Australian Government

MURRAY–DARLING BASIN AUTHORITY

Constraints management strategy

Annual progress report 2015

May 2016

Published by the Murray–Darling Basin Authority

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MDBA publication no.: 34/15
ISBN (online): 978-1-925221-50-3

Cover image: Wetland on the Gingham watercourse – Gwydir Valley (photo by Bill Johnson, MDBA)

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Acknowledgement of the Traditional Owners of the Murray–Darling Basin

The Murray–Darling Basin Authority acknowledges and pays respect to the Traditional Owners, and their Nations, of the Murray–Darling Basin, who have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters. The MDBA understands the need for recognition of Traditional Owner knowledge and cultural values in natural resource management associated with the Basin.

The approach of Traditional Owners to caring for the natural landscape, including water, can be expressed in the words of Darren Perry (Chair of the Murray Lower Darling Rivers Indigenous Nations) —

> *'the environment that Aboriginal people know as Country has not been allowed to have a voice in contemporary Australia. Aboriginal First Nations have been listening to Country for many thousands of years and can speak for Country so that others can know what Country needs. Through the Murray Lower Darling Rivers Indigenous Nations and the Northern Basin Aboriginal Nations the voice of Country can be heard by all'.*

Contents

Summary

Regulating the Basin's river system has allowed water to be managed for more reliable supply for people, crops and livestock. The changes have led to considerable economic and social benefit, but over the decades regulation and management has also led to the declining health of our riverine environments. Some of the key changes that have occurred as a result of river regulation are a loss of small to medium overbank flows which connect rivers to their floodplains, cycle nutrients and fill wetlands to provide food and habitat for the plants and animals that depend on them.

The current work by governments in the Basin aims to restore and protect the health of the Basin so it can continue to support communities and industries. In order to do this, we need to be able to restore some small part of the natural flow patterns to connect the rivers and floodplains. Addressing constraints to environmental watering provides an opportunity to restore some of these important flows and improve environmental outcomes in the Basin. If proposed flows affect third parties then these will be worked through to avoid or address potential impacts.

Constraints are river operating rules and structures that limit the volume and timing of water released from dams and other water storages, and the flows that can be delivered through waterways, limiting the extent of floodplain that can be actively watered. The constraints management strategy released in 2013 provides a pathway to investigate how to manage water in smarter ways to improve the health of the rivers and floodplains of the Murray–Darling Basin.

Importantly, the constraints management strategy is limited to changing managed flows to the lowest parts of the floodplains, in areas often designated as floodways or 'flood country'. Generally these areas are not where there are buildings or crops but often have significant ecological values where a range of native species will benefit.

The constraints management strategy identified that removing or relaxing constraints to water delivery will provide greater flexibility in achieving environmental objectives. In 2014 the Murray–Darling Basin Authority completed the pre-feasibility phase of the strategy. Basin governments, through their water ministers, agreed to proceed to the feasibility phase and develop proposals to manage physical constraints, and mitigate impact, in seven priority areas.

The work in 2014 showed that the area of wetland and floodplains that could be watered, may be significantly increased by addressing these constraints. In 2015 the focus for Basin states and the MDBA has been on developing business cases for ministers to consider in mid-2016 as a part of the intergovernmental process for making investment decisions about constraints measures.

The focus of business case development to date, has been to explore what needs to be done to 'top up' current flows to increase either their peak or duration, how this can be done without adverse impacts on landholders and to understand risks and costs. Considerable work has been undertaken, including collecting information on the impacts of proposed flows and the costs of mitigating those impacts. The sorts of works and measures under consideration include easements, levees and upgrading bridges, roads, jetties and other infrastructure. Investing in these works and measures can also benefit landholders during natural inundation events.

During consultation with communities people have consistently expressed concerns that the risks associated with naturally occurring inundation could be increased with more planned

environmental water events. As a result, constraints management investigations now seek to understand these risks and develop measures to prevent or mitigate them in ways that are acceptable to landholders and communities. There will be ongoing work in 2016 to engage with landholders and communities on this work.

Introduction

During the development of the Basin Plan, Basin water ministers requested the Murray–Darling Basin Authority (MDBA) complete a study of constraints to identify and describe the physical, operational and management constraints that are affecting environmental water delivery (s.7.08 of the Basin Plan). The Constraints Management Strategy 2013–24 is a long-term strategy that looks at smarter ways to operate rivers to enhance environmental outcomes, to be developed and implemented over 12 years (Table 1). The MDBA reports annually to ministers on the matters covered by the Strategy.

Table 1: Constraints development timeline.

