



Natural  
Resources  
Commission



# Review of the water sharing plan for the Border Rivers Regulated River Water source 2009

May 2018

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## **List of acronyms**

CEWO – Commonwealth Environmental Water Office

DOI – Department of Industry

LTEWP – Long Term Environmental Watering Plan

MDBA – Murray Darling Basin Authority

SAP – Stakeholder Advisory Panel

WRP – Water Resource Plan

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# 1 Executive summary

Water Sharing Plans provide the framework for balancing water use within the system, allocating water for community, industry and the environment. Introduced through the *Water Management Act 2000*, the plans provide for the sustainable and integrated management of waters sources for present and future generations in NSW. In particular the plans should apply the principles of ecologically sustainable development, protect, enhance and restore water sources, recognise social and economic benefits of water sources and encourage best practice management and use of water. Plans also act as a legal framework for water users with perpetual access licences and ensure equitable conditions and increased opportunities for trade through the separation of land and water as property rights.

The Natural Resources Commission has a statutory responsibility to review Water Sharing Plans due to expire and provide advice to the Minister for Regional Water as to whether the plan should be remade or extended. The Commission has reviewed the *Water Sharing Plan for the Border Rivers Regulated River Water Source 2009* (hereafter referred to as the Plan) consistent with this responsibility. The Commission recommends that the Plan be replaced with new management plans in order to:

- improve clarity and measurability of objectives, strategies and performance indicators
- strengthen monitoring and evaluation requirements
- revise environmental flow provisions to address operational issues
- facilitate improved environmental outcomes
- revise trade provisions to improve clarity of language and better facilitate trade
- allow incorporation into the Water Resource Plan as required by the Murray Darling Basin Plan

Stakeholders recognise the Plan for its role in providing certainty of water rights for water users in the Border Rivers. While it is difficult to attribute economic changes to a specific driver such as the Plan, the value of water is moving in line with market supply and demand drivers. There has been a trend towards production of higher value crops in the catchment over the life of the Plan, which is in line with the objectives of shifting water to its most economically efficient use.

There is some evidence environmental objectives of the Plan are being achieved. For instance, recent data collected along the Severn River to Apple Tree Flat indicates high levels of native vegetation cover (average of 95%), low levels of weed infestation, and very good fish habitat conditions including high snag loadings<sup>1</sup>. Technical advice on fish community status highlights that there is a relatively healthy native fish population that would provide a strong platform for recovery. While these changes cannot be attributed to the Plan alone, it is likely contributing to these outcomes.

While the Plan is recognised for its achievements to date, the Commission has identified opportunities for improvement. Improvements include changes that will address overarching issues of Plan effectiveness and implementation; adapting plan rules to improve environmental and cultural outcomes; and exploring opportunities that may further encourage efficient use of water and facilitate trade.

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<sup>1</sup> DPI Fisheries (2017). *DPI Fisheries comments on the NSW Border Rivers Water Resource Plan Surface Water Status and Issues Paper – April 2017*

Steps should be taken to ensure that requirements of the Intergovernmental Agreement, which governs a large portion of the system, are fully implemented. In particular, requirements in relation to environmental monitoring and management of cross-jurisdictional trade should be addressed as a matter of urgency. This will improve transparency and accountability in regards to both environmental outcomes and trade provisions.

Improved monitoring of environmental outcomes is needed to allow assessment of outcomes. The review has also identified operational issues with delivering planned environmental water rules and ongoing issues of cold water pollution that will need to be addressed to optimise outcomes for native fish populations in the Border Rivers.

It is acknowledged that many of the opportunities for improvement that have been identified by the Commission are currently being considered by the Department of Industry-Water (DOI-Water) through the water resource planning process. This includes the work being undertaken with the Stakeholder Advisory Panel (SAP). The Commission has acknowledged these efforts throughout the report.

While it is recognised that the SAP has considered many of the recommendations made in this report, the Commission notes that the SAP is considering a wide range of potential changes to the Plan, not all of which will be carried forward. This report outlines the key issues the Commission feels should be addressed in the incorporation of the Plan into the Water Resource Plan. Implementation of the recommendations will position the Plan well to achieve triple bottom line outcomes.

**Table 1. Recommendations**

**The Commission recommends that the Plan be replaced with a new management plan in order to address the following:**

1. DOI - Water should complete efforts to revise the objectives, strategies and performance indicators, in line with the update across all water sharing plans, to ensure that they are clear, measureable and achievable as an evaluation framework to demonstrate triple bottom line outcomes.
2. DOI - Water should revise Plan provisions for the release of planned environmental water (translucent flows) to accommodate practical considerations in dam operation during periods of low flow.
3. DOI - Water and WaterNSW should take steps to address issues with cold water pollution and the timing of the stimulus flow releases, including:
  - revise Plan provisions to extend the timeframes for the release of planned environmental water (stimulus flows) consistent with best available evidence
  - undertake a detailed evaluation of performance of multi-level offtake for the Pindari Dam to identify options that will meet the environmental and operational requirements without compromising instream biological functions to inform the new plan.

- 
4. In order to better protect environmental water, DOI-Water should consider revising Plan provisions to:
    - extend protection of stimulus flows to the junction with Dumaresq River, following full examination of potential social and economic impacts
    - incorporate any relevant recommendations by the Interagency Working Group for Better Environmental Water Management
- 
5. DOI - Water should implement current plans to incorporate consistent Plan trade rules that are easy to understand and practical to implement.
- 
6. DOI - Water and WaterNSW should work together to develop and implement provisions to better facilitate trade of supplementary water.
- 

In addition to recommendations in regards to changes to provisions in the Plan, the Commission has identified several opportunities to improve implementation of the Plan. Addressing these issues would better ensure that the Plan is achieving the intended outcomes:

A. DOI - Water should:

- Immediately, drive the re-establishment of the IGA Standing Committee to:
  - improve governance and transparency within the system
  - resolve cross-jurisdictional trade issues
  - develop a monitoring program to assess outcomes from environmental flows.

In the longer term, review the cross-jurisdictional governance arrangements to improve efficiency if possible.

- B. DOI - Water should implement and appropriately resource the monitoring strategy currently in development to ensure that progress against the indicators is tracked to allow improved assessment of whether the Plan objectives are being achieved in the future.
- C. DOI - Water should take steps to formalise interagency and community-based collaboration for the management and coordination of both planned and held environmental water.
- D. DOI - Water should take steps to enhance engagement with the Aboriginal community in relation to cultural flows, and if appropriate establish cultural licenses.
- E. Agencies involved in monitoring and management of environmental water in the Plan area (including DOI - Water, CEWO, DPI Fisheries, OEH) should establish a strategy to resolve existing knowledge gaps that will improve the management of environmental water releases.

## 2 Role of the Natural Resource Commission and recommendation

Water sharing plans are statutory instruments under the *Water Management Act 2000* that typically have a ten year term. They prescribe how water is managed to achieve sustainable water management that supports economic, social, cultural and environmental outcomes. They are designed to provide certainty for water users over the life of the plan – typically a period of ten years, unless they are extended.

Water sharing plans for water sources in the Murray-Darling Basin will form components of Water Resource Plans (WRP). For example, the NSW Border Rivers (Surface Water 16) WRP will incorporate two existing water sharing plans:

- *Water Sharing Plan for the Border Rivers Regulated River Water Source 2009*
- the surface water aspects of the *Water Sharing Plan for the NSW Border Rivers Unregulated and Alluvial Water Sources 2012*.

The Natural Resources Commission (the Commission) has a role under Section 43A of the *Water Management Act 2000* to review water sharing plans that are approaching expiry and provide a report to the Minister on:

- the extent that water sharing provisions of the plan have materially contributed towards achievement of the State priorities for Local Land Services that relate to natural resource management
- whether changes to plan provisions are warranted.

In conducting this review, the Commission is to call for and consider public submissions, and have regard to any other relevant State-wide and regional government policies or agreements that apply to the catchment management area. Depending on its review findings, the Commission may recommend extension of a water sharing plan, or that it be replaced with a new plan.

The Commission has worked with the Department of Industry - Water (formerly Department of Primary Industries – Water division) to coordinate this review with its WRP development process (see Appendix A). This Plan is due to expire the same year that Department of Industry – Water (DOI – Water) must deliver its WRPs (in 2019).

### 2.1 Review approach

#### 2.1.1 Scope

The Commission sought to understand how the provisions of the water sharing plan have contributed to state priorities for Local Land Services that relate to natural resource management, specifically the following goals from the Local Land Services State Strategic Plan:

- Biosecure, profitable, productive and sustainable primary industries
- Resilient, self-reliant and prepared local communities
- Healthy, diverse and connected environments.

The Commission identified and examined water sharing provisions of particular relevance to these goals. For example, the Commission considered the role of planned environmental water provisions in providing healthy, diverse and connected environments, and trade provisions in supporting productive and sustainable primary industries.

