

Better management of environmental water

Interim solutions package

Advice from the Interagency Working Group for Better Managing Environmental Water



Published by NSW Department of Industry

Better management of environmental water—Interim solutions package

First published June 2018

More information

Department of Industry—Lands and Water

industry.nsw.gov.au/water

Acknowledgments

Interagency Working Group for Better Managing Environmental Water

Cover image: Darling River at Louth on 13 April 2018—Department of Primary Industries—Fisheries

PUB18/284

© State of New South Wales through Department of Industry 2018. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Industry as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (May 2018) and may not be accurate, current or complete. The State of New South Wales (including the NSW Department of Industry), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

Contents

Summary	1
Recommendations	4
Background.....	5
Interim solutions.....	5
Roadmap	11
Guiding principles for roadmap implementation.....	14
Benefits.....	14
Monitoring, evaluation and reporting	15
Appendix 1—Roadmap	17

Abbreviations

CEWO: Commonwealth Environmental Water Office

CTP: commence-to-pump

Barwon–Darling WSP: Water Sharing Plan for the Barwon-Darling Unregulated and Alluvial Water Sources 2012

DPI: NSW Department of Primary Industries

HEW: held environmental water

IDEL: individual daily extraction limit

IWG: Interagency Working Group for Better Managing Environmental Water

LTAEL: long-term average annual extraction limit

MDB: Murray–Darling Basin

MDBA: Murray–Darling Basin Authority

MER: monitoring, evaluation and reporting

SAP: stakeholder advisory panel

TDEL: total daily extraction limit

WAL: water access licence

WM Act: *Water Management Act 2000*

WRAP: *NSW Government water reform action plan*

WRP: water resource plan

WSP: water-sharing plan

Interagency Working Group membership

Commonwealth Environmental Water Office

NSW Department of Industry—Lands & Water, Water branch

NSW Department of Industry—Water Renewal Taskforce

NSW Department of Primary Industries—Fisheries

NSW Department of Primary Industries—Agriculture

NSW Office of Environment and Heritage

Murray–Darling Basin Authority

Natural Resources Commission

WaterNSW

Summary

This paper presents the NSW Government with the Interagency Working Group's (IWG) advice on a package of interim solutions to be implemented for better managing environmental water and a roadmap for developing and implementing enduring solutions.

This package responds to community concerns about the long-term deterioration of water quality in rivers and associated ecosystems, especially during dry periods. The road map includes analysis to ensure that adverse impacts of potential solutions will be identified so that appropriate mitigation can be put in place. The package will make significant progress towards the better management of environmental water, and help improve community confidence in water sharing.

What has been done so far



Increased collaboration

State and Commonwealth agencies working together to find solutions for better management of environmental water—six IWG meetings held to date.



Community consultation

Engagement with the community at roadshows as part of Water Reform Action Plan consultation and attendance at recent Barwon–Darling Stakeholder Advisory Panel.



Protected low flows

Temporary water restrictions on extraction in the Barwon–Darling between 8 March and 28 April 2018 to protect initial flows in the system after an extended dry period.



Protecting held environmental water (HEW)—the Northern Connectivity Event

Temporary water restrictions to prohibit access to in-stream HEW released by the Commonwealth and NSW governments from upstream storages to connect river systems in the northern Basin, which in some cases has ceased to flow.

Figure 1. Work done so far

Photos: IWG meeting; environmental water consultation paper; flows at Louth 13 April 2018 (source: DPI Fisheries); environmental releases from Glenlyon Dam 18 April 2018 (source: CEWO).

Recommended interim solutions for better management of environmental water

Figure 2 shows the interim solutions that the IWG considers the most effective package that can be implemented until revised water-sharing plans (WSPs) come into effect as part of the rollout of water resource plans (WRPs) required under the Murray–Darling Basin Plan (MDB Plan). Learnings from these interim solutions will inform enduring solutions to better manage environmental water.

The interim solutions comprise measures that can be initiated relatively quickly to address immediate issues. The northern basin of the Murray–Darling Basin (northern Basin) has been experiencing prolonged dry conditions for more than a year. The interim solutions aim to ensure current and future flows achieve the best environmental, social, cultural and economic outcomes for all parts of the river system. The IWG will consider the potential impacts of these interim solutions on water users when developing event protocols for trials, and will consult further on the details that will underpin implementation of the proposed legislative amendments.