Date	Milestone
2012	Basin ministers request that the Basin Plan include a Constraints Management Strategy to be prepared by the Murray–Darling Basin Authority.
	Basin ministers request the MDBA include a sustainable diversion limit (SDL) adjustment mechanism to provide flexibility in setting the SDLs.
2013	The Constraints Management Strategy 2013-2024 is released in November 2013.
2014	The MDBA completes a Basin-scale analysis of priority constraints for the pre-feasibility phase of the constraints management strategy which involved analysis and prioritisation of constraints in 7 key focus areas and preliminary stakeholder consultation.
	Basin ministers agree that the key focus areas identified in the pre-feasibility phase progress to business case development.
	The MDBA provides the first annual report to Basin ministers about progress with the strategy.
2015	'Reach reports' are completed for each key focus area that include investigation and analysis of what can be done to address constraints.
	In August 2015 ministers note that constraints projects offer potential as 'supply measures' to reduce the water recovery target.
	Basin governments develop business cases for key focus areas. South Australia submitted the River Murray in the South Australia constraints measure business case, as a without prejudice draft.
2016	Basin governments continue to develop business cases for key focus areas.
	Basin ministers are required to agree a package of constraints and SDL adjustment measures to recommend to the MDBA by 30 June 2016.
	Where agreement is reached on how to proceed with measures, continue to engage with landholders and communities and continue to improve the understanding of likely impacts and mitigation options.
2024	Agreed constraint measures enter into operation.

The constraints management strategy identified 7 key focus areas: Hume–Yarrawonga Weir, Yarrawonga–Wakool junction, lower River Murray, Goulburn, Gwydir, Murrumbidgee and the lower Darling reaches. The development and release of the constraints management strategy

has improved understanding of the likely impacts and identified knowledge gaps, community issues and concerns about constraints.

The central principles of the constraints management strategy are that:

- solutions to overcome constraints will recognise and respect the property rights of landholders
- affected communities, including landholders and water entitlement holders need to be involved to identify potential impacts and solutions
- solutions will not create new risks to entitlement reliability.

These principles underpin the work Basin governments are doing so that any potential effects of new policies, such as changes to flow levels, are fully explored before final decisions are made.

The constraints management strategy also examines existing policy and operational practices that restrict the use of environmental water in achieving better environmental outcomes. For example significant local and Basin-wide environmental benefits would be achieved where policies are implemented to allow environmental water to flow down the river for environmental use, or allow the call of held environmental water from storage during un-regulated flow events. Addressing operational and management constraints is about changes to policy settings to maximise the benefits that can be achieved with environmental water.

Sustainable diversion limit adjustment mechanism

In 2012 Basin water ministers requested the MDBA include a mechanism to provide flexibility in setting the sustainable diversion Limits (SDL). The SDL adjustment mechanism included in the Basin Plan and the Intergovernmental Agreement on Implementing Water Reform in the Murray–Darling Basin (June 2013) sets out the process to develop and agree constraints measure proposals. In mid-2016 Basin water ministers will decide which constraints measures they will continue to progress in consultation with landholders and the community.

An independent 'stocktake' of the SDL adjustment measures and constraints measures was completed in August 2015. The stocktake confirmed that there is potential for constraints measures to be nominated as 'supply measures' where they meet criteria in the Basin Plan. The stocktake considers for example, that the River Murray constraints program could enhance the supply contribution by 30–100 GL which will reduce the water recovery required.

The stocktake found ‘a higher level of confidence that the River Murray program can be delivered up to modest levels of constraint relaxation through a staged process’, however there was a degree of uncertainty regarding the costs of some proposals.

Constraints to 2014

In 2014, the MDBA completed the initial phase of the 10-year work program identified in the Strategy and undertook a Basin-scale analysis of constraints. The outcomes of this work were provided to ministers in the constraints annual report in November 2014. Reach reports were also prepared that describe this work in detail including the effect on the environment and stakeholders of delivering the higher flows under investigation, and possible works and measures to manage the effects of flows on landholders. These reports were updated after further stakeholder feedback and then finalised and published in 2015.

In relation to operation and management constraints, the pre-feasibility phase concluded that protecting environmental flows from extraction, delivering environmental water on top of other in-stream flows and using environmental water throughout the length of the river are the most significant factors for achieving environmental outcomes.

The work undertaken in 2014 highlighted that the area of floodplain vegetation and wetlands that could benefit from constraints management is significant. For example the flows 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 addition to environmental benefits, constraints measures can assist in the management of minor flood impacts for landholders, including improving access during high flows.

There are also anticipated enhanced recreational and tourism opportunities associated with the restored health of the channel, backwaters, anabranches, wetlands and floodplains.

Progress during 2015

The focus during 2015 has been on progressing investigations to inform the development of business cases for the 7 key focus areas. This includes collecting information on the impacts of proposed flows and the costs of managing those impacts. The business cases will form the basis of advice for executive decision-making and investment. This is in response to ministers' decisions in late 2014 that the seven key focus areas identified in the MDBA's key findings from Phase 1 of the constraints management strategy progress to business case development.

On 27 November 2015 ministers emphasised the need for stakeholder involvement throughout the examination of options to ensure careful consideration of all the issues, particularly the options available to address and mitigate third party impacts. Ministers also raised the need for the constraints projects to be considered as an interdependent package across the whole system.

Decisions to address priority constraints will be made by the Australian Government and state government ministers by 30 June 2016.

