salt from floodplains into the river system. The salinity impacts of environmental watering must be understood and demonstrated transparently to communities through explicit inclusion in the accountability framework.

The positive and negative salinity impacts associated with environmental water management will both be accountable actions under Schedule B. BSM2030 aims to bring those impacts into the accountability framework in a streamlined and pragmatic way. The partner governments have agreed to the following collaborative approach to accounting for the salinity impacts associated with environmental water:

- the dilution benefits associated with water recovered for the environment under the Basin Plan will be brought on to Register A with the credits held by the

Commonwealth. Even though the Basin States hold a small amount of this water they have agreed to pool it and assign the dilution benefits to the Commonwealth. In keeping with BSM2030's guiding principle of streamlined and fit-for-purpose governance, the dilution benefits will be aggregated into one register entry to reduce the overall administrative burden

- individually, the Basin States will, unless otherwise agreed, be accountable for any salinity impacts (credits or debits) arising from the recovery of water for the environment under the Basin Plan and any salinity impacts (credits or debits) associated with the operation of works and measures under the Sustainable Diversion Limits (SDL) adjustment mechanism.

To further streamline the accountability framework, to reduce accounting costs and to reflect collaborative action, the partner governments have agreed that they may hold credits or debits collectively. In the first instance, they have agreed to be collectively accountable for any salinity impacts associated with:

- the use of environmental water under the Basin Plan environmental watering plan (excluding use associated with the operation of SDL works and measures and where already accounted for under The Living Murray program (TLM))
- changes to river operations to support environmental outcomes (that are not part of the SDL adjustment mechanism).

The Commonwealth will make available to relevant Basin States individually, or partner governments collectively, sufficient credits to offset any debits associated with:

- the recovery of water for the environment under the Basin Plan on a case-by-case basis, unless otherwise agreed
- salt mobilisation from the operation of environmental works and measures

associated with the SDL adjustment mechanism as agreed or on a case-by-case basis

- salt mobilisation from the use of all environmental water associated with the Basin Plan environmental watering plan (excluding use associated with the operation of SDL works and measures and where already accounted for under TLM)
- changes to river operations to support environmental outcomes (that are not part of the SDL adjustment mechanism) as agreed or on a case-by-case basis.

In addition to the water recovered under the Basin Plan, the Basin States have agreed to pool the credits associated with their other environmental water holdings (including the net balance of TLM Register A salinity credits not required to offset TLM debits). These credits will be pooled and held collectively by the partner governments in an account to be added to Register A. The pooled credits will be used to offset collective actions that result in salinity debits.

Each Basin State will be able to access its share of the collectively held credits for its individual use, but it will need to do so by following an agreed process.

The accountability arrangements for environmental water will be reviewed during the BSM2030 Strategic Review and may be reset in 2030 to meet the salinity accountability requirements of a fully operational Basin Plan.

There will be a need to monitor and assess the cumulative, system-scale salinity impacts arising from environmental watering regimes – including changes to river operations designed to support environmental outcomes. This will be a priority for strategic knowledge improvement under BSM2030.

Strategy: Under BSM2030, the partner governments will:

- amend Schedule B to enable the Commonwealth Government, and the partner governments collectively, to hold salinity credits and debits
- develop BSM2030 operating procedures that include the detailed salinity accountability arrangements for all environmental water, commencing in 2016.
- monitor and assess the cumulative salinity impacts from changed river operations and environmental watering events, through the MDBA, as a knowledge priority
- Establish a process for recording Register A salinity credits associated with other Basin State-held environmental water holdings in the collective account and develop the process by which Basin States can withdraw all or part of their credits from that account.

Responsive management of salt interception schemes

The existing 14 jointly managed salt interception schemes (SIS) reduce base salt loads in the river, and reduce the magnitude and duration of episodic salinity peaks. They have been very successful in reducing river salinity and they are still essential to achieving the Basin Salinity Target and are critical in low flow periods and for managing in-river salinity peaks.

