



Select Committee on the Murray-Darling Basin Plan

Submission from the South Australian Government

October 2015

1. Introduction

The South Australian Government remains committed to implementing the Basin Plan and associated water reforms agreed to by all Basin jurisdictions in the 2008 and 2013 inter-governmental agreements.

The Basin Plan and related Commonwealth investment programmes, delivered on time and in full, will halt widespread environmental decline across the Basin, help sustain regional communities and support a more efficient and sustainable irrigation sector.

While increasing water use and river regulation have contributed to significant economic development, there is overwhelming evidence of increasing degradation of environmental condition and water quality. If not addressed, this ongoing degradation will undermine the social and economic gains that have been made over the past 100 years.

The Basin Plan builds on a long history of collective water management and reform to support sustainable water use across the Basin. When adopted in 2012, it received bi-partisan support in recognition of the need to put water use on a sustainable footing, improve water quality and environmental health, provide water for critical human water needs, support irrigation productivity and sustain regional communities.

The Plan was developed based on sound science, socio-economic analysis and community input. Its provisions were extensively debated and revised, including changes recommended by Basin jurisdictions for water recovery targets to provide certainty to water users and for a mechanism to adjust the sustainable diversion limits (SDLs) on water use to achieve better social, economic and environmental outcomes.

Implementation is on track, with jurisdictions working cooperatively to deliver the Plan. This view on progress is supported by the independent review of the *Water Act 2007* (Water Act) in 2014 and by the Murray-Darling Basin Authority (MDBA) assessment of progress against the implementation agreement signed by all Basin states.

As expected, after only three years into an implementation programme that goes to 2024, there is still significant work to do. As a result it is too early to be able to truly assess the impacts of the Plan.

Despite this, there is good evidence that the billions of Commonwealth investment in water recovery, the SDL adjustment process, the cap on water purchase, and priority given to irrigation efficiency and



infrastructure projects are all working to mitigate adverse effects on the irrigation sector and regional communities. This investment also provides opportunities for business improvement that would not otherwise exist.

A recent stocktake of SDL adjustment projects found that it was plausible to significantly reduce water recovery by around 500 gigalitres, with further reduction possible. While a final outcome will not be known until 2016, the remaining task to 'bridge the gap' could be less than 300 gigalitres.

Recovery of an additional 450 gigalitres through the SDL adjustment mechanism will occur through Commonwealth Government investment in socio-economically neutral, on-farm efficiency programmes or State projects. Legislation recently passed by the Federal Parliament has extended eligibility to off-farm efficiency projects offering further opportunities for investment in efficiency and productivity improvements.

There is also good evidence of positive environmental change and improved water quality at sites across the Basin including the Northern Basin wetlands, the major river systems such as the Goulburn and Murrumbidgee, and the Coorong, Lower Lakes and Murray Mouth. These changes will increase benefits to agriculture, fisheries, boating, recreation, tourism and community wellbeing as well as avoid costs as a result of adverse water quality events, among other things.

The Basin Plan Constraints Management Strategy will increase the area of wetlands and vegetation that can be watered and benefit landholders and communities by improving access and addressing the impacts of naturally occurring floods. It will have positive outcomes for landholders and local environmental assets. However, it is acknowledged that there is not yet widespread community understanding of the strategy or the measures being considered.

Extensive scientific and technical studies demonstrate that provision of sufficient River Murray flows is the most effective means of ensuring the health of the Coorong, Lower Lakes and Murray Mouth. Removal of the barrages would cause devastating change to this internationally important wetland and would not remove the need for water to be returned to the environment under the Basin Plan. The River Murray system requires flows to meet environmental water needs all the way from its headwaters to the sea and to export salt and other pollutants.

Effort must continue to be focused on implementing the Plan in the most effective way to optimise social, economic and environmental outcomes. While it is helpful to check progress to ensure this is occurring, ongoing policy debate about the Plan's provisions risks creating uncertainty for water users and hindering progress.

Overall the South Australian Government considers that the benefits of the Basin Plan and associated Commonwealth funded programmes for agriculture, local businesses and regional communities far outweigh the costs. The Government is confident that, taking into account the level of investment in water use efficiency, the cap on water purchase and the strong prospect of more than 500 gigalitres of water recovery being offset by environmental works and measures, the Basin Plan is being



implemented to minimise adverse effects on water users and to optimise economic, social and environmental outcomes.

The South Australian Government recommends that:

- ***there is no change to the Basin Plan or its operation;***
- ***Basin governments continue to work cooperatively to implement the Plan on time and in full;***
- ***the current Commonwealth funded programmes are retained but are reviewed in sufficient time prior to the end of the current funding timeframes to ensure that these programmes are still adequately supporting the full implementation of the Basin Plan;***
- ***the Commonwealth Government undertake a review of the Water for the Environment Special Account in 2016-17 to investigate whether additional funding is needed in light of increasing water prices and other factors that may affect water entitlement holder participation;***
- ***Basin governments actively collaborate and engage stakeholders to improve understanding and allay concerns about the efficiency measures programme;***
- ***Basin governments and the MDBA work together to improve communication about the social, economic and environmental effects of the Basin Plan;***
- ***Basin governments continue to work cooperatively to optimise the use of environmental water for environmental assets across the Basin including multi-site watering and the provision of sufficient flows along the length of the River Murray and out to sea; and***
- ***Basin state governments and the MDBA improve communication about the benefits of constraints management and how they are working with affected landholders and stakeholders to identify and develop management measures.***

2. The implementation of the plan, including its progress

Under the 2013 *Intergovernmental Agreement on Implementing Murray-Darling Basin Water Reform* all Basin jurisdictions have committed to implementing the Basin Plan in a way that is effective, efficient, fit for purpose and minimises implementation costs.