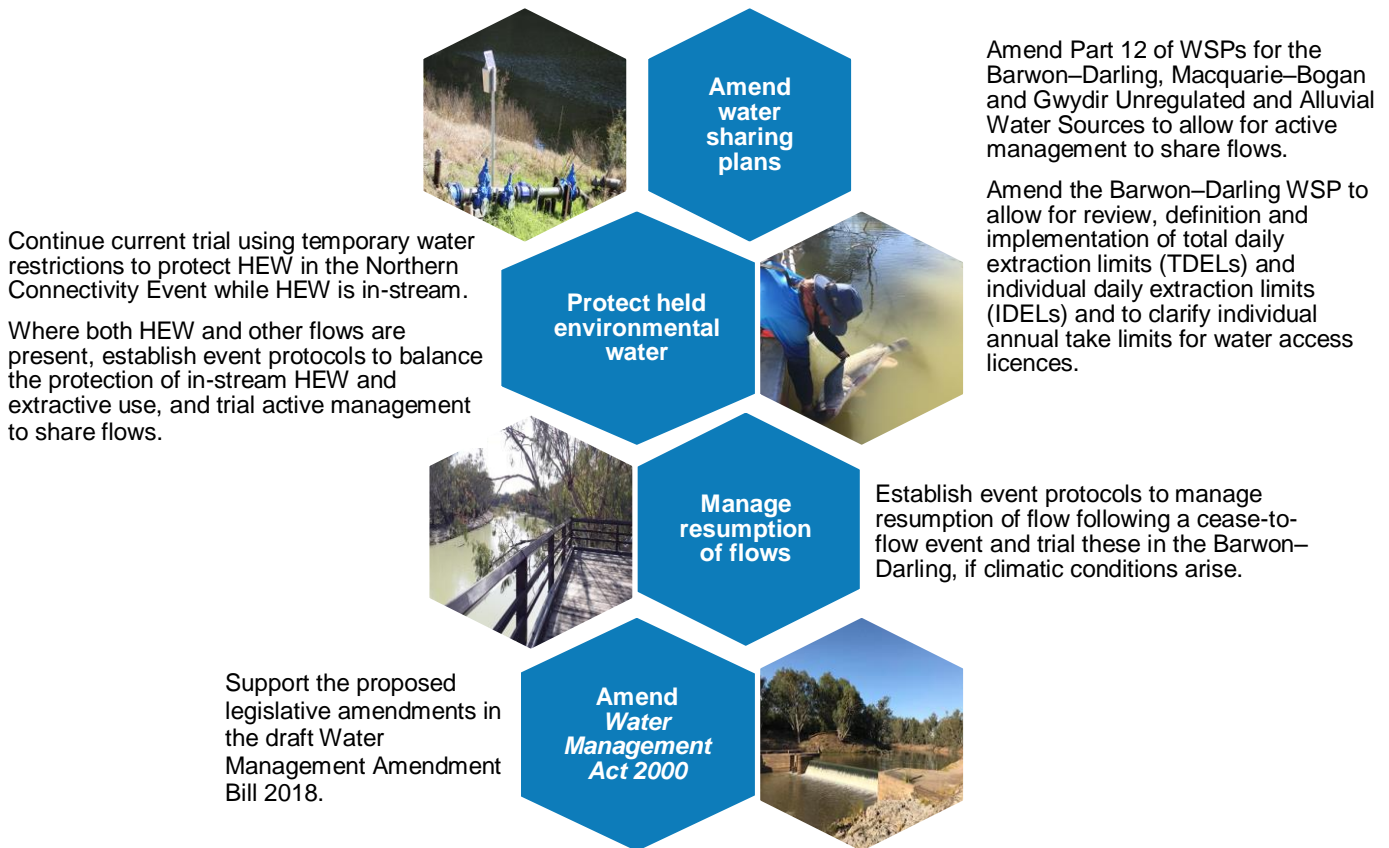


Figure 2. Recommended package of interim solutions to better manage environmental water

Photos: Metered work (source: Department of Industry, Water branch); Murray Cod observed during Darling River fish survey (source: DPI—Fisheries); Darling River at Bourke Wharf (source: Department of Industry, Water branch); Bourke Weir April 2018 (source: Department of Industry, Water branch).

Based on this initial work, the IWG is confident that a package can be developed by July 2019 that improves flow-based ecological outcomes, leading to healthier rivers, and improved community outcomes and confidence.

Roadmap to better manage environmental water

Over the next year, the IWG will work with stakeholders to develop an enduring package of solutions that provides certainty and confidence for all stakeholders.

The IWG has developed a roadmap that outlines further work to be progressed between now and July 2019 to implement interim solutions and to ensure that enduring solutions are in place after 1 July 2019.

The roadmap sets the path to ensuring solutions for better management of environmental water in the northern Basin are evidence-based and that adequate stakeholder consultation occurs. This includes analysis of benefits and impacts, as well as appropriate consultation. Enduring solutions will be implemented through the water management regulatory framework. This will include amendments to the *Water Management Act 2000* (WM Act) and the development of resulting regulations and amendments to WSPs, as part of the water resource planning process.

A report on progress against the roadmap will be provided to the minister by April 2019, including outcomes of stakeholder consultation.

Governance to ensure progress

Successful implementation of this package will require ongoing collaboration between policy makers, environmental water managers at the state and federal levels, rivers operators and water users. The foundations of this collaboration have already been established through the IWG and stakeholder advisory

panels (SAPs), which will continue to meet between now and July 2019. Enduring governance arrangements will be needed over the long term.

Stakeholder consultation

Consultation with stakeholders has largely occurred through the community consultation process for the *NSW Government water reform action plan (WRAP)*, including the release of a consultation paper on 13 March 2018. Members of the IWG also attended meeting five of the Barwon–Darling stakeholder advisory panel, where the Water Renewal Taskforce presented the options identified in the consultation paper.

In consultation to date, most stakeholders supported better management of environmental water.

- Environmental stakeholders seek assurances that water recovered for environmental purposes will remain available for this purpose.
- A number of stakeholders expressed concern that the lack of detail did not allow them to make informed comments, and although reference was made to future consultation occurring on more detailed solutions, it was not clear how and when this would occur and seemed inconsistent with the current stakeholder consultation framework.
- Industry stakeholders expressed concern that proposed solutions may have adverse impacts on reliability of access unless mitigation measures are in place, and could lead to changes to the risk assignment framework established under the National Water Initiative.
- Some industry representatives indicated that existing WSPs accommodate management of environmental water and sought further evidence on whether additional solutions are required.
- All stakeholders seek demonstration of expected benefits before enduring solutions are implemented. Accordingly, stakeholders requested further detail on solutions and consultation processes, and the opportunity to provide input.