Modelling indicates that there will be no need for further joint capital investment in new schemes for the life of BSM2030. Largely this is because of the dilution benefits associated with environmental water benefiting the river, the lower than expected increase in river salinity associated with the legacy of land clearing and the net salinity credit balances currently held by the partner governments. This spare capacity, combined with improved

ability to forecast in-river salinity, provides opportunities to vary the level of SIS operation in response to the salinity risk outlook, to achieve operational cost savings and learn more about their day-to-day operational capability.

BSM2030 will explore the potential to operate SIS in response to forecast river flow and salinity conditions, taking opportunities to reduce operations and therefore operating costs during periods of low in-river salinity. It will also provide an opportunity to better understand the operational capabilities of SIS and system responses to changed operations. Given that there is uncertainty regarding the risks associated with changing SIS operations, responsive SIS management will initially be trialled for a 3-year period commencing in 2016, with the outcomes being reported annually.

During the trial a precautionary approach will be applied to ensure that as far as possible salinity is maintained at appropriate levels. The effectiveness of the trial will be reviewed in 2019 at the end of the trial period. The review will analyse and document the river salinity impacts, third-party impacts, floodplain environmental impacts, benefits and costs. It will also make recommendations on the future operation of SIS to achieve optimal outcomes.

The guiding principles for the responsive management of SIS under BSM2030 are to:

- avoid, to the extent of SIS operational capacity, increases in the frequency, magnitude or duration of peak salinities (compared to the full operational capacity of SIS) and avoid exceeding Basin Plan salinity targets for managing water flows
- take a precautionary approach to avoid exceeding the Basin Salinity Target
- ensure SIS are operating at full capacity when salinity is forecast to be a problem

- avoid third-party impacts, and avoid reducing the health of the environmental assets affected by the groundwater systems managed by each SIS
- maintain a neutral effect on the salinity register balances for each partner government
 - if the responsive management of SIS results in a salinity debit, this will be offset to the extent possible by available Commonwealth salinity credits from the dilution benefit provided by the delivery of environmental water
 - the responsive management of SIS will not decrease the salinity credits or increase the costs associated with the state component of shared works and measures
- continue to regularly monitor, evaluate and report on SIS management, operations and costs and apply the improvements in understanding to optimise the efficiency and performance of SIS.

The trial of responsive SIS management will provide a comprehensive and robust understanding of the risks and uncertainties surrounding the ability to manage to these principles. This will inform SIS management for the remainder of BSM2030. It will also provide a comprehensive understanding of the operational capabilities of the schemes and confidence in the ability to forecast flow and salinity conditions over an appropriate timeframe.

Strategy: Under BSM2030:

- the partner governments will develop management arrangements around the adjustment of SIS operations during the course of each year
- the MDBA will conduct an initial three-year trial of responsive SIS management. The results of the trial

will determine whether or not responsive SIS management should continue and if so under what policy settings

- the MDBA will report annually on progress with responsive SIS management
- the Commonwealth will, for the life of BSM2030, make available salinity credits to offset, to the extent possible, salinity impacts from responsive SIS management. The SIS operating effort therefore cannot be reduced by more than the amount able to be offset by these credits
- a provisional entry will be recorded in Register A to account for the modelled salinity impacts of the changed management regime. The register entry will be confirmed or modified following the outcome of the trial if operation of responsive SIS management is continued.



*Salt interception activities along the River Murray
Photos: Jack Smart, Asitha Katupitiya, MDBA*

Flow management

River operations and flow management can have a significant effect on river salinity. With greater volumes of environmental water available there is greater potential to improve river salinity through increased dilution. Environmental watering can also, in some circumstances, increase salinity. Those circumstances need active management to minimise salinity impacts. The salinity risks associated with flow management therefore need to be identified and managed within the context of broader flow management objectives.