Based on progress to date, the South Australian Government sees no case for significant change to the Basin Plan or its operation. The legislative, governance and policy framework is sound. Basin jurisdictions are working cooperatively to fully implement the Plan by 2024 and significant progress has been made. The Plan is supported by Commonwealth Government investment that is fundamental in underpinning implementation and optimising social, economic and environmental outcomes.



The independent review of the Water Act in 2014¹ concluded the majority of the 2015 implementation priorities identified by the National Water Commission (NWC) in its initial audit report are either complete or well underway. The review also noted that there is still much more to be done. The review recommendations sought to strengthen the Plan's implementation and provide more time for implementation before a major review.

The independent review also concluded that the Water Act is an effective legislative framework and that successful administration and implementation of its intended reforms is vital to the long-term well-being of all Australians. The South Australian Government considers that these important reforms should not be compromised through premature change.

As with any cooperative exercise, there will continue to be implementation issues and differences in views on implementation approaches. Multi-jurisdictional arrangements have been established to work through these issues.

After only three years of implementation it is too early to be able to fully and accurately assess the effects of the Plan. Key provisions such as water resource plans and implementation of the SDL adjustment mechanism have yet to come into effect. More time is needed for the provisions of the Basin Plan to be implemented and adequate data to be collected on outcomes before any comprehensive assessment of effects can be made.

The South Australian Government notes that the Water Act and Basin Plan provide for mandatory review periods and considers these to be the appropriate mechanisms for assessment and consideration of the need for any changes.

While implementation is in its early phases, there are clear indications that the Basin Plan and associated Commonwealth funded programmes are on track and supporting benefits for Basin Plan communities and environments. These include improved water quality and ecosystem health, facilitation of efficient water trade, coordinated environmental watering, and improved water delivery, irrigation efficiency, regional development and business improvement opportunities. For example:

- Around 71% of the Basin Plan environmental water recovery benchmark of 2750 gegalitres has been recovered.
- A recent independent stocktake of progress on SDL adjustment supply measure projects found that a reduction in environmental water recovery of about 500 gegalitres was plausible, with potential to increase this volume through further project refinements.
- Commonwealth Government policies and programmes have been well targeted to ensure Basin Plan reforms are implemented with the least impact on consumptive water users and their communities. Commonwealth investment is also helping to support opportunities to build regional economic capacity that would not otherwise exist.
- Positive water quality impacts of environmental water recovery and delivery have been modelled and the majority of Basin Plan salinity and water quality targets are being met.



- Water trading rules came into effect on 1 July 2014 to support consistent trading rules within states. As a result inappropriate restrictions to trade have been removed. This will support efficient water market trade, facilitating industry adjustment and allowing water to move to higher value uses.
- Coordinated environmental watering, involving both science and local knowledge, is resulting in positive environmental benefits for birds, fish, vegetation and water quality across the Basin. Evidence of these changes comes from the monitoring programmes implemented by the Basin states, MDBA and Commonwealth Environmental Water Holder (CEWH).
- Business cases are being developed to identify and design constraints management measures to enable higher river flows to be augmented with environmental water. This will increase the area of wetlands and vegetation that can be watered and will also benefit landholders and communities by improving access and addressing the impacts of naturally occurring floods.
- Work is underway to build on existing state water planning arrangements to transition to the new requirements for water resource plans under the Basin Plan by 2019. Water resource plans will set out arrangements to share water for consumptive use, establish rules to meet environmental and water quality objectives and take account of potential and emerging risks to water resources.
- Monitoring and evaluation programmes are underway including monitoring and assessment of environmental changes and socio-economic outcomes.

The South Australian Government recommends that:

- ***there is no change to the Basin Plan or its operation; and***
- ***Basin jurisdictions continue to work cooperatively to implement the Plan on time and in full.***

3. The implementation of the plan, including its costs, especially those related to further implementation

The Basin Plan builds on pre-existing state water management arrangements with additional requirements for water resource planning, environmental watering, water quality and salinity management, water trade, monitoring and reporting.

In preparing its regulatory impact statement in 2012, the MDBA worked with the Commonwealth Government and Basin states to examine administration costs associated with the Basin Plan. The MDBA estimated that the net additional administrative costs could be in the order of \$100 million per year. This figure should be used with caution as the understanding of implementation requirements has progressed significantly since this time.

Since 2012, all Basin states have endorsed the *Intergovernmental Agreement on Implementing Water Reform in the Murray-Darling Basin* and the *Basin Plan Implementation Agreement*. These



agreements aim to ensure that implementation obligations are effective and efficient, streamlined and fit for purpose, and take into account the need to minimise implementation costs.

The initial stages of implementation to 2019 are likely to involve the highest administrative cost as jurisdictions undertake planning and revise their water resource management arrangements for Basin Plan compliance.

In recognition of the costs involved in transitioning to full Basin Plan compliance, the Commonwealth Government has provided financial support to the Basin States from 2012-13 to 2019-20. This funding is additional to existing state funding for water resources management in the Murray-Darling Basin.

The Basin jurisdictions and MDBA are working to ensure management arrangements are streamlined and implementation costs are minimised.

Based on its experience with implementation and noting the intergovernmental agreements that aim to ensure the Basin Plan is implemented cost effectively, the South Australian Government considers that the administrative costs associated with Basin Plan implementation are reasonable and will be significantly outweighed by the benefits to be gained from full implementation of the Plan.