Physical constraints

Basin state governments decided which flows would be investigated for constraints areas in December 2014. On this basis the Basin states, with assistance from the MDBA, have been further investigating these flows. More information has been collected on the effects of higher flows, mitigation activities and associated costs. This analysis improves understanding of the risks and impacts of the flows being considered to enable provision of the best possible advice to governments about the flows being investigated and how they can be achieved. Information collected during 2015 and feedback from stakeholders has led to some flow limits being re-considered in 2016. The introduction of relaxed constraint flows will occur only when adequate mitigation measures are in place.

At the Ministerial Council meeting on 14 August 2015 ministers acknowledged the importance of continued leadership by states in stakeholder consultation and engagement on proposed constraint measure projects and pre-requisite policy measure implementation plans.

Status of business cases

On 27 November 2015, ministers decided to revise the agreed assessment timelines to give states more time to finalise their projects and ensure ministers would receive the best and most comprehensive information before finalising the agreed package of measures by 30 June 2016.

During 2015 the MDBA developed the 3 integrated River Murray constraints measures (Hume–Yarrawonga, Yarrawonga–Wakool and River Murray in South Australia) on behalf of proponent Basin governments. This work has provided the basis for further business case development and stakeholder consultation by New South Wales and Victoria. At the same time, the New South Wales and Victorian governments have been developing business cases for the key focus areas in their respective states. South Australia submitted the River Murray in South Australia constraints measure business case on 30 November 2015, as a without prejudice draft.

Talking to the stakeholders — what we have heard

The Basin states and the MDBA value local landholder knowledge and experience about the potential impacts of higher flows. Feedback from stakeholders has been greatly appreciated. Key stakeholders include riparian landholders, councils, business owners and other representative bodies.

There is a diversity of views about the impacts and benefits of addressing constraints in the key focus areas — the flows that can be achieved and options to mitigate risks. Reach-specific feedback is provided in the following section however, many riparian landholders in particular are opposed to higher flows. In general their concerns relate to the following issues:

- perception of increased risk of uncontrolled flood events
- lack of information and certainty about the frequency, timing, duration and predictability of proposed flows, and the nature of dam operations that control environmental flows
- possible differences between modelled flows and actual inundation patterns
- higher flows inundating private land
- limited river and rainfall gauging network
- lack of certainty about mitigation options and payments on an individual property or business level.

During the first half of 2016 Basin governments, with support from the MDBA where appropriate, will further investigate these issues, to better inform business case development.

Alternatively, some stakeholders value the environmental, social and economic benefits of addressing constraints in the river such as:

- improving their local environment, particularly at the lower end of key focus areas
- better risk management and increased capacity to plan, prepare, manage and respond to natural high flow events
- improving access to land and property during high flows
- providing increased recreation and tourism opportunities
- providing more flexibility for river operators and environmental water managers.

These benefits will also be realised during natural high flow events that occur regardless of any environmental watering augmentations.

Figure 1: Murray River at Tocumwal showing the 2010 flood peak and minor flood level (photo by Emma Hampton, MDBA)

Key focus areas

An overview for each of the key focus areas follows including analysis of the proposal, hydrology and feedback from stakeholders.

Hume–Yarrawonga

The hydrology of the Hume–Yarrawonga reach has changed significantly since the construction of Hume Dam. The seasonality of flows in the river has changed from winter–spring dominant flow to summer–autumn, and average annual flows at Albury have increased over time due to transfers via the Snowy Mountains Scheme. Delivering overbank environmental flows up to 40,000 ML/day in this reach according to natural flow cues will help restore some natural seasonality and lead to improved environmental outcomes in both this reach and for downstream locations.

In 2015 MDBA has been developing the Hume–Yarrawonga business case on behalf of the Victorian and New South Wales governments. The proposal to increase the regulated flow limit from 25,000 up to 40,000 ML/day at Doctors Point for environmental flows has been under consideration for many years. New work this year has included following up on requests by the stakeholders to explore flood risk and hydrology and involving them in case studies to inform the cost estimates for addressing constraints.

Stakeholder engagement

The Advisory Group for Hume–Yarrawonga Waterway Management is an important forum to discuss the constraints work. This group includes representatives from the New South Wales and Victorian governments, the MDBA, local councils, and the Murray River Action Group, which represents the interests of riparian landholders. The advisory group met in October 2014, March 2015 and October 2015 with constraints discussed at all meetings. The group provides valuable input to the constraints project, including feedback on some of the draft material that informed the Hume–Yarrawonga business case.

In general, riparian landholders in this reach have expressed concerns with the proposal to increase the regulated flow limit to 40,000 ML/day at Doctors Point. Their concerns include the effects of prolonged overbank flows on their pastures, as well as the uncertainty about when environmental flows might be delivered. Landholders prefer winter flows which are considered less damaging to their farm businesses. Landholders are also worried that rain occurring during or following an environmental flow might lead to unintended flooding. Most landholders in this reach have previously been involved in a 25,000 ML/day easement process, and have ideas about how the process could be improved including seeking support to employ some of their own technical experts to represent their interests.