The Basin Plan sets salinity targets for managing water flows. The MDBA, the Basin Officials Committee (BOC) and the agencies of Basin States must have regard to those targets when managing water flows. Environmental water holders and managers must also have regard to those targets when making decisions about the use of environmental water. These entities undertake flow management at a range of scales. Under the Basin Plan, decisions with respect to flow management that impact upon river salinity require a higher level of transparency.

At the **site-scale**, environmental water holders and managers need to understand and manage the risk that watering at that site could mobilise salt to the river. Decisions about watering at high risk sites will require greater efforts to mitigate risks.

At the **system-scale**, environmental water holders and managers need to understand and manage the potential for cumulative (spatial and temporal) salinity risks when multiple sites are being watered – either in series on one river, or in parallel in different tributaries.

In carrying out **coordinated river operations**, river managers monitor, forecast and manage salinity including responding, day-to-day, to elevated river salinity. Their decisions about bulk water management and

transfers affect river salinity through the combined effect of the flow and salinities from each source. The need to consider SIS management and respond to elevated salinities also influences their decisions.

BSM2030 aims to facilitate continuous improvement in flow management by periodically reviewing and providing advice on flow management practices particularly in response to elevated salinity events in the shared water resources. This will provide assurance that the collective effort is providing effective in-river salinity management.

BSM2030 will support the implementation of the Basin Plan salinity targets for managing water flows through a coordinated management approach that will:

- document, regularly review and periodically update the principles and practices associated with operational flow management to manage day to day salinity – in order to facilitate continuous improvement by the responsible entities
- review elevated salinity events to examine the causes, impacts and effectiveness of management responses and to identify the potential for policy improvements
- inform the development and review of guidelines to assist responsible entities in having regard to the salinity targets for managing water flows.

Strategy: Under BSM2030, the partner governments will:

- provide assurance that flow management that affects the shared water resources is collectively undertaken in ways that have regard to the Basin Plan salinity targets. This will be achieved by providing a process for information sharing and to annually review and synthesise learnings from the routine reporting undertaken by the various entities responsible for having

regard to salinity targets when managing water flows

- facilitate continuous improvement in flow management by:
 - documenting, regularly reviewing and periodically updating the principles and practices associated with operational flow management
 - developing predictive tools that improve the forecasting of in-river salinities – as a knowledge priority
 - supporting the development of (and future improvements to) any guidelines prepared by the MDBA aimed at assisting entities in meeting their obligations to 'have regard to' the Basin Plan salinity targets for managing water flows
 - reviewing elevated salinity events with respect to the cause, impact and mitigation strategies associated with flow management activities.

Salinity management in catchments

Basin States have responsibility for land and water management activities that address salinity risks. Depending on the magnitude of the salinity risks within their particular catchments, communities and governments throughout the Basin have worked together to improve landscape management and irrigation practices. Since the 1980s these activities have typically been implemented through state-based instruments such as land and water management plans or catchment plans or individual investments.

Under the existing salinity accountability framework, actions taken in catchments are included on the salinity registers where they have a significant effect on river salinity at Morgan. This accountability requirement will continue under BSM2030. Under the Basin Plan, the Basin States also have obligations to prepare water resource plans that,

amongst other things, must identify and assess the risks arising from elevated salinity to the condition and continued availability of the water resources in the water resource plan area.

BSMS was framed in the expectation that in the absence of substantial intervention, contemporary management systems would cause three to five million hectares of land to become salinised during the following 100 years. In that context, it introduced end-of-valley targets (EoVTs) to serve as indicators of catchment health and to help assess and manage the impacts of salt exports from the catchments to the shared water resources.