## 2.1.2 Available evidence

The Commission's review was informed by:

- **Submissions** – the Commission called for submissions in conjunction with DOI – Water's call for submissions for the status and issues paper prepared and released as part of the WRP development process. Stakeholders were asked to respond to eight questions to assess the contribution of the Plan to State priorities for Local Land Services (see Appendix B). Fifteen submissions were received, including one confidential submission.
- **Targeted consultation** – with government agencies, community and industry organisations. The Commission attended several meetings of the Border Rivers Stakeholder Advisory Panel to gain a better understanding of issues of concerns and identify opportunities for improving plan provisions from water users.
- **Document review** – the Commission obtained both publically available information and unpublished modelling and reports from water management agencies including DOI – Water, the Murray Darling Basin Authority (MDBA) and Commonwealth Environmental Water Office (CEWO). A full list of documents reviewed by the Commission are detailed in Appendix C.
- **Technical advice** – from consultants to provide expert analysis on Plan provisions and opportunities for improvement.

## 2.2 Recommendation to the Minister

The Commission recommends that the water sharing plan for the *Border Rivers Regulated Water source 2009* be replaced with a new management plan that takes into consideration the specific revisions outlined in Table 1 and discussed within this report. These revisions will contribute to:

- improved clarity of strategies, objectives and performance indicators
- improved monitoring of outcomes
- improved outcomes from environmental flows
- clarity of language for stakeholders and consistency of terminology with other plans
- improved opportunities for trade

In addition to recommendations related specifically to remaking of the Plan, the Commission has included advice in regards to opportunities to improve the implementation of the Plan including:

- full implementation of the Intergovernmental Agreement
- enhanced engagement with the Aboriginal community
- improved interagency governance arrangements, knowledge strategies and monitoring and evaluation.

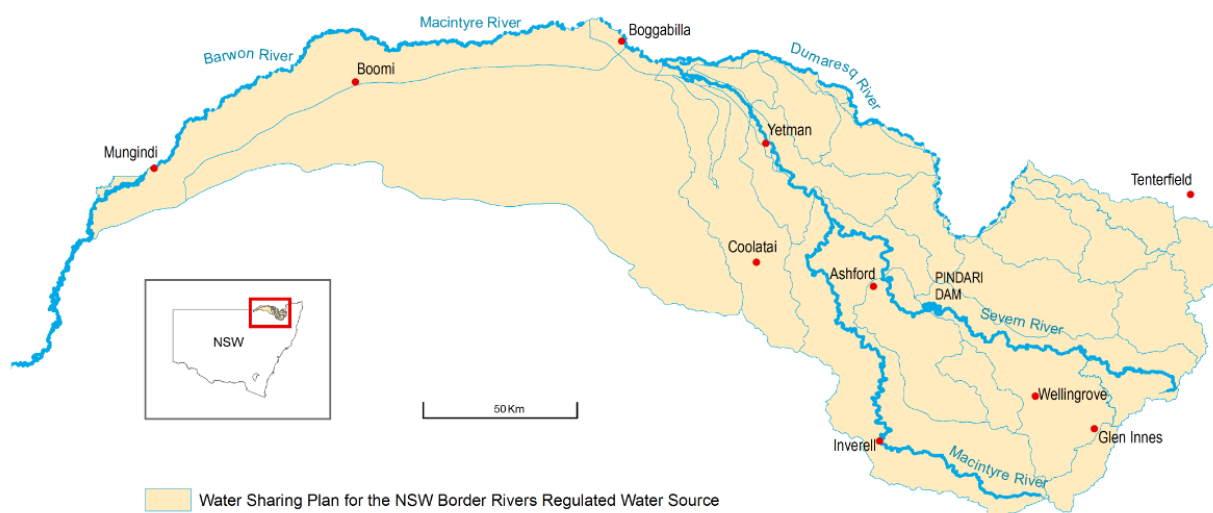


## 3 The Border Rivers Plan area

### 3.1 The Border Rivers Catchment and Water Sharing Plan

The Border Rivers is a cross-jurisdictional catchment spanning northern New South Wales and southern Queensland. The headwaters rise in the western slopes of the Great Dividing Range and the river system flows west gradually forming the Barwon River near Mungindi.

Figure 1. NSW Border Rivers Water Sharing Plan region



Border Rivers flows through country of Kamilaroi and Bigambul First Nations. The catchment includes Boobera Lagoon which is of cultural and spiritual significance to the Goomeroi people of Toomelah, Boggabilla and Goondiwindi.<sup>2</sup>

Major tributaries in NSW include the Macintyre, Dumaresq and Severn River and in Queensland the Severn River, Macintyre Brook and Weir River. Effluent streams include Boomi River (NSW), Callandoon and Dingo Creeks (QLD), Little Weir River (QLD), and Whalan Creek (NSW).

The three major water supply structures located in the Border Rivers catchment area include:

- Pindari Dam (312 GL) on the Severn River (NSW) operated by Water NSW
- Glenlyon Dam (254 GL) on Pikes Creek (Queensland) operated by Sunwater
- Coolmunda Dam (69 GL) located on Macintyre Brook (Queensland)

Major population centres include Glen Innes, Inverell and Tenterfield in NSW, and Goondiwindi and Stanthorpe in Queensland.

The *Water Sharing Plan for the Border Rivers Regulated River Water Source 2009* (hereafter referred to as the Plan) includes the surface waters between the banks of the following rivers and storages:

<sup>2</sup> Austlii (2001), Indigenous Law bulletin. Available: <http://www.austlii.edu.au/au/journals/IndigLawB/2001/9.html>

- the upper limit of Pindari Dam storage, including all tributaries to the storage (named and unnamed) up to the high water mark of the storage,
- the Severn River from Pindari Dam downstream to the junction of the Macintyre River,
- the Macintyre River from its junction with the Severn River downstream to the junction of the Barwon River,
- the Barwon River from its junction with the Macintyre River downstream to Mungindi Weir,
- the Dumaresq River from its junction with Pike Creek downstream to the junction of the Macintyre River.

The Plan area is immediately upstream of the Barwon-Darling Unregulated system as show in Figure 2.

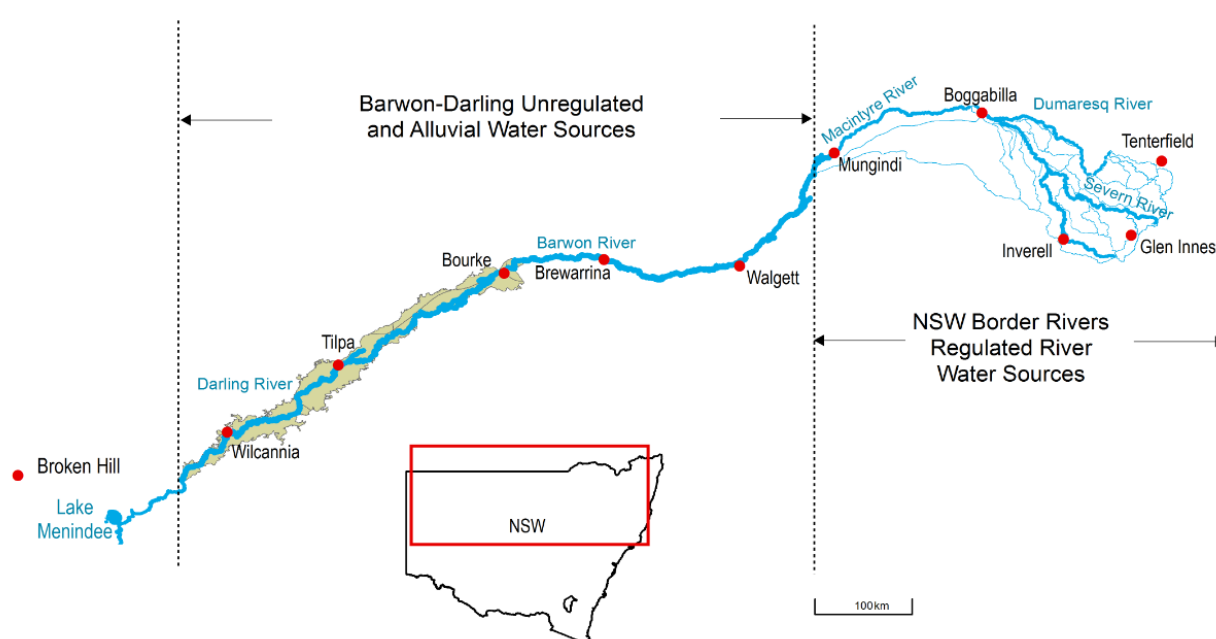


Figure 2. NSW Border Rivers and Barwon-Darling Unregulated and Alluvial Water Sources Water Sharing Plan regions