Implementing the recommended interim solutions package will require further engagement with stakeholders, as will the development of enduring solutions. This will involve continued consultation through the existing WRP processes, including engagement with stakeholder advisory panels, public exhibition of WRPs and additional targeted forums as required.

Monitoring, evaluation and reporting

Monitoring, evaluation and reporting for the trials in the interim solutions package will assist to inform decisions about practical and feasible enduring solutions. A consistent and coordinated approach will ensure that observations and key learnings from implementing these solutions are captured efficiently for consideration by the IWG in its advice on enduring solutions.

Recommendations

That the minister approves:

- 1) the proposed interim solutions package, which will allow for better management of environmental water and establish the legislative framework for enduring solutions, including:
 - a) continue the current trial to protect held environmental water (HEW) to deliver the Northern Connectivity Event and trial a form of active management, if there is a mix of HEW and other flows in the system
 - b) establish event protocols to manage the resumption of flow following a cease-to-flow event and trial in the Barwon–Darling River through the use of temporary water restrictions (made through a s.324 order) if climatic conditions arise
 - c) support the proposed legislative amendments aimed at better management of environmental water in the public consultation draft of the Water Management Amendment Bill 2018
 - d) include additional provisions in this Bill to amend the WSPs for the Barwon–Darling, the Macquarie–Bogan and the Gwydir Unregulated and Alluvial Water Sources to facilitate the development of enduring solutions which will provide greater certainty for water users. This will include:
 - amending WSPs for the Barwon–Darling, the Macquarie–Bogan and the Gwydir Unregulated and Alluvial Water Sources to provide for the active management to share flows in the future
 - amending the Barwon–Darling WSP to remove the current IDEL provisions and signal the intention to amend IDELs and TDELs subject to further analysis
 - amending the individual annual take limit in the Barwon–Darling WSP to remove ambiguity in interpretation and clarify the original intent of the rule
- 2) the proposed roadmap to deliver the interim solutions and progress enduring solutions. The roadmap includes recommendations for further analysis of, and consultation on, enduring solutions, including consideration of benefits, impacts and mitigation, and establishment of arrangements for active management to share flows in unregulated systems
- 3) proposed governance arrangements and reporting including:
 - a) that the IWG continues to operate at least until WRPs commence, assisting government to drive and progress the roadmap deliverables
 - b) a report on progress against the roadmap to be provided by end April 2019
 - c) development and implementation of appropriate MER for the interim solutions package trials
- 4) using the existing consultation mechanisms, including the MDB Plan WRP consultation process, to progress these reforms.

Background

In December 2017, the NSW Government released the Water Reform Action Plan (WRAP). The WRAP includes actions that the NSW Government is taking to improve water management in NSW, including better management of environmental water.

A working group, the IWG, comprising representatives of state and federal agencies was established in February 2018 in accordance with the WRAP. The IWG was responsible for presenting the NSW Government with interim solutions for the better management of environmental water by 7 May 2018.

Interim solutions are solutions that can be implemented by 30 June 2019. The IWG considered available information, stakeholder submissions, what could be done practically now and what could be delivered to achieve environmental benefits.

In addition to detailing the interim solutions, this paper includes a roadmap that outlines further work needed to implement the interim solutions between now and 30 June 2019, and to ensure that enduring solutions are in place after 1 July 2019.

Other water reform activities progressing under the WRAP, such as improved measurement of water take and improved transparency measures, will support the implementation of interim and enduring solutions to better manage environmental water and help restore community confidence.

The need for solutions

The community expects that HEW recovered for environmental purposes through NSW and Commonwealth governmental investment is used for its intended purpose. Irrigators appreciate that it is not acceptable or sustainable to divert water recovered for environmental purposes. The current regulatory framework allows HEW released from upstream, regulated storages into downstream, unregulated water sources to be extracted legally in circumstances where all requirements for extraction are met, with environmental water potentially providing additional extractive opportunities. This limits the ability for environmental water managers to influence specific flow components and contribute to environmental outcomes, particularly in the low-to-medium flow range.

In his report *Independent investigation into NSW water management and compliance*, Ken Matthews, AO, identified the unregulated northern Basin system as an area requiring urgent attention, as there was community concern regarding the long-term deterioration of riverine water quality and associated ecosystems, especially during dry periods. The alteration of the natural flow regime across the majority of valleys in the northern Basin has had significant impacts on the flow and ecological conditions of water-dependent native aquatic plants and animals.

Assessment of environmental water requirements to protect and improve environmental assets in the Barwon–Darling using both modelled and observed data has shown that many ecologically important flow components are at risk. For example, there has been a recent increase in the number of cease-to-flow events, a reduction in the time between cease-to-flow events, and a reduction in frequency of medium-flow events. This and other changes to flows have significant ecological and social impacts.

Interim solutions

Interim solutions to better manage environmental water are those that can be implemented before 30 June 2019. Interim solutions include legislative amendments to establish the legislative framework and trials that will inform the development of enduring solutions.