4. The implementation of the plan, including direct and indirect effects on agricultural industries, local businesses and community wellbeing

Numerous studies on socio-economic impacts have been undertaken to understand the costs and benefits of the Basin Plan.^{2,3} Overall, the conclusion of these pieces of work is that the long-term social, economic and environmental benefits of the Basin Plan are likely to outweigh the long-term costs.

Analysis undertaken in 2011 concluded that the main economic effect is likely to be a reduced rate of natural growth in agricultural production for the period to 2019, after which growth is expected to return to the average sustainable rate of economic growth.⁴ Australian Bureau of Agricultural and Resource Economics Sciences⁵ (ABARES) modelling indicates that potential costs based on loss of profits to the irrigated agriculture sector, without SDL adjustment, could be approximately \$109 million per annum.⁶ These costs will be mitigated by the operation of the SDL adjustment mechanism and further offset by quantifiable benefits from tourism, floodplain agriculture, fishing and boating of approximately \$100 million per annum, even without taking into account significant non-quantifiable benefits.⁷ Effective water markets can also assist to mitigate adverse impacts.

Commonwealth Government policies and programmes are well targeted to mitigate the costs borne by irrigators and regional communities likely to be most affected. In general, these programmes focus on supporting productivity improvements to offset the effects of environmental water recovery.



The effects of the Basin Plan and associated Commonwealth funded programmes are discussed further below, including examples of how communities are being supported to adapt to the Basin Plan and other drivers of change within the South Australian Murray-Darling Basin region.

Water Purchase

The effects of water purchase can be difficult to assess as changes in regional communities are caused by multiple economic and climatic factors. For example, drought, increasing farm mechanisation and market driven factors such as commodity prices and exchange rates all affect employment, production and investment.⁸ At times changes in employment resulting from such factors may have been inappropriately attributed to water purchase.

Reputable studies and surveys have found that water purchase by the Commonwealth Government generally either has minor or positive impacts on communities. Key findings from a number of these studies are provided in Appendix A.

To address community concerns regarding water purchase, the Commonwealth Government has focused its purchasing programme on small volumes of water in targeted areas, rather than large open tenders. The Commonwealth Government has also placed a legislated 1500 gegalitre limit on water purchases (meaning further water purchases are restricted to a maximum of 335 gegalitres). These initiatives, along with water recovery offsets through the SDL adjustment mechanism, will help to further minimise any potential negative socio-economic effects associated with water purchase.

Investment in Water Efficiency Projects

The Commonwealth Government is investing billions of dollars in rural water use management and efficiency across the Murray-Darling Basin. A key emphasis is on projects that improve the operation of off-farm water delivery systems and help water users improve on-farm water use efficiency. This investment supports regional productivity and enables communities to adapt whilst also contributing to water recovery.

These investments will have both short term and long term positive effects on production and employment in the Murray-Darling Basin:

Case studies of projects under the *On Farm Irrigation Efficiency Programme* show that the investment phase provides stimulus for infrastructure suppliers and other contractors. In the longer term, increased farm productivity can result in increased employment from demand for labour and transport for cultivation, field operations and harvest. Case studies also indicate that many farms now have increased flexibility and resilience, which will enable them to adapt more easily to future climate change and market conditions. It has also been reported that improving irrigation efficiency has had other benefits such as reduced water logging and improved salinity management. A list of case studies reviewed is provided in Appendix B.



In South Australia, the Commonwealth Government has provided \$265 million toward the *South Australian River Murray Sustainability* programme (SARMS) to support business innovation, research and development and recovery of 40 gigalitres of water entitlements. The programme was initiated by South Australian irrigators and is being delivered by the South Australian Government.

The programme comprises two areas of investment, the \$240 million *Irrigation Industry Improvement Programme* that supports water recovery and farm productivity improvement and a complementary \$25 million *Regional Economic Development* element that supports a suite of regional development, research and innovation projects.

Under the *Irrigation Industry Improvement Programme* there has been a high demand for the programme with over 500 applications received. Over 108 projects have been funded to optimise water use and achieve greater business resilience and productivity and return over 20 GL of water entitlements. Another 60 funding offers have been made and are being considered by South Australian irrigators, with potential to return a further 14 gigalitres of water to the environment.

Some examples of the diverse projects being offered grants through the programme are outlined below.

- Walker Flat Almonds has invested in an irrigation optimisation and almond growing expansion program.
- The Fischers from Meningie are developing a showcase facility for intensive dairy production. The facility will increase the size of their milking herd and maximise production per cow, and a new effluent management system will increase the economic viability and sustainability of the property.
- Pennyfield Pome has purchased processing and packaging equipment increasing their efficiency in processing produce and increasing market potential through retail-sale packaging. In addition, their new business model will optimise income per megalitre of water use, enabling them to take up annual crop market opportunities or to reduce annual crops to secure irrigation water for permanent plantings during drought.
- The Renmark-Paringa Council will further develop their Water Conservation Plan by extending their re-use network for recycled water.
- The Gerard Community Council Aboriginal Corporation will convert a disused almond orchard into an irrigated lucerne hay business, providing on-going training and jobs for Aboriginal people in the Riverland.
- Dairy farmers David and Karen Altmann will trial a new loafing shelter for their cattle alongside the feed shed, which will boost animal health and help to reduce soil erosion in surrounding paddocks. The Altmann family's work is being closely watched by interested parties around the world.

Case studies for the programme show that real benefits are being realised through efficiencies and productivity gains. Many farms now have increased flexibility and resilience that will enable them to adapt more easily to future climate and market conditions.