Given the inherent uncertainty associated with the delivery of future environmental flows, it has not been possible to alleviate all landholder concerns. However, the MDBA has provided information on possible future hydrological scenarios to stakeholders and is currently investigating ways to better understand the potential flood risk in order to mitigate any possible effects. On the basis of landholder feedback, the MDBA has also estimated the costs for representative landholder groups to employ their own technical experts to represent their collective interests in any future negotiation process.

Local councils have identified access issues as the main concern, with some low-lying roads becoming submerged at these flows. One council is also concerned that the flows may limit future development near the river. In general the effects on council assets are considered to be relatively minor, depending on the duration of flows.

Engagement with Traditional Owners has commenced in this reach, with preliminary discussions held with representatives from some Aboriginal Nations. No major concerns have been identified to date, with those consulted generally in favour of overbank environmental flows provided cultural heritage sites are not negatively affected.

Yarrawonga–Wakool

Flows along the Yarrawonga–Wakool reach of the river have been modified by the three major upstream dams (Hume, Dartmouth and Eildon). Prior to river regulation, large winter and spring flows were relatively common throughout the reach and summer flows were typically low. One of the main effects of increased regulation has been a change in hydrology, resulting in less variability of in-stream flows, reduced flood frequency, a reduced area of extent (or overland flows) and changes in duration of overbank flows.

In December 2014 the Yarrawonga to Wakool junction reach report was first released for public comment. Following consultation and feedback from stakeholders, the final version of the reach report was published in July 2015 on the MDBA website. The report investigates and documents constraints to environmental flows in the Reach.

During 2015, state governments decided on the constraints flows to be investigated and requested the MDBA to develop a draft business case for the Yarrawonga–Wakool region. This business case forms part of the integrated package of the 3 key focus areas along the Murray River: Hume–Yarrawonga, Yarrawonga–Wakool junction and South Australia, lower River Murray.

The draft business case for the Yarrawonga–Wakool region investigated flows of 50,000 and 65,000 ML/day downstream of Yarrawonga Weir. Some stakeholders raised concerns about the potential impacts of these flows and as of May 2015, the New South Wales Government took overall responsibility for stakeholder engagement in the Yarrawonga–Wakool. The New South Wales minister directed that business case development of the Yarrawonga to Wakool region is to be managed by New South Wales Department of Primary Industry Water, to better address local concerns, regarding the development of constraints management strategy proposals in New South Wales. After a period of further analysis and information gathering New South Wales re-commenced stakeholder engagement in the latter half of 2015.

Stakeholder engagement

In 2014-15 the MDBA held 19 meetings as part of the stakeholder consultation on the constraints management strategy. This included meetings during September 2014 and March 2015, with the Edward–Wakool Constraints Advisory Group. The group comprises of mostly private rural landholders but includes representatives from a major irrigation company, the forestry industry and the national parks estates. Additional meetings were held throughout the reach with small landholder groups, local New South Wales councils, and private corporations. New South Wales and Victorian government agencies have also been involved.

Overall, in regards to all the flow rates studied, there was considerable stakeholder concern about an increased risk of causing large or unmanageable floods, either in the same season, or in a subsequent year. There were also considerable concerns relating to flood risk at flows over 35,000 ML/day downstream of Yarrawonga Weir.

Improving the understanding of the potential for increased flood risk, and involving stakeholders in generating options for managing those risks is a key component in any future work. This work is critical in helping build community confidence in identifying acceptable future flow rates.

Lower River Murray, South Australia

Significant progress has been made developing the business case for the River Murray in South Australia. As previously reported in 2014 during the pre-feasibility phase, desktop assessments and broad consultation were undertaken by the MDBA and the Department of Environment, Water and Natural Resources staff as the first phase of the constraints management strategy. During 2015 the initial assessments have been progressed with updated flow inundation modelling and continued consultation with landholders and other stakeholders who have verified the potential impacts, mitigation strategies and cost estimates. This work has culminated in the preparation of a business case for the River Murray in South Australia which the MDBA has been working with the South Australian Government to develop.

Addressing constraints 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). It would also benefit landholders and communities by improving access and addressing other impacts of naturally occurring floods.

The focus is on what needs to be done to enable naturally occurring flows to be topped up to increase either their peak or duration and to reach a larger area of the floodplain. The changes being investigated affect a certain limited classification of flows but there is no intention to create or change the frequency of moderate and major floods.

For the purposes of investigation for the business case for the River Murray in South Australia, a maximum flow of 80,000 ML/day at the border has been considered. This is regarded as a high river flow for the majority of the river channel and is a minor flood risk only for the holiday houses or ‘shack’ areas downstream of Cadell. Hydrological modelling indicates that 80,000 ML/day flows represent the operational limit of practical delivery to South Australia and that it is possible to deliver such flows from coordinated water releases from multiple storages and valleys.

Relaxing constraints in upstream reaches will contribute to higher environmental flows in all downstream reaches, including the River Murray in South Australia. Relaxing constraints within the River Murray in South Australia will enable higher flows to be better received and managed to meet the environmental water demands of key environmental assets. In South Australia there is potential to water around 82,000 hectares of wetlands and vegetation at the flow rates being considered.