The interim solutions focus on the northern Basin, including the Barwon–Darling in particular, as this is the area of most pressing need. The recent stakeholder consultation also supported a northern Basin focus.

Successful implementation of this package requires ongoing collaboration between policy makers, environmental water managers at the state and federal levels, rivers operators and water users. The foundations of collaboration have already been established through the IWG and stakeholder advisory panels.

Table 1. Interim solutions

Interim solution 1—Protect held environmental water	
Continue current trial to protect HEW to deliver the Northern Connectivity Event, including trial of a form of active management to share flows if there is a mix of HEW and other flows in the system (see Box 1).	
Description	Rationale
<p>Continue current temporary water restrictions (through a s.324 order) to prohibit take of in-stream HEW, released from upstream storages, by access licence holders in the Barwon–Darling Unregulated River Water Source and some of the Macquarie Bogan and Gwydir Unregulated River Water Sources.</p> <p>Trial a form of active management if there is a mix of HEW and other flows in the system through flexibility built into the s. 324 order.</p> <p>Establish event protocols to balance the protection of instream HEW and extractive use when the flows in the unregulated systems are above the commence-to-pump levels.</p>	<p>HEW released from upstream storages and flowing into downstream water sources is currently not protected from being extracted by downstream water users and could be legally extracted, if all other access conditions are met.</p> <p>Stakeholders expect that, given the significant public investment in the purchase of water to achieve environmental outcomes, HEW can be managed to meet its intended use.</p> <p>Event protocols provide transparency in how events are managed, including communication and consultation processes, decision-making processes, management of risk, and responsibilities.</p> <p>The trial will enable identification of benefits and impacts and provide a basis for development of an enduring solution.</p>
Interim solution 2—Manage resumption of flow after cease-to-flow event	
Establish event protocols to manage the resumption of flow following a cease-to-flow event and trial in the Barwon–Darling Unregulated River Water Source through use of temporary water restrictions if climatic conditions arise.	
Description	Rationale
<p>Establish interim event protocols to manage resumption of flow after a cease-to-flow event.</p> <p>If climatic triggers are met, implement temporary water restrictions (through an s.324 order) to prohibit take by access licence holders in the Barwon–Darling Unregulated River Water Source to manage access to initial flows after a cease-to-flow event.</p> <p>A trial of this nature is similar to a first-flush flow rule, but with relatively small target flows.</p>	<p>Event protocols will provide clarity on when the temporary water restrictions may be considered to manage resumption of flow after a cease-to-flow event. The protocol would prescribe how these events are managed, including communication and consultation processes, decision-making processes, management of risk, and responsibilities.</p> <p>If conditions arise, this trial will meet one of the objectives for better management of environmental water breaking an extended cease-to-flow period. This would enable the benefits and impacts to be identified and provide information on how the river reacts to the first flow after a cease-to-flow period, helping refine flow forecasting capabilities in order to inform any future enduring solutions.</p> <p>Temporary water restrictions imposed in March–April 2018, although not undertaken specifically for environmental purposes, are also an example of this interim solution (see Box 3).</p>

Interim solution 3—Legislative amendments	
Support the proposed legislative amendments aimed at better management of environmental water in the public consultation draft of the Water Management Amendment Bill 2018.	
Description	Rationale
<p>Temporary water restrictions:</p> <ul style="list-style-type: none"> Amends the existing temporary water restriction provision to allow the minister to restrict or prohibit the taking of water where the minister is satisfied it is necessary for the purposes of managing water for environmental purposes. <p>Imposition of mandatory conditions by regulation:</p> <ul style="list-style-type: none"> Enables regulations to impose mandatory conditions on access licences and approvals to limit, for environmental purposes, the taking of water in specified circumstances. <p>Assignment of individual daily extraction components (IDELs):</p> <ul style="list-style-type: none"> Amends the access licence dealings provisions to enable individual daily extraction components to be assigned between access licences. Enables information about assignment of individual daily extraction components to be included in the water allocation account for an access licence. 	<p>The proposed amendments support implementation of enduring solutions to better management for environmental water.</p> <p>Temporary water restrictions:</p> <ul style="list-style-type: none"> Section 324 of the WM Act can already be relied upon to impose temporary water restrictions for environmental purposes if the minister is satisfied the circumstances are in the public interest. This amendment will make it clear that temporary water restrictions can be applied for environmental water management, in accordance with a framework set out in the regulations. The framework will detail the circumstances, including the systems, in which the temporary restrictions may be imposed. Consultation will be undertaken on draft regulations. <p>Imposition of mandatory conditions by regulation:</p> <ul style="list-style-type: none"> One way to protect environmental flows is by prescribing mandatory conditions on licences and approvals that regulate extraction to protect environmental water. This proposed amendment to the WM Act allows mandatory conditions to be prescribed in the regulations for protecting environmental water. This enables consistent conditions to apply to all licences and approvals or classes of licence and approvals without having to separately amend individual WSPs. Consultation will be undertaken on draft regulations. An example of a regulation that could be made is to require mandatory conditions on works approvals in unregulated water sources as a compliance mechanism to protect held environmental water, when in-stream. <p>Assignment of IDELs:</p> <ul style="list-style-type: none"> Temporary trade of IDELs will allow a market-based mechanism for access and sharing of specific flow events that are above commence-to-pump thresholds. Risk associated with trade can be considered in setting the trade rules.