### 3.2 Overview of economic conditions, land and water use

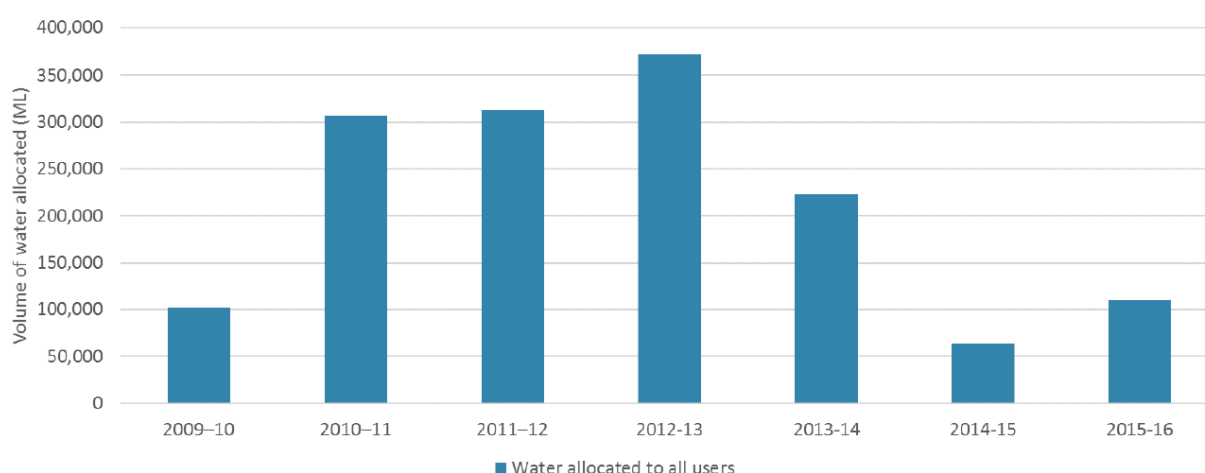
The Commission was unable to identify any economic data specifically relating to the Border Rivers Water Sharing Plan area. While data is available for Border Rivers to Gwydir natural resource management area, it is not possible to derive meaningful conclusions in relation to the Plan area from this data.

Broadly speaking, land use in the Border Rivers catchment is dominated by grazing and dryland cropping with irrigated cropping accounting for a relatively small percentage of land use. Most irrigated agricultural production occurs in the west of the system between Goondiwindi and Mungindi. In addition to broadacre agricultural production, the Border Rivers also supports a relatively small commercial fishing industry.

The Border Rivers catchment supports several different water uses including urban and town water, stock and domestic water for grazing industries and irrigated cropping.<sup>3</sup> High security, general security and supplementary water entitlements make up 99 per cent of total system allocation (see Table 2). As highlighted in Figure 4, entitlements have not translated to full allocation to licence holders with water determinations ranging between 16% in 2014–15 to 96% in 2012–13. Table 2 demonstrates that total entitlement has remained relatively stable in the Border Rivers system with minor changes to entitlement type across the life of the Plan.

**Table 2. Water entitlements allocated for the NSW Border Rivers Regulated Water Source**

Purpose	Entitlements (ML/yr) or shares (2009)	Entitlements (ML/yr) or shares (2017)
Domestic and Stock	1,205	1,001
Town Water Supply	620	620
High Security	1,233	1,500
General Security – A class	21,000	22,027
General Security – B class	244,000	241,211
Supplementary water	120,000	120,001
<b>Total</b>	<b>388,058</b>	<b>386,360</b>



Source: Aither 2016. Based on data provided by NSW DPI Water 2016.

Note: Includes available water determinations (AWD) plus carryover.

**Figure 4. Total volume of water allocated to all entitlement types in the Border Rivers (Regulated) 2009-10 to 2015-16**

Data available for the Border Rivers and Gwydir catchments combined indicates a significant increase in the volume of water applied for irrigation accompanied by a decrease in the total irrigation area. A direct comparison cannot be made between water availability, total irrigation volume and area irrigated due to aggregation of valley based data. However, it is observed that the shift towards irrigated cotton production is broadly aligned with water allocation to entitlement holders.

<sup>3</sup> Aither (2017). Water trade analysis for water sharing plan reviews – Analysis of water trade for the Border Rivers WSP. 18 December 2017. Report commission by the Natural Resources Commission.

Feedback indicates this general trend (towards irrigation for cotton production) is occurring in the Plan area. The drivers for cotton production are complex. Factors that may influence the shift towards cotton production include global cotton prices, seasonal forecasts, usage of allocation by individual licence holders and the availability of necessary infrastructure to enable cotton production.

### **3.3 Cross-jurisdictional arrangements in the Border Rivers Plan area**

#### **3.3.1 Border Rivers Commission**

The Border Rivers Commission was constituted under the New South Wales – Queensland Border Rivers Agreement made in 1946 and ratified in NSW by the *New South Wales-Queensland Border Rivers Act 1947*.

The Border Rivers Commission consists of three commissioners (1 NSW, 1 Queensland and 1 Chair not in the service of either State Government) and supported by a secretariat. The role of the Border Rivers Commission includes, but is not limited to:

- operation and maintenance of joint water infrastructure and implementation of agreed water sharing arrangements.
- coordination of a water quality monitoring program in the Border Rivers and intersecting streams.<sup>4</sup>

The joint infrastructure managed by the Border Rivers Commission includes Glenlyon Dam, Boggabilla Weir and a number of fixed-crest weirs and regulators along the Border Rivers<sup>5</sup> and intersecting streams<sup>6</sup>.

#### **3.3.2 Border Rivers Intergovernmental Agreement**

The *NSW – Queensland Border Rivers Intergovernmental Agreement 2008 (IGA)*, was established in response to COAG reform and the Murray-Darling Basin Agreement. The extent of the Border Rivers Plan area governed by the IGA is highlighted in Figure 5. The IGA governs approximately 80% of the extent of the three major regulated rivers (Severn, Dumaresq and Macintyre) within the Plan area. The IGA also covers the unregulated rivers in the region. The IGA sets out interstate water sharing, access and trade arrangements, environmental water management and water delivery to the Darling (downstream of Mungindi). The Plan and Queensland Resource Operations Plan give effect to the IGA. The Plan includes a note indicating any review of the Plan should take into account the provisions of the IGA.

The IGA also sets out monitoring requirements, including the requirement to establish an Integrated Environmental Monitoring Program. The IGA established the Border Rivers Standing Committee as the governance body responsible for the implementation of the agreement. The agreement is not intended to affect the role, functions or powers of the Border Rivers Commission.

Section 44 of the IGA requires review of the IGA in parallel with review of the Water Resource (Border Rivers) Plan 2003 in Queensland and the Plan. DOI – Water advised the Commission

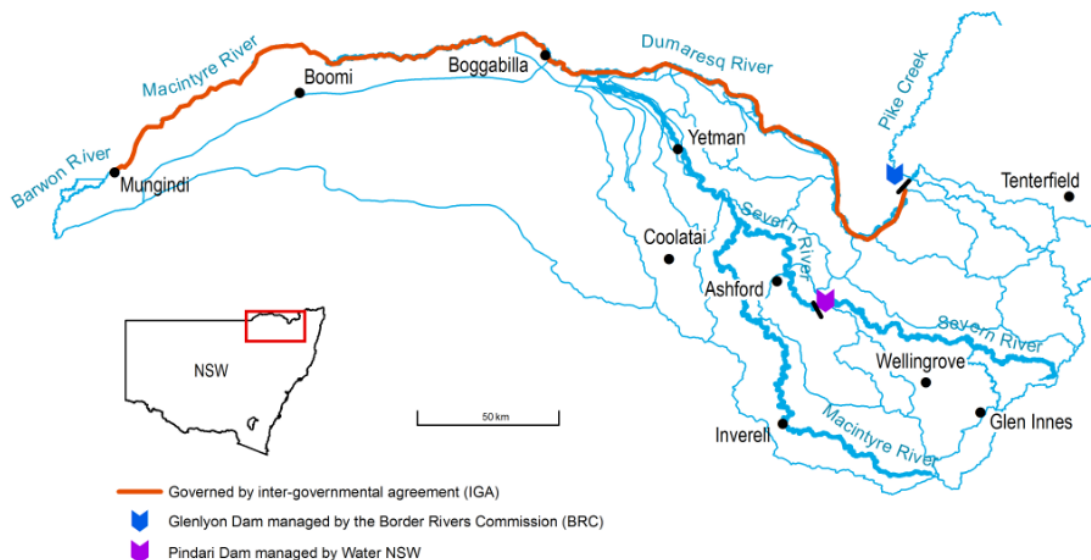
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<sup>4</sup> Dumaresq-Barwon Border Rivers Commission (2017), *About Border Rivers Commission*. Available: <http://www.brc.gov.au/about/index.html>

<sup>5</sup> This include the parts of the Dumaresq, Macintyre and Barwon Rivers that constitute the boundary between New South Wales and Queensland from Mingoola to Mungindi

<sup>6</sup> This includes the Moonie, Bokhara, Narran, Culgoa, Ballandool, Warrego and Paroo Rivers and their effluents and tributaries, and any stream or watercourse which forms part of the Darling River drainage system and crosses the New South Wales-Queensland border west of the town of Mungindi.

that there is no IGA review underway at this stage. Section 64(2) of the Plan specifies that any amendments to the water sharing plan that may impact on the IGA must be done in consultation with Queensland. The Commission is aware that consultation between NSW and Queensland water planning staff has occurred, with Queensland planning staff attending the most recent SAP meeting in Goondiwindi (1<sup>st</sup> March 2018).



**Figure 5. Border Rivers Plan area indicating the portion of major regulated rivers\* governed by the NSW Queensland Border Rivers Agreement**

\*NOTE: The Intergovernmental agreement also covers unregulated rivers within the region. The figure highlights the relevant regulated rivers only.