The contemporary understanding, based on improved knowledge, is that future increases in salt loads from past land and water management activities (*i.e.* delayed salinity impacts) from most valleys, with the exception of the Mallee, are less than previously understood and that current salt contributions are being managed appropriately. Any new actions and significant change in projected salt loads will be addressed through the accountability framework. There remains a need to continue to monitor and manage salinity including episodic elevated salinity events. While local salinity problems and salt exports from valleys will fluctuate in response to climatic cycles, the predicted maximum future impacts will not be substantially worse than those during and following the wet climatic sequence of the mid to late 1990s. Given this, the role of EoVTs under BSM2030 will be to provide a valley scale context to the identification and management of salinity risks to the shared water resources.

If through monitoring a valley is identified as posing an increasing salinity risk to the shared water resources, the need for additional monitoring and detailed analysis and modelling will be assessed, and undertaken if appropriate, to determine if further action is necessary. Basin States may

also consider the need for additional measures to protect in-valley assets and to manage and monitor impacts of in-valley land and water salinisation. Basin States may undertake such works if they are cost-effective and consistent with state or regional initiatives or water resource plans.

Strategy: Under BSM2030, the Basin States will:

- report on stream flow and salinities for all EoVT sites on an annual basis
- assess the need for additional monitoring and detailed analysis and modelling if a valley is identified as posing an increasing salinity risk to the shared water resources, and undertake this where appropriate, to determine if further action is necessary
- propose amendments to EoVTs where the review of monitoring data or detailed modelling indicates that the existing targets can be improved in a fit-for-purpose fashion
- identify and, where appropriate, implement cost-effective measures for salinity management, through water resource plans, land and water management plans or other relevant state instruments, for those valleys where there are salinity risks to local assets or the shared water resources. Any in-valley actions will be reported on a biennial basis
- review baseline data sets and projected salinity trends for all valleys before 2026, to ensure that the BSM2030 Strategic Review (outlined in the *Review* section on page 19) is informed by a contemporary understanding of the salinity risk from valleys
- continue to record in the Registers the delayed salinity impacts of ‘legacy of history’ actions and the net effect of within valley actions that have a significant effect on the shared water resources
- amend Schedule B to reflect the ongoing role of EoVTs.

Efficient governance

The governance of the salinity management program has been developed over 30 years and is now well understood and accepted. Given this, there are opportunities to retain its key functionality but streamline it in a way that reflects its maturity.

BSM2030 will streamline the management program developed under BSMS by making it risk-based and more efficient. The monitoring, reporting, review and auditing arrangements will ensure transparency and assure compliance with the agreed actions and accountabilities of BSM2030. They will also help to continually improve the knowledge of salinity risks.

Register management

The salinity registers will continue to be operated and maintained under BSM2030, and the maintenance of the salinity registers will continue to include periodic review of register entries and associated models. Importantly however, under BSM2030 a risk-based approach will be applied to the review of register entries and associated models.

Many register entries and their associated models are now mature having been reviewed several times. Given this, the maximum time period between reviews will be extended from 5 to 10 years. Review periods will be set by the MDBA and a shorter review period will be agreed for those register entries and models where there is higher risk, uncertainty or where there is new knowledge, changes in land use or operational experience.

A 4-year register entry and model review plan, with a 10-year outlook, will set out the frequency of reviews required of each register entry and model. Developing the plan will enable partner governments and the MDBA to make pragmatic decisions to focus limited resources on the most significant salinity threats or where there is likely to be significant change or uncertainty. Once

developed, the review plan will provide partner governments with a basis for estimating budgetary and resourcing requirements, and identifying workloads to inform business planning cycles.

During the life of BSM2030 there are likely to be improvements to the modelling platforms and the other technical elements that underpin the salinity registers. Where these may have significant implications for the salinity registers, they will be carefully planned and implemented in collaboration with partner governments.

As outlined in *Salinity accountability for environmental water management* on page 12, the salinity registers will be modified to allow the Commonwealth to hold salinity credits and debits. Similarly, they will be modified to allow the partner governments to collectively hold salinity credits and debits. They will also be modified to allow some specific register entries to be held as provisional until they are confirmed.