There have been flow-on effects to irrigation suppliers, nurseries, engineers and construction workers, shed builders, as well as businesses supplying new and second-hand machinery and business consulting services. This is creating increased demand in other sectors, such as the retail and hospitality sectors. Successful project recipients are making it a priority to engage local firms to assist with their redevelopment, and local suppliers and construction firms are seeing a benefit.⁹

The South Australian Government expects every dollar of investment through the programme to stimulate around four times this in economic activity. Through the Round One projects alone, it has been estimated that 250 jobs will be created in 2015-16, with modelled long-term job increases of more than 500 by the time the programme is completed.¹⁰

The \$25 million available through the Regional Economic Development elements is supporting in research and innovation programmes, including commissioning industry-led applied research, development of state-of-the art agricultural research facilities at the Loxton Research Centre and funding to non-irrigating organisations to deliver regional employment opportunities and improve regional economic diversity.

Sustainable diversion limit adjustment mechanism

The Basin Plan recognises that the environmental, social and economic outcomes from new SDLs may be improved by adjusting those SDLs up or down within defined limits. The surface water SDL adjustment mechanism will operate from the 2750 gigalitres water recovery benchmark to:

- increase SDLs and offset water recovery through projects that achieve the same environmental outcomes with less water, such as environmental works and measures or improved river operations (known as supply measures); and
- reduce SDLs and increase water recovery through measures that have neutral or positive social and economic outcomes, such as on-farm water use efficiency improvements or other projects proposed by states (known as efficiency measures).

A recent stocktake of SDL adjustment supply measures found that a plausible estimate of supply measure outcomes is approximately 500 gigalitres. The stocktake also determined that this estimate could potentially be increased through further project refinements.¹¹ This will significantly reduce further water recovery required to achieve the 2750 gigalitre Basin Plan benchmark.

The efficiency measures programme is scheduled to run over nine years from 2015 with the objective of increasing environmental water by 450 gigalitres with neutral or better socio-economic outcomes.

The best available science¹² shows that recovery of the additional 450 gigalitres, along with addressing delivery constraints, is vital to deliver a healthy river and floodplain system and maximise the benefits of the Basin Plan. For example, modelling has shown that this achieves 17 out of 18 environmental indicators (compared to 11 out of 18 for 2750 gigalitres) for the Barmah-Millewa, Gunbower-Koondrook-Perricoota, Hattah Lakes and Riverland-Chowilla floodplain sites in New South



Wales, Victoria and South Australia and improves environmental outcomes for the Coorong, Lower Lakes and Murray Mouth.

Under the Water for the Environment Special Account, a further \$1.57 billion of funding is available for efficiency measures (in addition to \$200 million for constraints management). This account underpins the successful achievement of the Basin Plan objectives and outcomes and it is imperative that this fund remain in place.

The Commonwealth Government is currently consulting on the design of its efficiency measures programme, which will assist irrigators to modernise their on-farm irrigation infrastructure while returning water savings to the environment. The design is based on feedback from governments and industry about on-going demand for on-farm irrigation efficiency.

The Commonwealth Government's *Water Amendment Bill 2015* also amended the Basin Plan to allow off-farm efficiency projects to be considered as socio-economically neutral SDL adjustment efficiency measures. This will provide additional opportunities to improve efficiency and modernise infrastructure.

As the market place evolves and more is learnt about the best approach to designing efficiency measures programmes, there may be merit in the Commonwealth Government undertaking an early review of the Water for the Environment Special Account, to investigate whether additional funding is needed in light of increasing water prices and other factors, which may affect water entitlement holder participation.

The Commonwealth Government has committed to ensuring that the design and implementation of the programme will not affect any programmes seeking to recover water to 'bridge the gap' to the Basin Plan 2750 gigalitre benchmark.

Efficiency measures under the Basin Plan are not necessarily well understood within the broader community. A finding of the recent stocktake was that better engagement with governments and stakeholders is required to improve understanding and allay concerns including how the programme will interact with 'bridging the gap' programmes.¹³

The South Australian Government recommends that:

- ***the current Commonwealth funded programmes are retained but are reviewed in sufficient time prior to the end of the current funding timeframe to ensure that programmes are still adequately supporting the full implementation of the Basin Plan;***
- ***the Commonwealth Government undertake a review of the Water for the Environment Special Account in 2016-17 to investigate whether additional funding is needed in light of increasing water prices and other factors that may affect water entitlement holder participation; and***
- ***Basin governments actively engage with stakeholders to improve understanding and allay concerns about the efficiency measures programme.***



Benefits from Improved Environmental Outcomes Including Water Quality

There are many benefits for the economy and regional communities from environmental water recovery and use and associated improved Basin-wide environmental outcomes. Studies have found significant benefits of the Basin Plan to tourism¹⁴, floodplain agriculture¹⁵, recreational and commercial fishing¹⁶, and boating.¹⁷ There are also benefits from avoided costs – for example, costs associated with managing salinity, cyanobacteria blooms and preventing erosion and riverbank collapse.

There are also significant cultural, spiritual and intrinsic environmental benefits that are difficult to quantify.

Environmental water recovery and environmental flows under the Basin Plan will significantly improve water quality for human consumption, irrigation (including increasing productive yield per unit of water applied) and industry. A study by CSIRO (2012)¹⁸ found that the likelihood of hypoxic blackwater events, acidification due to exposure of acid sulfate soils and cyanobacterial blooms would significantly reduce as a result of the Basin Plan. Annual benefits, including avoided costs, were calculated to be up to \$30 million. Modelling has indicated that the dilution effect of the environmental water recovered under the Basin Plan will have a significant positive effect on improving salinity levels in the River.¹⁹ In addition, the Plan sets objectives and targets to guide the management of river flows and long term water quality and salinity management through states' water resource plans.