## 4 Improve inter-jurisdictional arrangements

The IGA performs a critical function in the management of the Border Regulated Rivers water source. According to information from stakeholders, the IGA Standing Committee has been responsible for delivery of the following measures:

- development of tagging mechanisms to facilitate interstate trade
- protocols for the operation of Newinga and Boomi regulator
- hydrological models for the Keytah groundwater resource
- review of the Paroo River Intergovernmental Agreement
- development of a draft integrated environmental monitoring program (IEMP)<sup>7</sup>.

The IGA establishes the low to moderate and end of system flow targets along the regulated rivers of the Dumaresq River from the Glenlyon Dam and Macintyre River to the Mungindi Weir. Under the IGA, the basis for achieving environmental outcomes is restrictions on extraction subject to flow rate targets being reached. These restrictions are implemented through the respective state plans. The achievement of environmental objectives through the IGA were to be monitored through the IEMP for the Border Rivers. While a draft IEMP was developed by the IGA Standing Committee, the program was not formalised or implemented by the respective States. Recent monitoring to improve current understanding of native fish population has been carried out on behalf of the CEWO for the Dumaresq / Macintyre stretch, but this was independent of the IEMP requirements.

There is evidence that issues to be resolved by the IGA Standing Committee are outstanding. During consultation stakeholders revealed high levels of frustration with the lack of resolution of cross jurisdictional issues, particularly coordination of environmental monitoring and inconsistencies in trade arrangements between NSW and Queensland. The recent SAP meeting (1<sup>st</sup> March 2018) identified ongoing concerns with Dingo Creek and Callandoon Creek during flooding events. Stakeholders highlighted the difficulties with cross jurisdictional water accounting, and indicated that there are issues of transparency associated with water trades between NSW and Queensland.<sup>8</sup>

The Commission is aware that due to loss of personnel the IGA Standing Committee has not met for a period of at least two years. Oversight by the Standing Committee of the IGA should be re-activated with the aim to facilitate full implementation of the agreement with greater transparency and accountability. The Commission understands that the Minister has just appointed a new NSW representative for the Committee. However, the Queensland representative and Chair still need to be re-established. Given the Dumaresq River and Macintyre River forms the border between NSW and Queensland for approximately 470 km, the Commission considers that resolution of cross jurisdictional issues is critical to the success of the Plan.

The capacity to track environmental outcomes from planned environmental water releases from the Pindari Dam are compromised by the absence of an IEMP for the IGA impacted

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<sup>7</sup> While a draft IEMP was prepared this was not supported or implemented by NSW and Queensland. Water quality monitoring has occurred along the Dumaresq / Macintyre river stretch via the Border Rivers Commission.

<sup>8</sup> Aither (2017). Water trade analysis for water sharing plan reviews – Analysis of water trade for the Border Rivers WSP. 18 December 2017. Report commissioned by the Natural Resources Commission.

Dumaresq/Macintyre river stretch. It should also be noted that this river is a major contributor to the Barwon Darling system and as such requires careful oversight of downstream flows.

Stakeholder feedback and analysis of cross-jurisdictional trades highlighted some ongoing issues with full transparency and accountability of tagged trades between NSW and Queensland water users. These appear to be associated with documentation and recording at the time of tagged interstate water trades. The lack of full transparency and traceability of water trades may impact on economically efficient water use and is an issue that could be addressed through the IGA.

The Commission understands that historically members of the Standing Committee and the Border Rivers Commission have often overlapped significantly. There may be opportunity to improve the efficiency of cross-jurisdictional governance arrangements, for instance by expanding the role and functions by the Border Rivers Commission to include implementation of the IGA provisions. This may avoid some of the barriers and duplication faced by the IGA Standing Committee, including access to budget and staff performing representation roles on multiple committees impacting the same river stretch.

In the absence of overall changes to governance structures to the IGA, and to avoid further delay to actioning the issues of trade and environmental monitoring, the immediate reactivation of the IGA Standing Committee is supported.

**Suggested action:**

A. DOI - Water should:

- In the immediate term, drive the reactivation of the IGA Standing Committee to:
  - improve governance and transparency within the system
  - resolve cross-jurisdictional trade issues
  - develop a monitoring program to assess outcomes from environmental flows.

In the longer term, review the cross-jurisdictional governance arrangements to improve efficiency if possible.

## 5 Improve performance indicators and monitoring

The Plan establishes objectives, strategies and performance indicators to guide and monitor performance (see Appendix E). Reporting against objectives and performance indicators for the Border Rivers was undertaken by NSW DPI Water in the report *Evaluation of NSW Water Sharing Plans for the major regulated rivers in the Murray-Darling Basin* (hereafter referred to as the Evaluation Report)<sup>9</sup>. The Evaluation Report mapped performance indicators to objectives, and ranked findings according to performance and strength. The Evaluation report indicates that:

- the objectives are broad and not targeted enough to adequately link to the strategies and rules in the Plan, resulting in objectives not reflecting the intentions of the Plan
- the objectives do not establish specific and measureable criteria

<sup>9</sup> NSW DPI Water (2017). Evaluation of NSW Water Sharing Plans for major regulated rivers in the Murray-Darling Basing [unpublished]

- additional information is needed to evaluate the performance of the Plan, i.e. where the performance indicator is seeking to measure changes in ecological condition, defining what the change ecological condition 'looks like' is important.

The Evaluation Report indicates that overall the Plan was appropriate for purpose, implemented efficiently, and has been effective to some degree. It notes that improvements could be made to the monitoring and evaluation framework, administration of licence conditions, and gathering of sufficient data and information to evaluate Plan performance.

This assessment is in line with feedback received by the Commission from stakeholders, which acknowledged that the Plan had resulted in greater security of tenure of water entitlements for all water users and facilitated trade within the Border Rivers. Stakeholders identified the need to update objectives and performance indicators to facilitate the reporting of Plan performance.

A shift in Plan development towards an outcomes based management approach was advocated by some stakeholders. While such an approach has significant merit, given the potential for adaptive management of the water source, to implement such a management strategy would require significant legislative changes. Implementation of opportunities identified within this review should be adopted as a first step towards continuous improvement of the Border Rivers Plan, with a progression towards outcomes based management of the water resource viewed as a long-term goal.

The Commission understands DOI-Water is undertaking a process to update objectives, strategies and performance indicators across water sharing plans. Further, as part of planning reforms to be completed through the Murray-Darling Basin Plan an Interagency Monitoring and Reporting program will be developed to facilitate collaboration with state agencies and the Commonwealth Environmental Water Office.

Actions underway to improve objectives, strategies and indicators and overall monitoring and evaluation are strongly supported by the Commission. In order to assess future Plan performance, measureable targets have to be established. While consistency across Plans is required, consideration should be given as to how measureable targets can be set for localised environmental assets, and the nuances of the Border Rivers system, which is characterised by event based flows and responses.

While improving the clarity of objectives and outcomes is an area that warrants improvement, it is also concerning that monitoring of performance was not implemented for the life of the Plan. A sound monitoring and evaluation plan is critical for assessing whether the Plan is operating as intended and supporting adaptive management. It is also essential that monitoring programs are adequately funded and resourced, with clear understanding of roles and responsibilities for collecting and reporting data.

### **Improving socioeconomic indicators**

In revising the strategies and indicators, DOI-Water should ensure that the full range of objectives are included to assess triple bottom line outcomes. During the SAP meeting (1<sup>st</sup> March 2018), stakeholders identified shortcomings in regards to indicators for community impacts. Opportunities to improve environmental indicators were also identified by the Commission. These are discussed further in Section 6.0.

The information obtained through the Northern Basin review provides an important social and community data set that could be used as a guide for the development of social indicators for



the Plan going forward. Specific requirements in regards to environmental monitoring were identified through this review and are discussed further in Section 6.4.

At the time of developing the Basin Plan, the Murray-Darling Basin Authority (MDBA) recognised there was an opportunity to improve the information base for the Northern Basin. Lack of data was noted in the scientific information available for the Condamine–Balonne and Barwon–Darling systems and more broadly, the social and economic data for informing water recovery decisions.<sup>10</sup> Governments agreed to a Northern Basin Review to address these knowledge gaps. Using a triple bottom line approach, the MDBA looked at a range of water recovery options and associated economic, social and environmental outcomes.

The Northern Basin Review compiled a significant volume of socio-economic data on impacted communities. The research focused on the 21 communities in the Northern Basin and sought to identify the impact of changes in water availability and impacts to the area under irrigation and the flow-on effects on community employment.

The socioeconomic analysis for the Northern Basin Review used three inputs: community-level modelling, floodplain grazing modelling and results from a survey of Aboriginal sociocultural capitals. Changes in irrigated production and employment were the key indicators for the community-level modelling<sup>11</sup>.

The report found that socioeconomic impacts were highly variable. The social and economic analysis highlighted how the effects of recovering water for the environment can be influenced by changes in the volume, location or type of entitlements recovered, and whether the recovery is through infrastructure investment or purchase. The timing and the pace of water recovery are two other factors influencing the effects on communities. For example, the purchase of large parcels of water over very short periods of time was found to have significant long-term effects as businesses take time (2-5 years) to adjust to the changes.