Interim solution 4—Water-sharing plan amendments	
Amend Part 12 of the WSPs for the Barwon–Darling, the Macquarie–Bogan and the Gwydir Unregulated and Alluvial Water Sources to allow access rules in these plans to be amended to facilitate active management to share flows.	
Description	Rationale
<p>The Water Management Amendment Bill will include amendments to enable arrangements for active management to share flows, to be prescribed at a later date in the WSPs, for the Barwon–Darling, the Macquarie Bogan and the Gwydir Unregulated and Alluvial Water Sources.</p>	<p>Water-sharing plans can include clauses that authorise future amendments to a plan. This proposed amendment to these WSPs will authorise future amendments to implement active management to share flows. This approach will allow time for appropriate rules to be developed and broad stakeholder input to be considered.</p> <p>Active management to share flows will be critical to implementing enduring solutions for management of HEW in unregulated water sources while it is in-stream.</p> <p>While active management to share flows is currently possible through an s.324 order, this is not an enduring solution for implementation of active flow management. New management approaches should be codified in the WSPs.</p> <p>Implementation may be limited in some river reaches by the current hydrometric gauging network.</p>
Amend the WSP for the Barwon–Darling Unregulated and Alluvial Water Sources to facilitate reconsideration of IDELs and TDELs.	
Description	Rationale
<p>It is proposed to amend the Barwon–Darling WSP as follows:</p> <ul style="list-style-type: none"> Amend Part 12 to allow IDELs to be established or amended. Delete current IDEL provision in clause 52 and include a note signalling an intent to determine establishment of IDELs following consideration of the benefits and impacts of options. 	<p>TDELs enable the sharing of flows above the commence-to-pump threshold between the environment, downstream uses and consumptive users. However, TDELs have not been established in the Barwon–Darling WSP.</p> <p>Part 12 of the Barwon–Darling WSP authorises future plan amendments to establish and/or amend TDELs. It is proposed to amend Part 12 to also authorise future amendments to establish, amend and remove IDELs and make associated dealing rules.</p> <p>In the Barwon–Darling WSP the current proposed IDELs are based on authorised, pre-WSP pumping rates. It was proposed that TDELs would simply be the sum of the IDELs in each management zone. Therefore the limits were not designed to achieve environmental outcomes but to limit individual daily take. In addition, the IDEL distribution rules currently in the Barwon–Darling WSP have unintended consequences.</p> <p>Review of TDELs and IDELs in the Barwon–Darling is proposed to determine if environmental outcomes can be improved and unintended outcomes of the current IDEL distribution method can be addressed. Potential impacts on water users will form part of the analysis of options.</p>

Amend the individual annual take limit for A, B and C-class access licences in the Barwon–Darling Unregulated Water Source to ensure enforceability of the clause in line with its original intent, clarifying that it is to limit individual annual take (including water taken and assigned) to equal to 300% of total shares (when expressed as 1 ML/unit share).

Description	Rationale
<p>Clause 42(3) of the Barwon–Darling WSP defines the annual individual take limit for A-, B- and C-class access licences.</p> <p>The take limit is designed to support compliance with MDB Cap over the long term, and therefore compliance with the long-term average annual extraction limit (LTAAEL) which is set by the MDB Cap.</p> <p>The take limit was intended to be three times the unit share of an access licence, including water taken and assigned in any water year.</p>	<p>Under the current WSP rules it is possible to process trades under s.71T of the WM Act above the take limit if there is sufficient water in the water allocation account of an access licence. This is because clause 42(3) of the WSP only provides for the calculation of a take limit and does not attempt to limit trades under s.71T to that limit.</p> <p>The way clause 42(3) currently operates has potential to undermine the MDB Cap and LTAAEL management strategy by theoretically allowing maximum water taken (extracted or assigned) in any given year to exceed 300% of entitlement (when expressed as 1ML/unit share). As LTAAEL is a primary mechanism for ensuring the protection of planned environmental water in NSW, it is now proposed to fix this error through the Bill.</p> <p>The proposed change does not change the intention of the clause when it was first drafted.</p>

Box 1: Protecting HEW—the Northern Connectivity Event

In January 2018, over 1,000 kilometres of the Barwon–Darling River downstream of Brewarrina ceased to flow. Water quality deteriorated in stagnant waterholes and native fish and other aquatic life experienced significant stress. Flows protected in March for social purposes were insufficient to fully replenish drought refuge waterholes, or substantially improve connectivity between waterholes. In response, the Commonwealth Environmental Water Office partnered with the NSW Office of Environment and Heritage in approving up to 31 gigalitres of environmental water (up to 23.8 gigalitres of Commonwealth environmental water and up to 7.2 gigalitres of NSW environmental water) to build on natural inflows and provide for connectivity across multiple river systems to protect and support native fish. Temporary water restrictions (s.324) are in place to ensure the HEW flowing in-stream is protected to benefit the environment and communities along the river.

Spanning April to June 2018, this event represents coordinated northern Basin deliveries on an unprecedented spatial scale, involving flows over 2,000 kilometres of river channels, including the northern tributaries and the full length of the Barwon–Darling River to the Menindee Lakes. It also involves extensive and targeted consultation with local landholders, irrigators, shire councils, traditional owners and various interest groups.

In addition to providing significant environmental benefits, the event will inform future policy, planning and operational decision-making. Learnings from monitoring will be shared with the community and inform future use of water for the environment. Although the flow is in progress, key learnings to date include the need to explore:

- whether there is a need for a system-scale coordinating group that has an annual planning forum. The group could work together when a flow event is being actively managed for environmental outcomes
- the importance of active management to share flows and the benefits of developing an event protocol so that processes are transparent.