From a South Australian perspective, the Basin Plan will help underpin secure, reliable and good quality River Murray water supplies, which are essential to South Australia's economy.

Water from the River Murray supports the majority of irrigated agricultural production in the South Australian Murray-Darling Basin, which accounts for over half of the State's gross value of irrigated agriculture (\$840 million in 2012-13) and supports critical public water supplies that sustain around 1.2 million people.

The Millenium drought highlighted the need for improved cooperative arrangements to ensure that water supplies for critical human water needs in South Australia, New South Wales and Victoria can be delivered during drought. The Basin Plan, together with the Murray-Darling Basin Agreement, support arrangements to ensure sufficient water is available to deliver water for critical human water needs during very dry periods.

South Australians take immense pride in the protection of the River Murray. Community members have seen the nature of the river system and its estuary change over time and understand the importance of restoring a sustainable balance between water use and environmental protection. Traditional owners have a strong cultural connection with the River Murray. Local communities, non-government organisations and Traditional owners are actively engaged in environmental water management.

As not all benefits and costs of the Basin Plan can be expressed in a common way, it is not possible to make a straightforward summation and comparison of the costs and benefits. However the overall



conclusion is that the benefits to agricultural industries, local businesses and community wellbeing will outweigh the costs.

Monitoring Effects

The MDBA continues to monitor and evaluate the observed social and economic effects of Basin Plan reforms with the first evaluation report due for delivery in 2017. It is important to continue to monitor and assess the effects of the Basin Plan to inform appropriate policy and management arrangements.

The South Australian Government recommends that:

- **Basin governments and the Murray-Darling Basin Authority (MDBA) work together to improve communication about the social, economic and environmental effects of the Basin Plan.**

5. The implementation of the plan, including evidence of environmental changes to date

Progress on Environmental Water Recovery

The best available science indicates that environmental water recovery of 3200 gigalitres or equivalent is necessary for a healthy River Murray system. The benchmark under the Basin Plan is 2750 gigalitres and the SDL adjustment mechanism enables an additional 450 gigalitres of water recovery in ways that are socio-economically neutral.

There has been good progress on water recovery against the 2750 gigalitres benchmark. As at 31 July 2015 around 1952.9 gigalitres of water had been recovered.²⁰ Around 60% of this water recovery came from water purchase from willing sellers with around 40% from investment in infrastructure, technology and other recoveries.

Progress on Environmental Water Planning and Management

There has been good progress in implementing the environmental watering plan. Environmental water is being actively delivered to sites across the Basin in accordance with plans and priorities developed by the Basin states and the MDBA with input from local communities.

Water requirements and expected outcomes are defined at a Basin, state, regional and site scale through the 2014 Basin-wide environmental watering strategy, states' long term environmental watering plans (in development) and state and Basin wide annual watering priorities developed with input from scientists and local communities.

Basin states, the CEWH and the MDBA work together to coordinate the delivery of water across the Basin to maximise the efficiency and effectiveness of environmental water use. For example, a



Southern Connected Basin Environmental Watering Committee meets regularly to coordinate watering in the Southern Connected Basin.

The MDBA, Basin states and the CEWH monitor and report on environmental water use and outcomes. Multi-jurisdictional arrangements support coordination of monitoring and evaluation programmes to understand the contribution of environmental water to improving environmental outcomes. Monitoring includes water quality sampling, vegetation condition assessment and fish, macro-invertebrates and bird surveys.

Environmental Changes to Date

Publicly available environmental outcomes reports prepared by the CEWH, the MDBA and state governments show that environmental water has resulted in improved environmental outcomes, such as improved ecosystem functioning, waterbird breeding responses and increases in fish populations, at a number of sites across the Basin.

During 2013-14 and 2014-15 over 1570 gigalitres of environmental water made its way to South Australia. This includes water that was delivered to environmental assets upstream and then flowed back to the River to be reused ('return flows'). For example, in 2013-14, return flows from the Barmah-Milewa forest were coordinated with flows from the Goulburn, Murrumbidgee and Darling rivers to deliver flows to the lower River Murray.

South Australia has three priority environmental assets: the River Murray floodplain, the River Murray channel and the Coorong, Lower Lakes and Murray Mouth. Although it is too early to quantify long-term trends, monitoring has shown positive environmental changes for all three assets in response to environmental water. Some examples are provided below:

- Significant improvements in vegetation health and frog populations have been observed as a result of inundation of the floodplain at the tri-State Chowilla Ramsar site. This includes observed increases in the spawning of vulnerable Southern Bell frogs.
- Golden and silver perch populations have improved in response to the delivery of in-channel flow pulses. The provision of environmental water to Dishers Creek in 2013-14 resulted in a record number of the threatened fish species Murray Hardyhead being counted.
- Bird populations have also responded to watering. For example in 2012-13, 17 species of waterbird (and over 300 individuals) were recorded at Whirlpool Corner wetland during two surveys following watering. The Eastern Great Egret was recorded and is listed under international migratory bird agreements.
- Monitoring is showing that the ecological decline of the Coorong, Lower Lakes and Murray Mouth appears to have been arrested. Salinity levels in Lakes Albert and Alexandrina have improved significantly with ongoing environmental flows required to bring Lake Albert salinities to within acceptable levels. Environmental water delivery has helped ensure flows through the barrages to maintain healthy water levels and salinity levels in the Coorong and to encourage fish spawning.