Socio-economic benefits include improved access and management of minor flood impacts for landholders. There are also anticipated enhanced recreational and tourism opportunities as the restored health of the channel, backwaters, anabranches, wetlands and floodplains improve activities such as eco-tourism and recreational fishing. Environmental benefits include restoring the health of plants and animals, providing water to recharge groundwater aquifers and improving water and soil quality across a greater area of the floodplains. Higher flows also improve the ability to flush salt and other pollutants through the system and contribute to maintaining an open Murray Mouth.

An important component of the work undertaken during the feasibility phase has been updating the flow inundation modelling layer for the River Murray in South Australia at 80,000 ML/day and conducting a geographic information system analysis to assess the potential impacts to land and infrastructure of these flows. Local stakeholders and communities were engaged to verify the potential impacts, develop mitigation options and estimate costs to inform the business case. Stakeholders and communities drew upon recent experiences of the natural high flow event of 2011–12, which peaked at 94,000 ML/day.

Impacts to stakeholders from increased flows may include inconveniences 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 to address or mitigate these impacts include purchase of easements, levees, and upgrading bridges, roads, jetties and culverts. Investment in these works and measures will also benefit landholders and stakeholders during naturally occurring minor flood events that occur regardless of environmental water augmentations.

Stakeholder engagement

Landholder and community support is critical for the effective implementation of constraints management works and measures. Feedback gathered from local councils, peak irrigation bodies, indigenous nations and shack communities so far indicates broad community support for the constraints management strategy and the delivery of higher flows in South Australia.

Effective communication and consultation with stakeholders will continue during further design and implementation to understand community issues at the regional and local level and to seek input on the development and implementation of constraints management measures.

Goulburn

Since 2003, Victorian technical studies and policy recommendations have consistently reported that the frequency and duration of overbank flows is less than what is needed to maintain the health of the Goulburn River and floodplain environment.

The constraints investigations at this site have primarily been based around the watering needs of the lower Goulburn River and floodplain, although there are additional environmental benefits of water flowing to the River Murray.

To achieve higher environmental flows in the lower Goulburn River means relying on a combination of unregulated tributary flows, topped up with some modest releases from Lake Eildon or Goulburn Weir. However, regulated flows are currently constrained by the potential impacts on private land, especially around Molesworth in the mid-Goulburn region. The intent of the constraints investigations is twofold:

- to find out if it is possible to make regulated releases from Lake Eildon to supplement tributary flows downstream to reach the creek and floodplain network of the Lower Goulburn
- to better understand how changes to river flows would affect people, businesses and communities all the way downstream of Lake Eildon.

In 2015 the Goulburn Broken Catchment Management Authority, on behalf of the Victorian Government, undertook the development of the Goulburn constraints business case. Work was done to improve understanding of how impacts, risks and benefits change for different flows along different parts of the river, and the range of mitigation measures that would be required. The MDBA has been providing engagement and technical support during 2015.

Stakeholder engagement

Community consultation during 2015 focused on potentially affected landholders. Information has been gathered through advisory groups, public meetings and other regional meetings with landholders, councils and community organisations.

Three community advisory groups, which include landholders and representatives from local businesses and councils, were formed in 2013 to assist with scoping the Goulburn constraints work. These groups have continued through 2015. The local information has been particularly valuable and members of these groups have been extremely generous with their time and input.

Letters outlining the project were sent to 1,300 landowners advising them of the project and inviting them to attend the open house meetings held in August 2015. Invitations for another series of open house meetings in January 2016 were sent out in December 2015.

In general, Goulburn River landholders are concerned about:

- unpredictability in forecasting rainfall and streamflow
- inadequacy of the existing river and rainfall gauging network
- widespread dislike for the concept of one off payments to secure enduring easements (private property agreements)
- some concern about the accuracy of flow footprint mapping at a property scale
- the uncertain future of the lower Goulburn levee system.

Much of the feedback received on the 2014 draft reach report for the Goulburn River raised concerns about higher flows and impacts on private land in the mid-Goulburn region between Lake Eildon and Yea. The Goulburn reach report was updated in 2015 on the basis of this feedback. Changes included developing a Molesworth landholder case study to better describe potential impacts and risks in the mid-Goulburn region and strengthening the text in relation to flows of significant community concern between Lake Eildon and Killingworth.

Gwydir

The watercourses and wetlands in the Gwydir are a significant ecological feature of the northern Basin. Located on the lower reaches of the river, the wetlands are environmentally and culturally significant, but also contain large areas of highly productive agricultural land. Areas of the wetlands are recognised under the Convention on Wetlands of International Importance (Ramsar Convention). They also support threatened wetland plant communities and act as a refuge for native fish in dry times.

The difficulty in delivering water along the watercourse to the wetlands is that daily flow rates are constrained by surrounding land use. Changed water management practices and consideration of farming activities such as spraying, sowing and harvesting has reduced the delivery of water downstream, resulting in many parts of the Gwydir becoming much drier and for longer periods. In 2014 the MDBA completed preliminary investigations to assess the effect on the environment and stakeholders from both current flows and a range of higher flows.