It is recognised that the Northern Basin review provides a socioeconomic analysis that can be drawn upon for impacted plan areas to assist in dissecting the relationship between water recovery and community impacts. To allow a truly triple bottom line assessment of impacts of the Plan, a continuation of the Northern Basin methodology should be included within the monitoring strategy.

### **Recommendation**

1. DOI - Water should complete efforts to revise the objectives, strategies and performance indicators, in line with the update across all water sharing plans, to ensure that they are clear, measureable and achievable as an evaluation framework to demonstrate triple bottom line outcomes.

### **Suggested action**

- B. DOI – Water should implement and appropriately resource the monitoring strategy currently in development to ensure that progress against the indicators is tracked to allow improved assessment of whether the Plan objectives are being achieved in the future.

<sup>10</sup> Murray-Darling Basin Authority (2016), *Northern Basin Review: understanding the economic, social and environmental outcomes from water recovery in the northern Basin*. Available: <https://www.mdba.gov.au/sites/default/files/pubs/Northern-basin-review-report-FINAL.pdf>

<sup>11</sup> Murray-Darling Basin Authority (2016), *Northern Basin Review - Technical overview of the socioeconomic analysis*

## 6 Improve environmental and cultural outcomes

The Border Rivers catchment supports a range of environmental values, including wetlands of national significance. The Morella Watercourse/Boobera Lagoon/Pungbougol Lagoon complex is listed on the Directory of Important Wetlands in Australia and acts as an important permanent water body during drought periods.<sup>12</sup>

The Border Rivers is rich in native fish fauna including Murray cod (listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)), silver perch, purple-spotted gudgeon, olive perchlet and eel-tailed catfish. The network of billabongs and lagoons supports nationally and internationally significant waterbirds including the great egret, brolgas, Australian painted snipe, black-necked storks, magpie geese and royal spoonbills. More than 108,000 hectares of wetlands have been mapped in the Border Rivers and adjoining Moonie River catchments, of which 56 percent occur in New South Wales.

Boobera Lagoon is recognised as a site of cultural significance.<sup>13</sup> The Kamilaroi people believe that it is the resting place of the rainbow serpent Garriya. Boobera Lagoon holds a significant number of Aboriginal artefacts (estimated to be millions) including adzes, flake tools, grinding implements, pebble nuclear stones, scar and canoe trees. Boobera Lagoon continues to be used by the local community for cultural practices and knowledge sharing.

### 6.1 Management of environmental water

#### 6.1.1 Current Plan provisions to manage environmental values

The Plan establishes a long-term average annual extraction limit for the life of the plan that caps take of water from the regulated water source for stock and domestic use, utilities and town water, Aboriginal cultural water and irrigation. The extraction limit is intended to provide protection of water within the system for environmental purposes.

The Plan additionally establishes two classes of water, planned environmental water and adaptive environmental water. Planned environmental water is water that is committed for fundamental ecosystem health or other specified environmental purposes, either generally or at specified times or in specified circumstances, and that cannot, to the extent committed, be taken or used for any other purpose.<sup>14</sup> The Water Sharing Plan rules to manage planned environmental water listed are in Table 3.

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<sup>12</sup> Department of Environment and Energy (2017), *Directory of important wetlands in Australia – information sheet: Morella Watercourse / Boobera Lagoon / Pungbougol Lagoon – NSW095*. Available: <http://www.environment.gov.au/cgi-bin/wetlands/report.pl>

<sup>13</sup> Department of the Environment and Energy (2010). *Directory of Important Wetlands*. <http://www.environment.gov.au/cgi-bin/wetlands/report.pl>

<sup>14</sup> Department of Water and Energy (2009). *Water Sharing Plan – NSW Border Rivers regulated river water source – guide*. June 2009.

**Table 3. Rules in the Border Rivers Plan to manage environmental water**

Rule	Description	Environmental Purpose
Continuous low flow rule	<ul style="list-style-type: none"> <li>Minimum release of 10 ML per day from Pindari Dam<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>Riparian flow</li> <li>Connectivity of downstream pools / riffles</li> </ul>
Translucency rule	<ul style="list-style-type: none"> <li>Pass inflows up to 50 ML / day during September to May</li> <li>Pass inflows up to 200 ML / day during June to August<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>Reflect downstream flows to the point of next significant inflows (i.e. Frazers Creek)</li> </ul>
Stimulus flows	<ul style="list-style-type: none"> <li>4,000 ML set aside each year for stimulus flows</li> <li>Stimulus flows can be released between 1 August and 1 December each year, triggered by an inflow of greater than 1,200 ML/day into Pindari Dam for the period April–August</li> <li>Water set aside but not used for a stimulus flow event may be carried over to the next water year capped at 8,000 ML</li> </ul>	<ul style="list-style-type: none"> <li>Flow mirrors a natural hydrograph</li> <li>Improve benefits of translucent flows</li> <li>Provide cues for a fish breeding event</li> <li>Inundate interconnected riparian areas in the region from Pindari dam to the confluence with Frazers Creek</li> </ul>

<sup>a</sup> Except when a release of greater than 10 ML / day is required to meet basic landholder rights and access licence extractions

<sup>b</sup> Except where a release of greater than 50 ML/day or 200 ML/day is required to meet basic landholder rights and access licence extractions

The Plan includes provisions for allocating adaptive environmental water licenses. Under these provisions, adaptive environmental water is committed by the conditions of access licences for specified environmental purposes, either generally or at specified times or in specified circumstances.<sup>15</sup> However, there are no such licences currently held within the Border Rivers regulated water source.

The Plan establishes objectives and performance indicators to measure the achievement of environmental outcomes specified in the plan relating to:

- changes in ecological condition of ecosystems,
- changes to low, medium and high flow regimes within the river,
- water quality metrics,
- cultural benefits; and
- requirements of water users (i.e. utilities, irrigators, stock and domestic users).

It is important to note that the Plan only covers environmental water provisions for the river section from Pindari Dam to the junction of the Severn River with the Dumaresq River.

<sup>15</sup> Department of Water and Energy (2009). Water Sharing Plan – NSW Border Rivers regulated river water source – guide. June 2009.

Environmental water for the remainder of the NSW Border Rivers regulated water source is defined under the IGA (see Figure 5).

### 6.1.2 Overview of held environmental water

Since the plan commenced, there has been significant Commonwealth acquisition of water entitlements for environmental purposes. Total Commonwealth environmental water holdings in the Border Rivers are:

- general security – 2,276 ML
- supplementary water – 1,300 ML

The environmental water portfolio aims to ‘protect the health and resilience of near channel wetlands and ecological processes in the lower Macintyre River, and fish habitat and life cycles in the Dumaresq River’.<sup>16</sup> Where sufficient resource is available, the CEWO may increase the scope of the aim from protection to improvement of environmental assets. The CEWO has a secondary aim to maintain the health of key wetlands e.g. Morella watercourse lagoons and anabranches.

The majority of CEWO environmental water holdings are in Queensland; however, given the cross jurisdictional nature of the Glenlyon Dam, which is managed by the Border Rivers Commission, CEWO consults with stakeholders across both NSW and Queensland. The Commonwealth’s unregulated entitlements in the Border Rivers currently exceeds regulated water holdings. As unregulated environmental water holdings are dependent on trigger flow events, the extent of achievement of environmental aims is impacted by seasonal conditions.

## 6.2 Achievement of environmental objectives

The extent that Plan provisions have contributed to environmental outcomes is uncertain due to insufficient empirical evidence, and a lack of specificity in the key performance indicators in regards to the outcomes being targeted. For instance specific cultural benefits and ecological condition changes are not included.<sup>17</sup> In particular, there is limited evidence of the effectiveness of specific planned environmental water provisions. The Commission has not identified any reporting on the performance indicators established under the Plan such as monitoring of responses of ecosystems to changed flow regimes or data on low, moderate and high flow regimes.

A compliance audit to assess the implementation of the Plan provisions was conducted by DPI Water (now DOI-Water) for the period of 1 July 2009 to 30 June 2014.<sup>18</sup> The audit of planned environmental water provisions identified no issues with the maintenance of continuous low flows. However, compliance breaches were identified with transparency rules and stimulus flows.

### 6.2.1 Transparency rules for planned environmental water

There have been a number of breaches of transparency rules, each year during June to October period, which mirrors periods of lower rainfall and lower dam inflows. A non-compliance was only reported in one instance, June 2013, by WaterNSW as part of their water supply work

<sup>16</sup> Commonwealth Environmental Water Office (2017). Commonwealth Environmental Water, Portfolio Management Plan Border Rivers 2017–2018

<sup>17</sup> DPI Water (unpublished), *Evaluation of NSW Water Sharing Plans for regulated rivers in the Murray-Darling Basin*. Prepared in 2017.

<sup>18</sup> DPI Water (unpublished), *Audit of implementation: NSW Border Rivers regulated river water sharing plan report card*. Prepared for the period between 1 July 2009 and 30 June 2014

approval annual compliance report.<sup>19</sup> The remaining breaches of transparency rules were not reported as it was deemed that these fell within the 80% target for delivering transparency releases set by Water NSW. However, such provisions are not stated within the Plan.