Monitoring

Monitoring is essential for successful salinity management. It helps to build an understanding of salinity processes, it supports the analyses and models that are used to quantify, validate and review accountable actions and delayed salinity impacts, and it provides the data to support river managers and environmental water holders and managers in their day-to-day business. Therefore, under BSM2030 the partner governments, and the MDBA, will maintain the key salinity monitoring sites that will form the Basin-wide Core Salinity Monitoring Network.

Each partner government, and the MDBA, will nominate, for inclusion in the network, the sites they see as critical in underpinning the models that quantify register entries, evaluating trends at EoVT sites, assessing compliance with the Basin Plan, improving knowledge in priority areas, and supporting

river operations, SIS management and environmental flow management. The network will be maintained for the life of BSM2030 and monitoring sites will be reviewed at least every 5 years to ensure the network continues to provide a sound basis for salinity assessment in response to an improved knowledge of risk and uncertainty.

Reporting

Every second year, a comprehensive report will be provided to the Ministerial Council on progress against objectives. Every other year, a status report will be provided to BOC along with a summary report for the Ministerial Council. BSM2030 reporting arrangements will be tailored to complement and reference Basin Plan reporting arrangements.

The reporting requirements will be expanded to include reporting on the collective outcomes of efforts to have regard to the Basin Plan salinity targets for managing water flows. They will also include reporting on the responsive SIS management.

All reports will continue to be publicly available.

Audit

The Independent Audit Group for Salinity will continue to assess the performance of partner governments and the MDBA in implementing the provisions of Schedule B – including the methods used to quantify and record entries on the salinity registers. The auditing cycle will however be biennial rather than annual as befits the mature salinity accountability framework.

Review

The BSM2030 strategy as a whole will be subject to a strategic review that will commence by 2026. By then the implementation actions for the Basin Plan should mostly be completed – including SDL adjustment measures and relaxed constraints – and 10 years of environmental watering

and the experience with responsive SIS management will bring greater insights into the future requirements for salinity management.

The BSM2030 Strategic Review will:

- consider future salinity management requirements in the context of a fully implemented Basin Plan
- use the contemporary understanding of salinity risks from valleys, the results of monitoring undertaken through the Basin-wide Core Salinity Monitoring Network, and associated investment in knowledge priorities
- re-evaluate the salinity risks and associated uncertainty, and present an improved understanding based on new knowledge of the salinity impacts arising from major changes to the flow regime
- consider the operation of salt interception schemes including outcomes from the trial of responsive management of salt interception schemes
- inform development of the next phase of Basin-wide salinity management in the expectation that the majority of actions for the Basin Plan should have been fully implemented by then.

Strategy: Under BSM2030, the partner governments will:

- amend Schedule B to ensure that it will enable BSM2030 to be implemented
- establish the requirements for status reports and comprehensive biennial reports
- develop and implement procedures for monitoring, reporting on and reviewing accountable actions and delayed salinity impacts
- revise the terms of reference for the Independent Audit Group for Salinity

- nominate key monitoring sites, and commit to maintain them as the Basin-wide Core Salinity Monitoring Network
- establish the requirements for the four-year register entry and model review plan
- undertake a strategic review of BSM2030 – commencing by 2026.

Strategic knowledge improvement

Knowledge is the key to salinity management in the Murray–Darling Basin. Steady improvements in knowledge about salinity processes in the Basin have underpinned three decades of successful adaptive management. From the first efforts at salinity management in the late 1960's through to the development of this strategy, knowledge has been critical.

BSM2030 will therefore treat knowledge as a strategic resource that will be brought to bear on problems and opportunities. The focus will be on overcoming critical information gaps and uncertainties in order to provide a solid basis for decision-making and future planning. In that context, the ongoing need is to improve the understanding of key salinity processes and reduce the uncertainty inherent in some existing knowledge. These needs must be met before the BSM2030 Strategic Review that will commence by 2026; the information will be needed then to provide the grounds for action in developing the strategy to replace BSM2030.