To improve the condition of the wetlands a range of measures are being considered. These include measures to enable an increase in the managed flow limit for environmental water releases in both the Gwydir and Gingham Rivers from 250 ML/day to 450 ML/day, and an increase in the managed flow limit for environmental water releases in the Mallowa River from 150 ML/day to 300 ML/day. Other measures include allowing managed flows to be delivered at any time of year when natural tributary flow events typically happen, reducing channel sharing issues, and undertaking infrastructure upgrade works to increase regulated flow capacities.

It is likely that the increased environmental benefits from these projects will be considered in the Northern Basin Review.

Stakeholder engagement

The business case being developed by the New South Wales Government builds on work done in the pre-feasibility phase of the constraints management strategy. Information for the business case has been collected through input from the New South Wales Department of Primary Industries Water, NSW Office of Environment and Heritage, NSW Fisheries, Water NSW, the MDBA and key stakeholders in the Gwydir.

In developing this business case, the New South Wales Government, with support from MDBA, has:

- worked collaboratively with affected landholders to understand impacts to agricultural land and develop appropriate mitigation options
- consulted with Northern Basin Aboriginal Nations
- used modelling, satellite imagery, existing ecological data and local knowledge to map flows on the floodplain
- undertaken hydrologic modelling to assess the potential frequency, timing and duration of studied flow rates
- assessed the costs for private infrastructure works to address impacts on private property
- consulted with the Moree Shire Plains Council to ensure that no public infrastructure will be affected by flows; and designed and costed infrastructure upgrades on the Tyreel, Gundare and Mallowa Creek regulators, to improve water delivery
- continued to work with landholders and Gwydir Valley stakeholders regarding proposals and business case development.

Murrumbidgee

The headwaters of the Murrumbidgee system are regulated by a number of dams, with Tantangara and Burrinjuck dams on the Murrumbidgee River, and Talbingo and Blowering dams on the Tumut River being the main structures. These dams have greatly modified flows, and the remaining flows, which would once have filled the lagoons and anabranch streams, are no longer sufficient to water these areas, at a frequency to sustain their health.

The flows analysed in the prefeasibility phase in 2014 included 48,500 ML/day, 40,000 ML/day and 30,000 ML/day at Wagga Wagga. In July 2015 the Murrumbidgee reach report was finalised and published after having considered comments from stakeholders.

In 2015, the New South Wales Department of Primary Industries and Water led the feasibility assessment of addressing flow constraints in the Murrumbidgee with support from the MDBA. A maximum flow of 40,000 ML/day has been investigated and, in response to concerns from some stakeholders, further flows at 35,000 ML/day and 32,000 ML/day at Wagga Wagga are now being investigated.

The duration of the proposed flows is anticipated to be in the order of three to four days at Wagga Wagga, followed by a natural rate recession, with a frequency of around three to four events over a ten year period. Revised inundation mapping has been undertaken by Water New South Wales, with support from the MDBA using satellite imagery and feedback from landholders to help verify and improve the understanding of the system further.

The MDBA, along with engineering consultants, have worked with each council in the catchment to identify and cost measures to mitigate any potential effects on public infrastructure. These

measures include improving low-lying crossings and access ways and providing pumps for stormwater escapes under town levees.

Consultants with agricultural expertise have also worked to estimate the costs of mitigation measures for agricultural enterprises. This has involved checking estimates with local agronomists and interviews with nine sample landholders. The New South Wales government, with support of the MDBA and other agencies, is putting together the business case for the proposed flows.

Stakeholder engagement

A total of 71 meetings and farm visits were undertaken in 2015 to discuss the effects of the flows being investigated. Upstream landholders are concerned about the effects of inundation; for example, damage to low-lying crops and fencing, spreading of weeds, access to land and the need to move stock and pumps away from the river at short notice. Landholders further downstream believe that the inundation is beneficial to wetlands and floodplain grazing land.