- There have been improvements in fish populations in the Coorong, Lower Lakes and Murray Mouth, particularly species that need both fresh and saline environments to complete their lifecycle, with a direct economic benefit to the commercial and recreational fishery in the Lower Lakes. In 2014-15, abundances of congollis and common galaxias were the highest sampled since 2006. The higher water levels also provided conditions for recovery of the native aquatic grass crucial to the Coorong ecosystem (*Ruppia tuberosa*). Improvements in environmental condition have also led to increases in waterbird populations.
- The delivery of environmental water, in conjunction with significant volumes of unregulated flows, has assisted in meeting the Basin Plan salinity targets for managing water flows at sites upstream of Lock 1 and improving water quality in the Lower Lakes following drought.

These examples provided early indications of the potential that can be realised with full implementation of the Basin Plan, noting there is still much more to be done. For example, dredging is currently underway to keep the Murray Mouth open, highlighting the importance of the Basin Plan and achieving full recovery of environmental water to reduce the frequency of mouth closure in future.

The South Australian Government recommends that Basin governments continue to work cooperatively to optimise the use of environmental water for environmental assets across the Basin including multi-site watering and provision of sufficient flows along the length of the River Murray and out to sea.

6. The effectiveness and appropriateness of the plan's Constraints Management Strategy, including progress of identifying constraints and options to mitigate the identified risks, and environmental water flows and river channel capacity

The South Australian Government strongly supports the implementation of the Basin Plan's Constraints Management Strategy (CMS). Implementing the strategy will allow water to reach creeks, wetlands and floodplain vegetation that rarely receive the water they need (as a result of reduced flows and river regulation). The strategy will benefit landholders and communities by improving access and addressing other impacts of naturally occurring floods.

Significant progress has been made in implementing the ten-year CMS. A recent stocktake²¹ found that work is progressing satisfactorily to develop business cases to address the constraints to delivering larger volumes of environmental water in seven priority areas across the Basin. The business cases will support a decision by Basin Ministers in 2016 about progressing constraints measures by 2024. Further design and implementation will then be rolled out, in consultation with the community.



Constraints measures are focused on what needs to be done to enable flows to be topped up to increase either their peak or duration and reach a larger area of floodplain. The changes being investigated are modest and are not trying to create or change how often moderate and major floods occur. Topping up flows may increase minor flood inconvenience such as the need to remove stock and equipment from low-lying areas or closure of minor roads or low level bridges.

Works and measures under consideration include purchase of easements, levees, and upgrading bridges, roads, jetties and culverts to avoid or mitigate inundation effects. Investing in these works and measures will also benefit landholders during natural minor flood events that would occur regardless of any augmentation with environmental water.

In South Australia, flows are not planned to be greater than 80,000 ML/day at the border. This is regarded as a high river flow, with a minor flood risk only for shack areas downstream of Cadell.

The area of floodplain vegetation and wetlands that could benefit from constraints management is substantial. For example the flow levels being examined for the River Murray channel could allow for improved environmental watering for between 111,000 to 194,000 hectares of floodplain vegetation. In South Australia there is potential to water an extra 40,000 hectares of wetlands and vegetation²².

Socio-economic benefits include improved access and management of the impacts of minor floods for landholders. There is also potential for enhanced recreation and tourism opportunities as more wetlands and floodplain areas receive water. Environmental benefits include restoring the health of plant and animal species, providing water to recharge groundwater aquifers and improving water and soil quality across a greater area of the Basin. Higher flows can also improve the ability to flush salt and other pollutants through the system and contribute to maintaining an open Murray Mouth.

An example of the benefits of the CMS is highlighted by the condition of the aquatic vegetation communities of the Mid-Murrumbidgee Wetlands, whose condition declined dramatically during the millennium drought. Modelling shows that prior to the last century of development and regulation of the Basin, even during drought, water would have reached these wetlands. Implementation of the CMS could allow connecting flows to be provided to these wetlands to help the ecosystem recover and prevent future decline.

Landholder and community support is critical for the effective implementation of constraints management works and measures. Feedback gathered so far indicates there is broad community support for the CMS and the delivery of higher flows in South Australia from local councils, peak irrigation bodies, indigenous nations and shack communities. At the same time, it is recognised that there is not yet wide-spread understanding about the strategy, the measures being considered and how the community is being involved.

To improve understanding and allay community concerns, it is important that Basin state governments and the MDBA communicate effectively and consult with potentially affected landholders and stakeholders at all stages to understand community issues at the regional and



local level and to seek input on the development and implementation of constraints management measures.

The South Australian Government recommends that Basin state governments and the MDBA improve communication about the benefits of constraints management and how they are working with affected landholders and stakeholders to identify and develop management measures.

7. The management of the Coorong, Lower Lakes and Murray Mouth, including the environmental impacts of the locks, weirs and barrages of the Murray River.

The South Australian Government, working with the Commonwealth Government, actively manages the Coorong, Lower Lakes and Murray Mouth to optimise ecological health and water quality outcomes for all water users including the environment. Extensive investigations have demonstrated that alternative options such as barrage removal and a weir at Wellington fail to protect and maintain the environmental values of the site and would not remove the need to provide sufficient River Murray flows.

Importance of the Coorong, Lower Lakes and Murray Mouth

The River Murray system flows to the Southern Ocean after passing through Lake Alexandrina and the Murray Mouth. Lake Alexandrina is connected to the Coorong and Lake Albert.