Importantly, improving knowledge about salinity risks will inform and potentially delay, or reduce the need for, future new joint investment in salinity mitigation. Improving knowledge and predictive capability will also enable more efficient salinity management with a higher degree of confidence.

The key knowledge gaps that will be addressed by BSM2030 are:

- Mallee Legacy of History – improved understanding of risk associated with the projected impacts of historic land clearing and water use in the Mallee regions of NSW, South Australia and Victoria will help to reduce the uncertainty surrounding the future magnitude and timing of salinity risks to the shared water resources
- improved understanding of environmental water management and watering practices will help to better assess the salinity impacts of environmental watering in the shared water resources including:
 - environmental watering and floodplain dynamics – development of the next generation groundwater models to assess and predict potential salinity impacts from environmental watering
 - the cumulative, system-scale salinity impacts arising from environmental watering regimes (*Salinity accountability for environmental water management* on page 12)
- predictive forecasting for in-river salinity – improved surface water models to support predictions and forecasting of salt loads and river salinities will help to reduce the risks associated with responsive SIS management and inform other management actions
- responsive SIS management – improved understanding of the salinity impacts associated with responsive SIS management, with particular focus on the floodplain and in-river responses will help the potential to further reduce operating costs and improve SIS operations

Strategy: Under BSM2030, the partner governments will invest in these key priority areas.

Community engagement and communication

Achieving the best salinity management outcomes for the Basin requires the involvement and engagement of a diverse range of stakeholders and communities. Effective engagement can leave a lasting legacy of informed, involved and confident communities who understand the value of salinity management. It can also help to ensure that each agency involved in environmental water management, river management, waterway management and land management can appreciate how their own contributions can improve salinity management for the Basin as a whole.

Ministerial Council recognises that community understanding of salinity is essential to its ongoing management and that this has been a major factor in the success of the Salinity and Drainage Strategy and the BSMS. The transition period from 2016-2030 will require a mature community understanding.

It is important that communities understand that salinity risk has been reduced through past investment and environmental water recovery under the Basin Plan. Similarly, it is important that they understand that salinity risks remain and that river salinity levels still require careful management to ensure the Basin Salinity Target is achieved. Therefore, communities need to be assured that the partner governments will maintain careful oversight and management of existing and new activities that are likely to cause salinity impacts.

Ministerial Council also recognises that community engagement in on-ground salinity management programs is critical to their success, and it recognises that there has been a long history of the partner governments engaging with their communities in these programs. This will be continued under BSM2030. The partner governments will engage their communities

on salinity management through their various natural resource management and planning activities. This will include identifying high value environmental, social and economic assets and assessing whether they are at risk from salinity. Where necessary, this will also involve ensuring that appropriate actions are taken to protect local assets, or the shared water resources, from salinity.

The partner governments will report on community engagement and communication activities undertaken through their salinity management programs as part of their comprehensive reports to Ministerial Council.

Strategy: Under BSM2030:

- MDBA will continue to publish salinity forecasts
- MDBA will publish fact sheets and a simple summary of the annual reports on salinity management on its website
- comprehensive Ministerial Council reports, including the status of the salinity registers, and the reports of the Independent Audit Group for Salinity will be available on the MDBA website
- partner governments will report on community engagement and communication activities undertaken through their salinity management programs as part of their comprehensive reports to Ministerial Council.

Implementation

Partner governments will continue formal arrangements to enable collaborative and effective implementation of BSM2030.



*Salinity monitoring on the River Murray
Photo: Asitha Katupitiya, MDBA*



*Mourquong disposal basin at Buronga, NSW
Photo: Alison Reid, MDBA*



*Field preparation and irrigation infrastructure near
Strathalbyn, South Australia
Photo: Brayden Dykes, MDBA*

Glossary

Accountable Action means a land or water management action that is expected to have a *Significant Effect*.