The breaches of planned environmental releases appear to be related to operational constraints resulting from periods of low flow over the winter / spring and a lack of flexibility for the release of translucent flows. Consideration should be given as to how to improve the practicality of these provisions to ensure that that Plan is not subject to repeated breaches, in a manner that does not reduce beneficial outcomes. The Commission's intent is not to advocate for any reduction in planned environmental water, but rather to support the incorporation of greater flexibility. Such changes to translucency flows should be carried out in collaboration with WaterNSW to ensure that operational constraints are minimised for future years of the Plan.

Benefits of greater flexibility on provisions for transparency releases include that it may permit mitigation of thermal pollution issues caused by cool, deeper water releases from Pindari Dam. The Commission notes that DOI - Water is currently reviewing the effectiveness of translucency rules more broadly across in NSW. Any relevant lessons from that review should be incorporated into the new Plan.

#### **Recommendation**

2. DOI - Water should update Plan provisions for the release of planned environmental water (translucent flows) to accommodate practical considerations in dam operation during periods of low flow.

### **6.2.2 Stimulus flow rules for planned environmental water**

Stimulus flow releases occurred in 2012–2013, 2013–2014 and 2015–2016 when the inflow trigger of 1,200 ML/ day was reached. The stimulus flow event in 2012–2013 occurred outside the permitted window that concludes on the 1<sup>st</sup> December, and took place from the 2<sup>nd</sup> December to 6<sup>th</sup> December. The release of stimulus flow outside the specified Plan window (1 August – 1 December) is technically a breach of the planned environmental water rules. This release was delayed to allow coordination with other environmental water and to mitigate impacts on a platypus breeding event.

Stakeholder feedback identified two areas where improvements could be made to Plan provisions to improve outcomes achieved from the release of stimulus flows. These can be grouped in to the following themes:

- extending the timeframe for the release of stimulus flows; and
- protecting stimulus flows along the Severn River beyond its confluence with Frazers Creek.

#### **Extending the timeframe within the Plan rules for release of stimulus flows**

The window for stimulus flow releases as specified in the plan (1 August – 1 December) limits environmental benefits as it reduces the ability of the dam operator to mitigate the impacts of cold water pollution and time flow release dates with those that are optimal for fish

<sup>19</sup> DPI Water (unpublished), *Audit of implementation: NSW Border Rivers regulated river water sharing plan report card*. Prepared for the period between 1 July 2009 and 30 June 2014.

recruitment. More flexible dates may also enable the coordination of planned environmental water delivery with other water orders e.g. for consumptive purposes or held environmental water. Consideration of further flexibility should take into account the full data available. The Commission notes that the current Plan dates were established taking into consideration evidence from CSIRO regarding the natural hydrograph. This should be considered in conjunction with the latest available evidence regarding cold water pollution.

The Commission is aware that algal blooms are an issue in the majority of summer periods at Pindari Dam. Operational protocols exist to manage water quality impacts generated by algal blooms. When blooms are identified water is released from lower in the dam profile to ensure the algae is not spread from the dam. This stratification of release to manage for water quality issues results in cold water pollution, which has negative effects on fish populations, in most years. Research indicates that despite Pindari Dam having a multi-level intake tower, thermal depression is high compared with other dams due to the high thermal stratification.

Studies assessing impacts on fish population have highlighted that effects on fish recruitment caused by cold water pollution can be managed via:

- reducing the volume of stimulus flow releases<sup>20</sup>, or
- changing stimulus flow release dates to outside high risk algal bloom period where releases can be drawn from higher in the dam water profile.

In order to implement these management options, greater flexibility in the permitted timeframes for stimulus releases will be required within Plan rules.

While flexibility in stimulus flow releases will mitigate the impacts of cold water pollution, to achieve significant improvements in fish breeding and recruitment, investigation of a longer term solution that manages algal blooms and cold water pollution concurrently warrants investigation. Research has identified release dates of December to January as optimal for native fish recruitment. However, these summer period releases cannot achieve their fish recruitment outcomes while ongoing management of algal blooms trigger issues of cold water pollution.

In order to develop a longer term solution to cold water pollution a detailed evaluation of the performance of the multi-level off take for the Pindari Dam will be required. This would allow release of water at a temperature more suitable for fish. The evaluation should include assessment of options that will deliver flows necessary to meet physical environmental outcomes and dam operational requirements without compromising instream biological functions and impacts on the fish community. It is envisaged that the feasibility of thermal destratification could be considered as part of this assessment, as investigated for the Cotter Dam.

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<sup>20</sup> Research indicates that impacts on fish recruitment are great where larger volumes of stimulus flows are released.

### Recommendation

3. DOI - Water and WaterNSW should take steps to address issues with cold water pollution and the timing of the stimulus flow releases, including:
  - revise Plan provisions to extend the timeframes for the release of planned environmental water (stimulus flows) consistent with best available evidence
  - undertake a detailed evaluation of performance of multi-level offtake of the Pindari Dam to identify options that will meet the environmental and operational requirements without compromising instream biological functions.

### Extension of the protection of environmental water

Environmental outcomes could be enhanced through the extension of protection of planned stimulus flows beyond the confluence with Frazers Creek. Currently if stimulus flows contribute to flows above the trigger for supplementary water take beyond Frazers Creek, then irrigators holding supplementary water licences will have access to flows.

Modelling was developed for the November SAP meeting, which indicated that introduction of the rule change to protect stimulus flows from pumping further down the system would result in a decrease in supplementary diversions of 25ML (2% reduction). However, combined modelling of general security and supplementary licences indicated that average decreases may be as low as 0.3%, as the rule change may shift irrigators to draw down on their general security licence rather than their supplementary account.

Given environmental impacts have not been fully assessed in the model provided to the SAP<sup>21</sup>, technical advice was sought to gain insight regarding the environmental benefits derived from the rule change. Technical advice indicated Silver Perch, Purple Spotted Gudgeon, Olive Perchlet and Freshwater Catfish would benefit from greater protection of flows due to the resulting inundation of habitat, connection and dispersal opportunities between tributaries, and spawning outcomes supported by stable flows during critical periods. Evidence of a relatively healthy native fish population indicates that the support of additional flows would provide a strong platform for ongoing recovery.

Consultation with stakeholders indicated that stimulus flows have been intentionally managed to avoid supplementary take triggers downstream of Frazers Creek (take is not permitted between Pindari Dam to the confluence with Frazers Creek). However, this restricts the ability of environmental water managers to target the full range of flows. It is understood that there have been ongoing discussions between DOI Water, DPI Fisheries, OEH and the CEWO in regards to extension of the stimulus flow further downstream.

NSW is currently reviewing the protection of environmental flows, particularly in the Northern Basin, through the Interagency Working Group for Better Environmental Water Management. The protection of stimulus flows is aligned with the improved management of environmental outcomes being sought under the NSW Government reforms.

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<sup>21</sup> Changes to flow ranges were modelled as part of the protection of stimulus flows scenario for consideration by the SAP. No analysis was provided regarding the significance of changes to flow ranges; however, the differential appeared to mirror the modelled changes in flow presented to the SAP under other scenarios. Technical expertise on the location of environmental assets and potential impacts would be required in order to assess the benefits derived from the rule change.

The Interagency Working Group for Better Environmental Water is examining how all environmental water can best be protected through revision of the water sharing plans and other measures. The intent is to prevent water that was purchased and released, or planned for, environmental purposes from being pumped out for other uses further downstream. The Commission notes that this group's work is ongoing. Initial work by the group indicates that changes needed to protect held environmental water are mostly likely to be confined to unregulated systems. However, the Commission expects that any recommendations from that group that are relevant will be incorporated into the Plan as needed.

It should be noted that the suggested protection of stimulus flows will only protect releases to the junction with the Dumaresq River. In order to extend protection along the Macintyre River agreement with Queensland will be required through provisions under the IGA.

#### **Recommendation**

4. In order to better protect environmental water, DOI-Water should consider revising Plan provisions to:
  - extend protection of stimulus flows to the junction with Dumaresq River following full examination of potential social and economic impacts
  - incorporate any relevant recommendations by the Interagency Working Group for Better Environmental Water Management

### **6.2.3 Opportunities to coordinate planned and held environmental water**

The contextual settings of the Plan are not contemporary as they do not recognise the significant amount of environmental water held by the CEWO in the Border Rivers catchment. Consideration needs to be given to the optimisation of environmental outcomes that may be achieved through the coordination of planned and held environmental water releases.

Changes to be introduced under water resource planning, via the Long-term Environmental Watering Plan (LTEWP), may facilitate coordination of planned and held environmental water. Given the LTEWP is still under development, it is too early to assess whether this planning document will achieve the coordination of the environmental water portfolios.

Interdepartmental consultation on releases of planned environmental water occurs on an informal basis for stimulus releases. Historically coordination has involved agencies including DOI - Water, OEH, DOI Fisheries, Water NSW, CEWO and Queensland partner organisations. This informal group determines the quantity of water to be released, the type of flow to be targeted, e.g. a continuous low flow versus a high flow event, and environmental outcomes to be targeted with the stimulus flow.