The Coorong, Lower Lakes and Murray Mouth region is acutely affected by water management throughout the entire Basin. The health of the region provides a benchmark for the commitment of governments and communities to environmental protection and sustainable management of water resources.

The region is an internationally important wetland system with a diverse range of freshwater, estuarine and marine habitats. The native plants and animals are unique, not just within the Murray-Darling Basin, but worldwide. The region provides habitat for internationally recognised migratory birds. The site is an internationally recognised Ramsar wetland and one of six Icon Sites under The Living Murray initiative chosen for their high ecological and economic value as well as their cultural significance.

The Murray Mouth is the entry and exit point for fish that move between freshwater and marine habitats and is the only pathway to export salt and other pollutants from the Murray-Darling Basin.

The economic and social wellbeing of the communities is intimately linked to the health of the site. A healthy Coorong, Lower Lakes and Murray Mouth provides water supply for local towns and



communities and supports local communities deriving a living from a diverse range of industries, including irrigation, commercial and recreational fishing, boating, recreation and tourism. The site supports recreational and commercial fish species such as black bream, greenback flounder, Coorong mullet and mullet.

Conservative estimates of the value of the boating industry and associated tertiary industries in the River Murray, Lower Lakes and Coorong are estimated at \$650 million annually²³.

The region is one of the most popular tourism and recreational locations in South Australia. Local business such as cafes, restaurants and accommodation are important employers and are reliant on tourism and recreational activities. These retail and service industries are significantly affected during periods of reduced flow.

The Coorong, Lower Lakes and Murray Mouth is of central significance to the life and culture of the Ngarrindjeri people, who continue to live on their traditional country.

A recent study undertaken by CSIRO identified 26 important ecosystem services of the site²⁴. All of these benefits and associated industries are directly or indirectly dependent on the provision of water to or through the site.

The Millennium drought brought home to communities in the region just what can occur when insufficient water is provided to this region. Low water levels, high salinity and poor water quality not only detrimentally affected the environment, but also the health and wellbeing of local communities. Important plant, frog, fish and bird species showed significant decline and there was an increase in pest plants and animals. Water supply infrastructure was stranded and agricultural productivity and other economic activities declined with the closure of some businesses. Costly management interventions were required to mitigate impacts including the acidification of water and soils. Local communities experienced high levels of stress, which affected the social cohesion and fabric of these communities.

With improved river flows and the provision of environmental water, along with active management of the site, the Coorong, Lower Lakes and Murray Mouth is now recovering and environmental condition and water quality is slowly improving.

Management of the Coorong, Lower Lakes and Murray Mouth

The South Australian and Commonwealth governments are committed to managing and maintaining the Coorong, Lower Lakes and Murray Mouth site as a Ramsar wetland of international importance and have made significant investments in management of the site. The site is also a The Living Murray Icon site managed through the Murray-Darling Basin joint venture.

River Murray flows are the main driver of the ecological health of the Coorong, Lower Lakes and Murray Mouth. However, as a result of increasing diversions across the Basin, annual streamflow at



the Murray Mouth has reduced significantly. CSIRO indicate that, between 1920 and 2000, annual flows at the Mouth declined by 61%.²⁵

Water recovery and environmental water delivery under the Basin Plan are essential to provide additional environmental flows to protect and restore the health of the Coorong, Lower Lakes and Murray Mouth. The MDBA's modelling shows that in most years, flows sufficient to meet environmental requirements along the length of the River Murray will also be sufficient to meet the requirements of the Coorong, Lower Lakes and Murray Mouth.

The Coorong, Lower Lakes and Murray Mouth is actively managed to optimise water levels, provide flows to the Coorong and the Murray Mouth, protect water quality and minimise the need for costly intervention such as dredging. Current management is supported by extensive planning, scientific studies and local knowledge, including involvement of the Traditional owners. Information on current Coorong, Lower Lakes and Murray Mouth programmes and management is available via: http://www.environment.sa.gov.au/managing-natural-resources/river-murray/river-restoration-and-environmental-water/Coorong_Lower_Lakes_Murray_Mouth

The South Australian Government works closely with the MDBA and CEWH and the community to manage barrage operations and environmental water delivery to, and through, the site. This is based on ecological monitoring data, water quality data, lake level data and modelling, input from community groups, Traditional owners and expert advice from scientists and river operators.

Alternative management options such as removing the barrages and installing a connecting pipe or channel between Lake Albert and the Coorong have been explored to address water quality issues and maintain ecological health. These options are not considered suitable for various reasons, including cost and failure to maintain the ecology of the site.

Modelling and engineering studies have found that the costs of connecting infrastructure between Lake Albert and the Coorong outweigh the benefits. In addition, with predicted Basin Plan environmental flows, it would not be needed to return Lake Albert salinity to its historical salinity range. Instead, the South Australian Government is cycling water levels in the Lower Lakes to remove higher salinity water from Lake Albert. Temporarily pumping water between Lake Albert and the Coorong could be considered if needed in a future extreme drought.

Environmental Impacts of Barrages

River regulation and upstream water use mean that river flows are no longer sufficient to limit the saline water entering Lake Alexandrina and the lower reaches of the River Murray from the Coorong and Murray Mouth.

The barrages were constructed in the 1930s, when the first effects of use and regulation began to be felt but prior to increasing levels of use that occurred up until the 1990s. The barrages are operated to manage Lake water levels and flows for environmental outcomes.