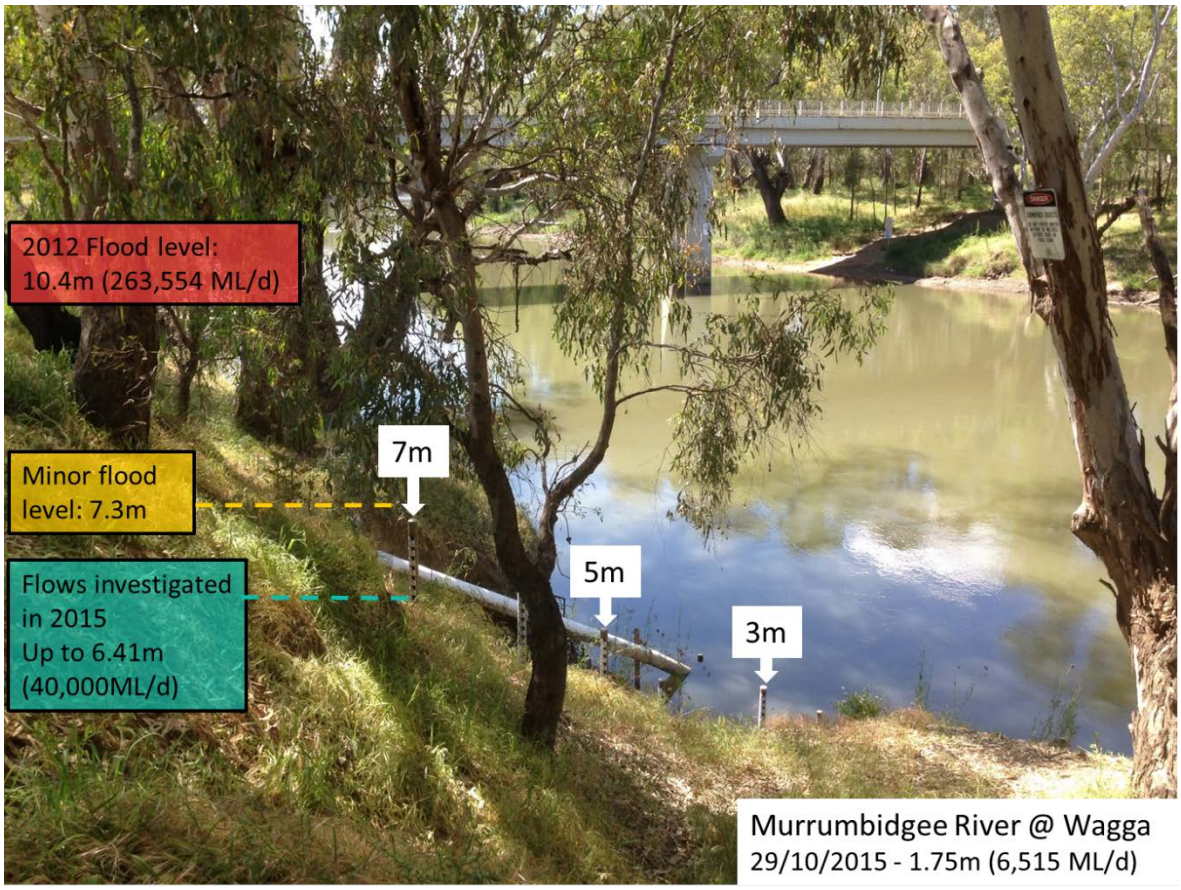

Figure 2: Murrumbidgee River gauge site at Wagga Wagga showing the flow heights being investigated under the constraints management strategy (photo by Paul Doyle, MDBA)

Lower Darling

The lower Darling key focus area is the section of the Darling River between Menindee Lakes and its junction with the River Murray at Wentworth. In the past, the lower Darling provided significant contributions to high flow events into the River Murray in South Australia. However, the completion of the Menindee Lakes Storage Scheme in the 1960s and extensive upstream irrigation development meant that the flows that still reach the Lakes are now mostly being captured and stored. Water in Menindee Lakes is shared by New South Wales and Victoria.

Before the construction of the Menindee Lakes storage, flows in the lower Darling generally occurred in spring or autumn. However, the regulation of the lakes means that high flows are now regularly delivered in summer.

The current regulated flow limit for the Lower Darling is 9,000 ML/day at Weir 32. Flows above this height start to run into the Great Darling Anabranch and to fill some other billabongs and wetlands. In 2014 the MDBA investigated the potential for flows of 14,000 and 17,000 ML/day at Weir 32.

Environmental flows would generally be between June and November when natural high flows in the River Murray typically happen. Historical records show that the lower Darling regularly experienced high flow volumes during this time as well, so these flows are also likely to benefit wetlands in the lower Darling. Research shows that 50% of wetlands on the lower Darling channel are inundated at flows of 13,000 ML/day.

In December 2014 New South Wales decided to pursue constraints investigations through the Menindee Lakes Water Savings Project. The New South Wales Department of Primary Industries Water is developing the Menindee Lakes Water Savings Project, in partnership with the Australian Government.

Research and analysis

During 2015 significant technical work was undertaken by the MDBA to inform the development of constraints business cases. This technical work included an assessment of third party impacts, mitigation measures and costs associated with higher managed flows. This work addressed key uncertainties and limitations associated with work that had been undertaken in the previous 2014 pre-feasibility assessment.

A new hydrologic model was used to define a maximum extent for opportunities to deliver environmental water, if constraints were relaxed. This hydrologic model improved upon the model used in the 2014 prefeasibility assessment. It also took into account the different levels of constraint relaxation that were considered in 2015 (e.g. 65,000 and 50,000 ML/day downstream of Yarrawonga Weir) compared to 2014.

Updated inundation maps in some reaches were used to estimate the spatial extent of effects of higher managed flows. These inundation maps drew on further hydraulic modelling of the flows being considered, and also took into account feedback from on-ground stakeholders regarding how land is affected by different flow rates. Independent consultants were engaged to undertake the work to assess third party impacts, mitigation measures and costs. As well as undertaking desktop-based analyses, the consultants worked with regional stakeholders, including landowners, local councils and other asset owners. This work was undertaken through the following projects:

- a project to assess levee works required in the Yarrawonga–Wakool, Murrumbidgee and South Australia reaches, and associated costs
- a project to refine the pre-feasibility assessment of impacts on agriculture, and appropriate mitigation options such as easements and/or infrastructure works on private crossings
- a project to refine the pre-feasibility assessment of impacts on public infrastructure (e.g. roads, crossings, bridges) and mitigation options and costs
- a project to assess what approvals and other processes would be required to implement mitigation measures, and the resources and costs required
- a project which considered specialist activities (e.g. golf courses, caravan parks, Murray shacks), how they might be affected by changes in flows, and mitigation measures and costs.