While informal arrangements have worked well historically, due to strong working relationships between partner organisations, there is potential to improve the existing arrangements. This will ensure that coordination and collaboration is not limited in future due to movement of personnel. It is also recognised that formalising existing structures may enable these groups to expand membership beyond government agencies, allowing community based knowledge to be captured and inform releases of planned environmental water. The involvement of community members additionally facilitates a line of communication beyond Government agencies for the timing and implementation of releases and any resulting outcomes from releases.



It is recognised that such formal settings exist in other valleys through the Environmental Water Advisory Groups (EWAG). The Border Rivers catchment does not have an EWAG. The Commission supports establishing formalised consultation arrangements under a similar structure to the EWAG in the Border Rivers catchment. As part of this new approach it is suggested that a communication strategy be adopted to ensure that environmental outcomes are shared more broadly than the membership of the advisory group. It is anticipated that this communication strategy could be captured via the monitoring, evaluation and reporting processes as part of the LTEWP. Establishment of formal committee arrangements should be tailored to catchment conditions and the event based nature of environmental flows in the Northern Basin.

The CEWO plans environmental watering (for held environmental water) over a multi-year timeframe, documenting what has been achieved in the previous three years and stating a desired future outcome across environmental assets. The CEWO develops an annual environmental watering plan in consultation with stakeholders and documents the intended use for regulated and unregulated water in the Border Rivers for the upcoming 12 month period. Management and delivery of environmental water is implemented in conjunction with State Government partners in Queensland and New South Wales, individual landholders and regional industry and environmental groups. The formal governance structures recommended should be utilised when developing annual plans for held water portfolios to avoid unnecessary duplication and facilitate coordination.

**Suggested action:**

- C. DOI – Water should take steps to formalise interagency and community-based collaboration for the management and coordination of both planned and held environmental water.

### 6.3 Improve cultural outcomes achieved through the Plan

The Border Rivers Plan has provisions for Aboriginal cultural licences. The Commission is not aware of any requests for an Aboriginal cultural licence to date. The Aboriginal Water Initiative (AWI) was established in 2012 to improve Aboriginal engagement in representation and water management planning. The AWI engaged with Traditional Owners and the broader Aboriginal community to identify issues and key priorities for water planning across valleys. Issues identified to Aboriginal communities included:

- Fishing and cultural renewal practices are impacted by significant weed growth that is stimulated by poor water quality during periods of low flow.
- Access to water is critical for cultural renewal practices, but planning for these events is problematic without security of flows.

The Commission understands that the AWI program is no longer funded and to date engagement with Traditional Owners to capture issues specific to the Border Rivers Plan has been limited.<sup>22</sup>

The Commission supports DOI –Water re-establishing Aboriginal engagement in water planning by identifying and facilitating, where required, development of Aboriginal cultural water access licences. Quantifying water volumes required to meet cultural values and needs in

<sup>22</sup> DPI Primary Industries – Water (2017). New South Wales Border Rivers Water Resource Plan – Surface Water (SW16) Status and Issues Paper.

the Border Rivers could be investigated using the methodology established through the Cultural Flows Research Project. Further, it is understood that engagement and planning in relation to cultural water will be undertaken in order to meet the requirements of the Murray Darling Basin Plan.

Feedback indicates that requirements around cultural licenses could be clarified for both agency staff and the Aboriginal community. DOI – water should work with the Aboriginal community to understand what their water needs are and to provide clear guidance in regards to how cultural licenses may be used and accessed.

**Suggested action:**

- D. DOI – Water should take steps to enhance engagement with the Aboriginal community in relation to cultural flows, and if appropriate establish cultural licenses.

## 6.4 Improve performance monitoring

### 6.4.1 Current monitoring of the Plan

NSW water agencies developed an Integrated Monitoring of Environmental Flows (IMEF) in 1997. Following the development of water sharing plans, they assessed information across a series of 180 targeted sites to monitor ecological responses to environmental flow rules in regulated rivers.<sup>23</sup> The last progress report was produced in 2009. The Commission understands that the IMEF is no longer funded, although when the monitoring program ended is unclear. The Water Sharing Plan Ecosystem Performance and Assessment Strategy was prepared in 2012–13 to replace the IMEF; however, it is the Commission’s understanding that monitoring under the Strategy has not occurred.

The Commonwealth short-term environmental monitoring program has funded recent projects assessing the impact of flows on fish spawning and habitat monitoring. While the CEWO funded these projects, the on-ground data collection was conducted by state based agencies.

Detailed aquatic mapping conducted as part of the CEWO Short-term Environmental Monitoring Program has been undertaken along the Severn River to Apple Tree Flat indicating high native vegetation cover (average of 95%), low levels of weed infestation, and very good fish habitat conditions including high snag loadings<sup>24</sup>. This data appears to indicate that environmental flows are sufficient to prevent a deterioration in river health. Detailed habitat mapping along the Dumaresq River to the Macintyre will shortly commence in partnership with the CEWO. Box 1 outlines specific monitoring related to native fish populations and benthic algae that has been undertaken.

<sup>23</sup> Office of Water (2011). *Environmental flow response and socio-economic monitoring – Border Rivers Progress Report 2009*.

<sup>24</sup> DPI Fisheries (2017). *DPI Fisheries comments on the NSW Border Rivers Water Resource Plan Surface Water Status and Issues Paper – April 2017*

### **Box 1: Monitoring of native fish population and benthic algae for the Border Rivers Plan**

Prior to the commencement of the water sharing plan, a four-year study was undertaken to establish spatial and temporal patterns in the distribution of fish between the Severn, Mole and Macintyre rivers. This study provided a basis for understanding the potential benefits of stimulus flow releases in terms of fish spawning and recruitment.<sup>25</sup> The study also identified substantial thermal effects downstream of Pindari Dam that can impact recruitment success. It recommended the optimal window for releasing stimulus flows for fish objectives (December – January) to mitigate these effects and safeguard success of September – November spawning and recommended low flow periods to improve survival of native fish larvae.

Further studies to improve understanding of the relationship between flows and fish spawning highlighted the importance of maintaining river flows from late spring through to summer to ensure adequate dispersal of juvenile fish.

Monitoring of stimulus flows in 2012 occurred; however, monitoring of fish recruitment was done via inference, through the assessment of water temperatures that are correlated to minimum spawning temperatures for native fish. Fish spawning responses to release of stimulus flows for the 2015–2016 period has been tracked as part of the Commonwealth Short-term Environmental Monitoring Program.

Benthic algae are the primary food source for higher trophic levels in upland rivers. The assemblages of benthic algae alter with changes to river flow. Where river flow is insufficient to disturb benthic algal communities, late stage assemblages dominate that are less palatable to fish.<sup>26</sup> Benthic algae monitoring indicated that stimulus rules are unlikely to alter algal communities attached to rocks where flow is below 1,000ML per day. However, studies suggested that where flows are increased above 2,000 ML per day or piggy backed on to unregulated tributary flows, positive changes to algal assemblages outcomes will occur.

#### **6.4.2 Opportunities to improve environmental monitoring**

In order to ensure that the Plan is achieving the desired environmental outcomes, improved monitoring and reporting is needed. Sound monitoring, evaluation and reporting will allow for adaptive management to improve overall outcomes and effective communication of plan benefits and performance. Key performance indicators should be specific and measurable to ensure that in the future progress towards plan objectives can be more meaningfully assessed. Feedback obtained from the SAP (1<sup>st</sup> March 2018) highlighted the importance of communicating environmental outcomes. It is anticipated that a communications strategy to report on environmental outcomes could form part of the monitoring and evaluation framework that is to be developed as part of the LTEWP.

Any long term changes towards adaptive management of the Plan will require data that informs changes to delivery of planned and held environmental water. As the Border Rivers is an event based system, the monitoring program should reflect this pattern of flows. The CEWO

<sup>25</sup> Wilson, Glenn & Ellison, Tanya. (2010). *Pindari Dam fish monitoring project*. Final Report to the New South Wales Office of Water.

<sup>26</sup> Davie and Simon (2014). Benthic algal biomass and assemblage changes following environmental flow releases and unregulated tributary flows downstream of a major storage. *Marine and Freshwater Research* 65 (12) p. 1059.

has established event-based monitoring of environmental water releases, which may be an effective longer term approach.

The River Condition Index was developed in 2012 to facilitate spatial reporting of river health and the stratification of performance and monitoring. The River Condition Index has been used in the High Ecological Value Aquatic Ecosystem Framework (the Framework) to replace other NSW instream value assessments and help prioritise where the best instream values occur within a catchment. The Framework project identifies a range of instream values for freshwater rivers in NSW. These values prioritise areas for water management, which may be fed in to long term planning instruments such as the Plan.

An introduction to the Border Rivers LTEWP was presented to the SAP meeting on the 1<sup>st</sup> March 2018, outlining progress and next steps. The Commission understands that the LTEWP team has to date identified environmental values across the Border Rivers including native vegetation and fish, water birds, function and flows and connectivity. Matters such as objectives for each value and flows or management strategies required to manage environmental values are yet to be determined. According to the discussion held at the SAP Meeting (1<sup>st</sup> March 2018) it is anticipated that the environmental monitoring will sit in a separate monitoring and evaluation framework for the water resource plan more broadly.