Poor quality pool habitat downstream of Wilcannia on the Darling River prior to Northern Connectivity Event flows, Image NSW DPI Fisheries.

Roadmap

Most stakeholders consulted supported better management of environmental water.

- Environmental stakeholders sought assurances that water recovered for environmental purposes will remain available for this purpose.
- A number of stakeholders expressed concern that the lack of detail did not allow them to make informed comments, and although reference was made to future consultation occurring on more detailed solutions, it was not clear how and when this would occur and seemed inconsistent with the current stakeholder consultation framework.
- Industry stakeholders expressed concern that proposed solutions may have adverse impacts on reliability of access unless mitigation measures are in place, and could lead to changes to the risk assignment framework established under the National Water Initiative.
- Some industry representatives indicated that existing WSPs accommodate management of environmental water and sought further evidence on whether additional solutions are required.
- All stakeholders sought demonstration of expected benefits before enduring solutions are implemented. Accordingly, stakeholders requested further detail on solutions and consultation processes, and the opportunity to provide input.

A roadmap has been developed to outline the actions required to implement interim solutions and develop enduring solutions. This sets the path to ensure that long-term solutions are clearly defined and evidence-based, and that adequate stakeholder consultation occurs.

Potential enduring solutions require:

- further development and definition
- analysis to assess the expected improvements in environmental water management and the potential social, economic and cultural impacts and benefits
- input from stakeholders.

This includes assessing concerns raised by industry stakeholders that proposed solutions may have adverse impacts on reliability of access or increased costs of operations.

Potential long-term solutions also need to address concerns raised by environmental interests that HEW, if released for downstream outcomes into unregulated systems, can be pumped under the current regulatory framework.

Further analysis and consultation will enable options to be identified that best meet the environmental water objectives, address implementation challenges, consider potential impacts, and take appropriate mitigation measures before embedding enduring rules into the WSP framework.

New options may arise as a result of analysis and consultation or through learnings from trials. Options will be assessed to ensure an appropriate mix of enduring rules is selected.

Key engagement activities are outlined in the roadmap and are aligned to the review of WSPs as part of the water resource planning process. Engagement is to be purposeful, inclusive, timely, transparent and respectful. Engagement approaches will recognise the differences and connections between water sources.

Implementing the recommended interim solutions package will require further engagement with stakeholders, as will the development of enduring solutions. This will involve continued consultation through the existing WRP processes, including engagement with stakeholder advisory panels, public exhibition of WRPs and additional targeted forums as required.

Analysis will be shared with stakeholder advisory panels and feedback will be considered in refining enduring options before they are released for broader public comment.

All stakeholders will have the opportunity to provide feedback on enduring solutions during public exhibition of any proposed changes to WSP rules.

Implementation of enduring solutions will require enduring governance arrangements, which will be considered in due course.

Roles and responsibilities for actions identified in the roadmap will be agreed by relevant entities and form the work plan for the IWG.

The roadmap will be published and updated on a regular basis, identifying the status of actions on the Department of Industry website. A report on progress, including outcomes of stakeholder consultation, will be provided by the end of April 2019.

The success of the interim and enduring solutions will be dependent on the implementation of other actions under the WRAP, including improved water take measurement, metering, and transparency measures.

Box 2: Active management to share flows

Active management in its basic form involves determining what volume of flows can be accessed and when, under defined rules. A managed system shares flows between consumptive and other users, identifying the portion of flow that is available for extraction and the portion in-stream being managed for the environment.

Active management is currently possible and may be trialled as part of the Northern Connectivity Event, should circumstances arise. However, at present, it is only possible for a conservative estimate to be made of the environmental component of a flow and this relies on customers regularly checking the WaterNSW website. As this solution progresses to a more enduring measure, it is envisioned that these issues will be resolved to enable a greater balance in flow-sharing and notification capabilities.

Accurately determining the HEW component requires:

- improved monitoring of in-stream flows and extractive use to improve flow forecasting and determine an accurate daily water balance
- customers expressing interest in accessing their entitlement during an event, that is placing an order, to identify demand in the system and enable sharing of the event
- the ability to notify customers of their flow share in real-time, for example via automated notifications.

Active management is not yet codified in WSPs. In order to implement it, plan amendments would be required.

The roadmap outlines a number of actions to establish a better framework for active management. For example, the roadmap includes a review of the hydrometric network and a review of whether it is necessary to implement WaterNSW's customer relationship management system in unregulated systems.

Guiding principles for roadmap implementation

Managing water for the environment is complex. A number of challenges need to be met to ensure both interim and enduring solutions can be implemented and outcomes achieved while minimising socio-economic impacts.

The IWG developed the following set of principles to guide the interim and enduring solutions, which take into account stakeholder feedback:

1. **Adverse impacts are mitigated**—impacts are identified and appropriate mitigation measures are put in place where necessary.
2. **Unintended gains are avoided**—solutions, where possible, should not contribute to an increase in water access reliability for downstream water users, with any additional water adequately protected as part of interim and enduring measures to ensure that environmental outcomes are achieved or considered as an offset.
3. **Solutions are evidence-based, outcomes-focused and create certainty**—use best available information in a transparent manner to develop and deliver environmental outcomes with consideration of social and economic outcomes. Where possible, solutions will be articulated in WSPs, and event protocols will be developed and publically available.
4. **Solutions are feasible**—identify measures that can be implemented technically and operationally.
5. **Solutions represent value for money**—measures must present value for money and not be cost-prohibitive.