Basin Salinity Target is to maintain the average daily salinity at Morgan at a simulated level of less than 800 EC for at least 95 percent of the time, during the *Benchmark Period*.

Basin State means New South Wales, Victoria, Queensland, South Australia and the Australian Capital Territory.

Benchmark Period is an observed climatic sequence over a defined period (determined to be the period 1 May 1975 to 30 April 2000) that is representative of hydrological variability across the Basin.

BOC refers to the Basin Officials Committee which is the committee established under the Murray–Darling Basin Agreement.

BSMS refers to the Basin Salinity Management Strategy 2001–2015.

Delayed salinity impacts (also referred to as the ‘legacy of history’) means a salinity impact which occurs after 1 January 2000, but which:

- (i) in the case of New South Wales, Victoria or South Australia, is attributable to an action taken or decision made in that State before 1 January 1988; and
- (ii) in the case of Queensland or the Australian Capital Territory, is attributable to an action taken or decision made in that State before 1 January 2000.

EC is a unit of measurement for electrical conductivity (1 EC = 1 $\mu\text{S}/\text{cm}$), measured at 25 degrees Celsius, commonly used as an indicator of water *Salinity* (salt concentration).

EoVT refers to End-of-Valley Target.

Joint works or measures means physical works or measures that change in-stream salinity, either through a reduction in salt loads or through a changed flow management regime, for which partner governments have formally agreed to cost sharing.

MDBA refers to the Murray–Darling Basin Authority, as agent of the joint program.

Partner governments (or Contracting Governments under Schedule B to the Murray–Darling Basin Agreement) means any of the Governments of the Commonwealth, New South Wales, Victoria, South Australia, Queensland and the Australian Capital Territory.

Salinity (or salt concentration) is the concentration of dissolved salts in water, usually expressed in EC units or milligrams of total dissolved solids per litre (mg/L TDS).

Salinity Cost Effect is a change in average salinity costs resulting from an action.

Salinity Credit is a reduction in average *Salinity Cost Effect*.

Salinity Debit is an increase in average *Salinity Cost Effect*.

Salinity Effect means a change in river salinity that leads to a *Salinity Cost Effect*.

Salinity registers are a credit and debit based salinity accounting system which tracks all actions that are assessed to have a *Significant Effect* on river salinity, being a change in average daily salinity at Morgan which will be at least +/-0.1 EC by 2100. The *salinity registers* provide a primary record of partner government accountability for actions that affect river salinity.

Register A contains details of any actions after 1st January 1988 for NSW, Victoria and South Australia, and 2000 for Queensland and the ACT, that are considered to have a *Significant Effect*. *Register A* also brings forward information about works carried out under the former Salinity and Drainage Strategy and the BSMS.

Register B records *Delayed Salinity Impacts* due to actions taken before 1988 for NSW, Victoria and South Australia, and 2000 for Queensland and the ACT (the 'legacy of history' for which the partner governments accept joint responsibility). It also contains details of the predicted future effects of actions aimed at specifically addressing *Delayed Salinity Impacts*, including contributions from *Joint Works or Measures*, and their salinity costs.

Salt load is the amount of salt carried in rivers, streams, groundwater or surface run-off, in a given time period. The salt load is often expressed in kg/day, tonnes/day or tonnes/year.

Schedule B is a schedule to the Murray–Darling Basin Agreement (Schedule 1 to the *Water Act 2007* (Cth)) that provides the accountability framework for implementation of the BSM2030 by the partner governments.

SDL refers to the long-term average Sustainable Diversion Limits.

Shared water resources refer to the water resources of River Murray System as defined in Section 86A(3) of the *Water Act 2007* (Cth).

Significant Effect is a change in average daily salinity at Morgan which the Authority estimates will be at least 0.1 EC by 2100, or a salinity impact the Authority estimates will be significant.

SIS refers to salt interception schemes.

TLM refers to The Living Murray program.