Operational and management constraints

As part of the process agreed by Basin governments, to progress SDL adjustment and constraints measures, states are developing implementation plans to address the policy outcomes of the Pre-requisite Policy Measures by 30 June 2016. Pre-requisite policy measures, which are referred to as 'unimplemented policy measures' in the Basin Plan consist of policies to enable:

- environmental water to flow throughout the length of a river, and between rivers; and be protected from extraction, re-regulation or substitution (Basin Plan 7.15(2)(a) credit environmental return flows for downstream environmental use), or
- releases of environmental water on top of other instream flows, including unregulated events (Basin Plan 7.15(2)(b) allow the call of held environmental water from storage during un-regulated flow events).

The pre-requisite policy measures are an important part of the Basin Plan as the extent to which they are implemented by 2019 will affect the size of any SDL adjustment in regions where supply measures have been proposed.

Pre-requisite policy measures — assessment

As part of its role in the SDL adjustment process, the MDBA will assess whether the pre-requisite policy measures developed by the states meet the requirements of the Basin Plan. During 2015 the MDBA has worked with states to develop policies that meet the Basin Plan requirements.

The key elements of the assessment involve states demonstrating that their new policy arrangements are:

- secure and enduring — the policy and implementation frameworks need to be codified in relevant legislative or regulatory instrument
- fully operable — all aspects required to give effect to pre-requisite policy measures are addressed, including relevant enabling provisions to allow river operators to implement the pre-requisite policy measures
- able to provide for releases of held environmental water from storages on top of other instream flows, including unregulated flows
- able to allow environmental water to flow throughout the length of the river, and between rivers; and be protected from extraction, re-regulation or substitution.

Pre-requisite policy measures — implementation plans

In 2014 Basin jurisdictions agreed that draft implementation plans for pre-requisite policy measures would be submitted to the MDBA by June 2015 and that revised plans would be submitted by December 2015. Initial implementation plans for New South Wales, Victoria, South Australia and the River Murray have now been submitted to the MDBA for initial assessment[1].

In response to the request of the Basin Officials Committee, the MDBA is coordinating the implementation plan for the River Murray on behalf of New South Wales, Victoria and South Australia.

An initial assessment of implementation plans indicates the policies are at differing stages of progression in the states and the River Murray. All states have indicated a commitment to have the policies implemented by 2019.

The MDBA strongly encourages the Basin states to engage and consult with key stakeholders in the further development of these policies.

[1] Queensland is not required to submit a Pre-Requisite Policy Measures implementation plan because there are no supply measures proposed in Queensland.

Next steps

Physical constraints

A significant body of work has been prepared during 2015, which provides the basis for governments to make informed investment decisions in 2016 about a comprehensive package of SDL adjustment and constraint measures.

In November 2015 ministers agreed to revise the assessment timelines to give states more time to finalise projects. This will allow more comprehensive information to be available, and allow further consultation with landholders and communities, before the final package of measures is agreed by 30 June 2016. Ministers also raised the need for the constraints projects to be considered as an interdependent package across the whole system.

2016 represents a period of transition for the constraints management strategy. During the first half of the year, further analysis and refinement of information will continue, for example continuing to investigate concerns raised by the community and developing a more detailed understanding of the costs of mitigating the impacts of changes being considered.

During the second half of 2016 (subject to ministers' decisions about constraints in June 2016). Basin governments will be continuing to progress constraints measures including further investigations, analysis and consultation before finalising on-ground plans and target flow rates. Further communication and consultation with stakeholders will continue in order to better inform and understand community issues at the regional and local level and to seek input on the development and implementation of constraints management measures.

As part of this work, Basin governments will need to establish sound governance arrangements for implementation, followed by a period of information refinement and negotiations with affected parties. To support negotiations, program guidelines will need to be developed to provide information and guidance to affected parties, such as landholders and councils.

Operational and management constraints

During 2016 the MDBA will undertake assessments of pre-requisite policy measures implementation plans prepared by the Basin states. The final implementation plans will outline by June 2016 how the States propose to implement these policies by 30 June 2019. When implemented, the pre-requisite policy measures are consistent with the Intergovernmental Agreement on Implementing Water Reform in the Murray–Darling Basin, the Basin-wide environmental watering strategy and the constraints management strategy.

There are a number of river operations changes being investigated for implementing the constraints in the River Murray. The Basin Officials Committee has agreed to commission an independent expert to undertake detailed analysis of changes to river operation in the River Murray system. The changes will be necessary to give effect to the SDL adjustment measures, constraints measures and pre-requisite policy measures that are being proposed, to inform the Basin Officials Committee and Ministerial Council.