Benefits

Benefits of a staged approach

The solutions designed to achieve the better management of environmental water will be developed and implemented in a staged approach according to the roadmap.

The proposed approach allows for appropriate consultation with stakeholders and ensures that enduring solutions are evidence-based, transparent and defensible and that, where possible, adverse impacts from the proposed changes are mitigated and unintended gains are avoided before enduring solutions are embedded in the water management regulatory framework.

Environmental benefits

Expected environmental benefits include:

- promoting ecosystem resilience to disturbances and threats (such as dry times). This will primarily be achieved by **managing the resumption of flows** after a cease-to-flow-event that has been identified as meeting critical ecological thresholds
- protecting or improving the distribution and population structure of native fish species through supporting **whole-of-river flow connectivity** and **flushing flows**. These outcomes provide movement/dispersal opportunities for native fish along the Barwon–Darling (including the Lower Darling) and between tributaries, supporting spawning and recruitment of native fish, minimising population bottlenecks that can arise during extended cease-to-flow periods, and ensuring localised extreme events do not have catastrophic impacts for isolated populations
- improving the habitat that services water-dependent native fauna. This benefit is derived from **flushing flow** pulses in the system, which are important for nutrient cycling following the inundation of in-channel benches, and in the movement of salt out of the system
- supporting the objectives set by environmental water managers, which inform the use of HEW, through the protection of HEW as it moves between river systems and through unregulated rivers.

Associated social and cultural benefits

Submissions received during the public consultation process indicated cultural, tourism, health, recreation and other social and economic benefits could arise through better management of environmental water.

'I've heard numerous police officers, school teachers, health professionals and others observe that when there is water in the rivers there is less discord, better school attendance and a more positive feeling generally in nearby communities'

'The Barwon-Darling and northern Basin is home to significant totemic animals integral to First Nations culture and spirituality. The state needs to pay specific attention to water-dependent habitats of totemic animals and plants.'

Monitoring, evaluation and reporting

In any adaptive management system, well-planned and well-executed monitoring, evaluation and reporting generates the evidence for informed policy and planning decision making. In the context of environmental water management, monitoring, evaluation and reporting activities help to assess effectiveness of solutions and also identify any operational challenges and unforeseen risks, and how these can be managed in the future.

Monitoring, evaluation and reporting for the trials in the interim solutions package will assist to inform decisions about practical and feasible enduring solutions. It will require a multi-agency approach for which the foundations exist as part of the IWG. A consistent and coordinated approach will ensure that observations and key learnings from implementing these solutions are captured efficiently for consideration by the IWG in its advice on enduring solutions.

Reporting on the better management of environmental water will involve:

- presenting key findings and learnings from trial events, for example, reporting on the March 2018 s.324 event (Box 3) and the Northern Connectivity Event (Box 1)
- a progress update on implementation of the roadmap, which will be presented to the minister in April 2019. This report will strengthen accountability and provide for transparency in how actions in the roadmap are tracking.

Monitoring, evaluation and reporting for the enduring solutions will be integrated with the Barwon–Darling NSW Monitoring, Evaluation and Reporting Plan and other monitoring, evaluation and reporting plans currently under development for other valleys as part of the WRP requirements under the MDB Plan. This will ensure the activities conducted build on existing knowledge and programs in a cost-effective and coordinated manner.

Box 3: Insights from recent temporary water restrictions (s.324 event)

On 8 March 2018, temporary water restrictions on A-, B- and C-class water access licences in the Barwon–Darling Unregulated River were announced. These restrictions were extended to 28 April 2018, with the end-of-pump restrictions staggered based on the movement of flows down the river. The purpose of these restrictions was to protect initial flows making their way downstream from Queensland into the Barwon–Darling to replenish town water supplies and provide stock and domestic water for landholders.

These flows provided some level of flow connectivity from Mogil Mogil to Tilpa, servicing some town water supplies and basic landholder rights, but they were insufficient to provide any major improvement in environmental outcomes. Losses in the river were significant, particularly when weir pools required refilling and river beds were dry. Additional flows, including a larger volume flow, are still required across the length of the Barwon–Darling River to deliver environmental outcomes.

While these flows were protected primarily for social purposes, they provide learnings for the future management of environmental water. Key learnings from this event include:

- **communication**—despite efforts to communicate temporary water restrictions (s.324 announcement) to the community, media coverage is patchy in the Barwon–Darling meaning that use of media to notify water users of s.324 type information has its limitations, especially if notifying users at short notice. A communication platform populated with customer contact details is not currently available to distribute information. Other complementary communication tools are needed to efficiently notify water users of any temporary water restrictions
- **managing risks and improving transparency**—clear event protocols and a risk assessment framework are required to ensure that the community has a clear understanding of the steps and considerations involved in announcing and implementing temporary water restrictions
- **reporting on outcomes**—it is important to ensure that there is adequate monitoring and reporting of such events in place to account for what outcomes are achieved against the objectives of the event, and be transparent about any unintended third party impacts and learnings.

Appendix 1—Roadmap

Table 2. Roadmap. Note that deliverables and timing may change depending on outcome of analysis and consultation, and subject to the timing of WRP processes.