While opinions differ, the weight of evidence indicates that the Lower Lakes were mainly fresh prior to European settlement, with short periods where some seawater entered the Lakes during low upstream flows.²⁶ Evidence includes historical material from the 1800s and analysis of single-celled algae (diatoms) in dated sediment cores.²⁷ Most of the time freshwater flows down the River Murray would have been sufficient to maintain water levels in the Lakes and stop seawater entering.

Regardless of views on this issue, the fact is that the pre-European ecosystems no longer exist. The new ecosystems established since the barrages were constructed more than 75 years ago are of significant and internationally recognised environmental value.

It has been argued that removing the barrages would reinstate and stabilise a natural tidal estuary, reducing the need for freshwater to maintain water levels in the Lower Lakes. However, due to the significantly reduced freshwater flows to the site, even with Basin Plan environmental water, this action would significantly reduce water levels and establish a much more saline water body than exists now or existed prior to European settlement. Changing to a saline water body would cause significant and irreparable changes to the site's current freshwater ecology and would not reinstate the original ecosystems.²⁸

Removal of the barrages would also compromise major urban, irrigation and stock and domestic supplies below Lock 1 through salt water entering the off-takes. A weir near Wellington has sometimes been proposed to address this issue. A permanent weir would be very costly and would continue to subside due to lack of suitable foundations. A temporary weir was only considered as an emergency drought response.

The only way it would be possible to return the Lower Lakes to a Pre-European environment would be to return to the type of flow regime experienced before the barrages were built. This is not feasible as it would likely require irrigation across the Basin to largely cease, as well as significant reductions in stock and domestic and urban water use.

Removal of the barrages would not reduce the need for freshwater flows along the River Murray into the Lower Lakes and then out to sea. These flows are not simply 'lost' to evaporation. They deliver environmental benefits along the entire River, provide essential base flows for consumptive water delivery, support the ecology of the Coorong, Lower Lakes and Murray Mouth, support commercial and recreational fisheries and flush salt and nutrients from the entire system. River Murray flows to the site are also important for regional economic development and maintaining the cultural values of the site.

The sustainable level of consumptive use determined by the MDBA was not driven by the needs of the Coorong, Lower Lakes and Murray Mouth. The MDBA determined the SDLs based on environmental water needs across the Basin and did not specifically focus on the requirements of this site.²⁹

Finally, modifications have been made to the barrages to improve environmental outcomes. The construction of fishways in the barrages, which allow fish to pass between habitats, are critical to



allow migration of native fish species. The existing fishways are world-leading in design and operation. The functional design of the fishway allows migrating fish to pass through the barrages under a range of lake and sea levels while using a minimum amount of environmental water.

Environmental Impacts of Locks and Weirs of the Murray River

The locks and weirs provide an important function in storing water for irrigation and local water supplies and improving the navigability of the River. The locks and weirs have many benefits including: supporting irrigated agriculture, enabling tourism activity, responding to riverbank collapse and delivering environmental flows.

At the same time, this infrastructure has changed the river and connected wetlands to a series of pools which rarely change in water level. This has caused adverse impacts on wetland health, given their requirement for variations in water level.

The Sea to Hume fishway program has restored fish passages at the major weirs and barrages from the Murray Mouth in South Australia to the Hume Dam on the border of New South Wales and Victoria.

The South Australian Government is currently trialing ways to raise and/or lower weir pool water levels to improve environmental outcomes. Weir pools were raised and lowered in 2014 and water levels at Locks 2 and 5 will be raised in spring 2015. Changes to weir pool levels are only made after informing local communities and stakeholders and if the conditions are right. Ecological responses and any potential impacts on river users are closely monitored.

It is anticipated that manipulation of weir pool levels will become an increasingly common feature of routine river operations allowing greater hydrological variability to improve ecological outcomes along the River Murray.



Appendix A – Examples from studies of the effects of water purchase

Reputable scientific studies and surveys have found that water purchase by the Commonwealth Government generally either has minor or positive impacts on communities. For example:

- Modelling undertaken by the Centre of Policy Studies³⁰ indicates that despite concerns, job losses attributed to water purchase are relatively few. In some cases the water purchases that occurred during the Millennium drought actually provided an alternative to foreclosure.
- A 2011 Monash University study³¹ found that water purchase has little effect on aggregate farm output and, in fact, found that buyback could increase economic activity in the Southern Murray-Darling Basin. Arche Consulting³² and National Water Commission³³ studies have similarly concluded that purchase can contribute positively to regional economies.
- Third party impacts are often cited as a community concern resulting from water purchase. However, the ABARES³⁴ found that the effect of water purchase on agricultural processing is likely to be small, given the modest effect of buyback on irrigated output. ABARES also found that water purchase alone is unlikely to trigger a significant reduction in service delivery for most Basin communities.
- Evidence regarding the impacts of water sales to the Commonwealth can also be found in an independent evaluation undertaken by Marsden Jacobs Associates³⁵ in 2012. From a survey of more than 500 irrigators, this review showed that:
 - Selling water to the Commonwealth had been a positive decision for over 80% of participants, with funds from the sale being used to generate cashflow to either retire debt, supplement farm income or fund on-farm improvements.
 - The vast majority of irrigators who sold to the Commonwealth remained in farming with 60% selling only part of their water entitlement and a number of others selling all of their water entitlement but continuing farming. Many of those who had sold had found ways to change their farming operations and maintain production levels, with a large proportion reporting that selling water had no consequences on farm production.
 - Only 30% of those surveyed had sold all of their water entitlement and had exited farming and almost all of these people had either found alternative local employment or retired in their local community.
 - Of all the irrigators who had sold water and exited farming, a maximum of 10% of the proceeds may have left the region.



Appendix B – Case studies reviewed

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