	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	1 July 2019
WRP development	Public exhibition of the WSP components of the Gwydir surface water WRP ¹ All stakeholder advisory panel meeting (5–6 June 2018)	Public exhibition of the WSP components of the Macquarie–Castlereagh surface water WRP ²	Public exhibition of WSP components of the Barwon–Darling, NSW Border Rivers, Namoi and Intersecting Streams surface water WRPs			
Governance and reporting	Work plan for delivery of road map.				Progress report on delivery of the roadmap. Provide advice on enduring governance arrangements.	
Protection of In-stream held environmental water	Continue to trial instream protection of HEW during the Northern Connectivity Event.	Community report on the Northern Connectivity Event, prepared by the Commonwealth Environmental Water Office.	Report on the Northern Connectivity Event, including consideration of operational, hydrological and governance aspects of environmental water management. Consult Barwon–Darling stakeholder advisory panel and unregulated stakeholders in the Macquarie–Bogan and Gwydir Unregulated and Alluvial Water Sources on draft event protocols for protection of HEW instream and active management to share flows.		Finalise event protocols for protecting HEW instream and active management to share flows.	Commencement of new rules in WSPs/New arrangements are implemented.

¹ Holding clauses may be required to facilitate active management or outcomes of requirements for northern Basin connectivity in WSP for Gwydir water sources if required changes are not finalised in time for public exhibition of this plan.

² Holding clauses may be required to facilitate active management or outcomes of requirements for northern Basin connectivity in WSP for Macquarie Bogan Unregulated and Alluvial Water Sources if required changes are not finalised in time for public exhibition of this plan.

	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	1 July 2019
WRP development	Public exhibition of the WSP components of the Gwydir surface water WRP ³ All stakeholder advisory panel meeting (5–6 June 2018)	Public exhibition of the WSP components of the Macquarie–Castlereagh surface water WRP ⁴	Public exhibition of WSP components of the Barwon–Darling, NSW Border Rivers, Namoi and Intersecting Streams surface water WRPs			
Legislative amendments	Water Management Amendment Bill introduced to Parliament to progress proposed legislative amendments.	Commence amendments to WSPs as set out in the Bill.			Consult on regulations for mandatory conditions and temporary water restrictions for protection or management of water for the environment.	Commencement of new rules in WSPs/New arrangements are implemented.
Active management to share flows		Consult Barwon–Darling stakeholder advisory panel and unregulated stakeholders in the Macquarie–Bogan and Gwydir Unregulated and Alluvial Water Sources on proposed WSP rules to facilitate active management to share flows.	Public consultation on changes to the Barwon–Darling WSP and other unregulated WSPs as part of the WRP process to facilitate active management to share flows.	Business case for additional resourcing and gauging to actively manage sharing of flows, based on adequacy of existing hydrometric network and current management arrangements.	Finalise arrangements for commencement of active management to share flows including arrangements for acquisition and installation of gauging stations (subject to funding and resourcing, and outcome of earlier analysis and consultation).	

³ Holding clauses may be required to facilitate active management or outcomes of requirements for northern Basin connectivity in WSP for Gwydir water sources if required changes are not finalised in time for public exhibition of this plan.

⁴ Holding clauses may be required to facilitate active management or outcomes of requirements for northern Basin connectivity in WSP for Macquarie Bogan Unregulated and Alluvial Water Sources if required changes are not finalised in time for public exhibition of this plan.

	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	1 July 2019
WRP development	Public exhibition of the WSP components of the Gwydir surface water WRP ⁵ All stakeholder advisory panel meeting (5–6 June 2018)	Public exhibition of the WSP components of the Macquarie–Castlereagh surface water WRP ⁶	Public exhibition of WSP components of the Barwon–Darling, NSW Border Rivers, Namoi and Intersecting Streams surface water WRPs			
Manage flow resumption of	Trial the management of the resumption of flow following a cease-to-flow event subject to climatic conditions and in consideration of risks to all water requirements in the system, report on outcomes of any trials in accordance with interim event protocols.					
WSP rules in the Barwon–Darling		Analyse and report on the operation and outcomes of the recent March–April 2018 s.324 event in the Barwon–Darling. Develop detailed options and impact analysis on possible enduring solutions that could be implemented through amendments to access rules, TDELs and IDELs in the Barwon–Darling WSP. Consult Barwon–Darling stakeholder advisory panel on more detailed options and impact analysis for these enduring solutions.				
WSP rules in the Barwon–Darling			Public exhibition of any proposed rule changes to the Barwon–Darling WSP as part of the water resource planning process.			
Northern Basin connectivity		Stocktake of current northern Basin connectivity rules and consider next steps. Consult with relevant stakeholder advisory panels on options and analysis, if required, on northern Basin connectivity rules.		Public exhibition of any proposed rule changes to the WSPs in the northern Basin, if required, as part of the water resource planning process.		
Commencement of new rules in WSPs/New arrangements are implemented.						

⁵ Holding clauses may be required to facilitate active management or outcomes of requirements for northern Basin connectivity in WSP for Gwydir water sources if required changes are not finalised in time for public exhibition of this plan.

⁶ Holding clauses may be required to facilitate active management or outcomes of requirements for northern Basin connectivity in WSP for Macquarie Bogan Unregulated and Alluvial Water Sources if required changes are not finalised in time for public exhibition of this plan.