**Refer to Recommendation 3 regarding improved monitoring and evaluation.**

## 6.5 Resolve existing knowledge gaps

Knowledge gaps within the Plan area should be resolved, in order to better inform future decision making and ensure that environmental requirements of the system are more fully understood. The CEWO and the Risk Assessment of the Border Rivers has identified the following areas where better information would assist in flow management for ecological assets:

- determination of the requirements of aquatic biota and in-stream processes in the Dumaresq River
- assessment of the watering requirements of key environmental assets such as wetlands and anabranches within the catchment
- refined understanding of critical flow requirements for threatened native fish (e.g. purple spotted gudgeon, eel-tailed catfish and Murray cod)<sup>27</sup>.

As highlighted in Section 5.2.2, a longer term solution that will overcome issues of cold water pollution warrants investigation.

Given the number of Departments with responsibility for monitoring of outcomes from environmental water, a coordinated approach will avoid duplication and potentially increase the scope for data collection. It is recognised that the development of the LTEWP represents an avenue for the resolution and coordination of some existing knowledge gaps. Given the LTEWP is in its initial development stages, it is unclear whether this planning process will capture this opportunity; however, it is understood by the Commission that this is being considered by the relevant agencies.

<sup>27</sup> CEWO (2017), Commonwealth Environmental Water Portfolio Management Plan Border Rivers 2017-18

**Suggested action:**

- E. Agencies involved in monitoring and management of environmental water in the Plan area (including DOI - Water, CEWO, DPI Fisheries, OEH) establish a strategy to resolve existing knowledge gaps that will improve the management of environmental water releases.

## 7 Enable efficient water trade

The Border Rivers Plan contributed to economic outcomes through enhanced trading opportunities, but the extent of this contribution is difficult to differentiate from other factors.<sup>28</sup> In addition to the Plan, there are a number of key agricultural production drivers that impact the Border Rivers, including changing commodity prices, costs of farm inputs, varying seasonal conditions and capital costs required to transition between commodity production. The Plan has played a key role in enabling water users to gain improved control over managing their exposure to risk through management of their water account and portfolio.

The vast majority of trade has occurred in the Plan area with significant trade also taking place between NSW and Queensland Border Rivers water users. There is no trade from the NSW Border Rivers Regulated River system to other NSW systems, as this is not allowed in the Plan. Over the life of the Plan there has been limited trade of water entitlement, and where entitlement has been traded this has occurred in low volumes<sup>29</sup>. Entitlement trade refers to the trade of an ongoing right to receive a share of available water or entitlement (Water Access Licence). It is worth noting that the 1,500 ML (100%) of high security water entitlement has not been traded across the life of the Plan.

As anticipated, water allocation has been traded in higher numbers and volumes in the Border Rivers, with the highest number of trades (113) occurring in 2014–15, reallocating 14GL<sup>30</sup>. Allocation trade refers to the volumes or available water determinations that are allocated to an entitlement within a water year (1 July to 30 June). The difference between trade of entitlements and allocations is expected due to the small amount of resource available and the significant costs associated with entitlement trade.

The ‘tagging’<sup>31</sup> of entitlements to works licences carried out under the IGA, has facilitated cross-jurisdictional trade within the Border Rivers where it would otherwise have not occurred. The net direction of trade has been to Queensland, with the volumes of allocation moving out of NSW far greater than availability moving in to NSW production systems.

The trade observed in the Border Rivers system indicates that Plan and IGA provisions have supported movement of water allocation and entitlement. Feedback from stakeholders has highlighted some ongoing issues with cross-jurisdictional trade and improvements that could be made to further support trade in the catchment. These avenues for improvement are discussed below.

Trade is not permitted between the Plan area and the downstream plan area (Barwon-Darling Unregulated and Alluvial water source area). The Commission has not assessed the relation of the Plan to downstream water flows. However, it is noted that through the development of the Water Resource Plans and activities being undertaken as part of the Water Reform Action Plan connectivity between systems is being considered. The Commission encourages improved

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<sup>28</sup> Aither (2017), *Water markets in NSW: improving understanding of market fundamentals, development and current status*. Report prepared for Lands and Water, Department of Industry.

<sup>29</sup> *ibid.*

<sup>30</sup> *ibid.*

<sup>31</sup> Tagging allows cross jurisdictional trade of water allocation held via a water access licence by tagging the extraction of water to a water supply works (pump). This effectively reallocates a volume of water that was to be extracted from one pump in NSW to a pump in Queensland. The tagging process, developed under the IGA, facilitates the tracking of water allocation and extraction against the licenced entitlement held by a water user.

assessment of connectivity between plans by the Department and reflection of that connectivity in revised plans as appropriate.

## 7.1 Improving understanding of water trade terminology and rules

Trade rules and provisions are often complex and it has been suggested by some stakeholders that this could be a potential barrier to trade in the context of the Border Rivers Plan. For example, if developing an understanding of rules governing trade are too cumbersome, water owners may not engage in trade.

Stakeholders highlighted that rules in various Plans can be difficult to follow, and there is often a lack of consistency in terminology across different plans.<sup>32</sup> It is recognised that valleys may require trade provisions specific to their catchment in recognition of the operation of the regulated system; however, moving towards consistency in the terminology of trade rules, would remove barriers to trade by water users. Clarity for customers around trade rules will ensure that water users are more likely to engage in the market and improve the usage of available water allocation.

The Commission understands that DOI – Water is currently developing a web platform that will include an explanation of trade rules in plain English to ensure greater clarity for water users. It is also our understanding there are longer term plans to improve consistency of trade rules in water sharing plans across the State. Ensuring that this ‘plain English’ clarity is transferred consistently to water sharing plans in the longer term will be highly valuable to facilitating water trade.

### Recommendation

5. DOI - Water should implement current plans to incorporate consistent Plan trade rules that are easy to understand and practical to implement.

## 7.2 Encouraging economically efficient water use

The Border Rivers Plan has encouraged economically efficient water use, by ensuring the scarcity value of water is revealed, and facilitating the movement of water to its highest value use through trade. As identified in Section 3.2, there has been a significant increase in the conversion of broadacre cropping areas to higher value crops, particularly cotton, and a corresponding lift on the gross value of irrigated production in the region. This indicates that the Plan is, in part, enabling economically efficient water use.

An active market reveals the value of water to a range of uses and users, which encourages more efficient water use behaviours and practices. Price data, particularly value paid for water allocation, has moved in line with water availability, trending upwards during low rainfall periods. Value movement in line with key supply and demand prices indicates that the market is working as it should. The range in value for water allocation and entitlement licences across the Plan is outlined in Table 4.

<sup>32</sup> WaterNSW (2017). Submission to the Status and Issues Paper for the Border Rivers Surface Water Resource Plan.

**Table 4. Prices for licenced water allocation and entitlement 2009–2017**

Licence Type	Allocation (\$/ML)	Entitlement (\$/ML)
Interstate allocation trade	\$40–215	
General Security A		\$3,000–3,500
General Security B		\$1,750–2,000
Supplementary water		\$800–\$1,600

While the market appears to be performing to expectations, several stakeholders have highlighted issues with current provisions that limit trade of water allocation, specifically through the lack of zero share water access licences within the Plan. These licenses have zero entitlement but allow the holder to buy and sell water allocation. The Plan (Part 8, Division 2) specifies that the maximum amount of water allocation that may be credited to a licence account is equal to 100% of the entitlement volume. This results in buyers being restricted to purchase available allocation only in line with their total licenced entitlement. This potentially acts as a barrier to economically efficient water use.

To allow for greater flexibility and efficiency of water management, opportunities that enable the allocation of water to its most productive use warrants exploration. A zero share water access licence, which is available under other water sharing plans, will potentially address trade barriers identified by water users and improve consistency of trading arrangements across valleys. The introduction of such a licence will also ensure that the Border Rivers Plan is consistent with the Basin Plan principles of facilitating trade between water users.

The Commission is aware that DOI – Water has developed a policy options paper exploring the introduction of zero share water access licences that allows plus or minus trade in any water year and facilitates trade without permitting carryover. It is the understanding of the Commission that this will be presented to stakeholders via the SAP process in valleys impacted by this issue. Modelling and testing the policy options paper will enable a practical solution for water users and ensure minimisation of any unintended impacts.

### 7.3 Supplementary water trade

Supplementary licences are a significant entitlement type in the Border Rivers regulated water source, accounting for 31 per cent of the total entitlements on issue. Allocation has varied significantly across years, ranging from less than 10% (2013–2015) of total issued supplementary entitlement to 80% (2010–2011). Supplementary water events are time limited, ranging from a number of hours to up to two weeks. Currently WaterNSW has a target to address any trade request within three days. Depending on the volume occurring in an event, this may limit water users’ opportunities to trade supplementary water. There are potential benefits for both irrigators and the environment from having a greater ability to trade supplementary water.

One barrier that currently limits such trading opportunities is the speed in trade application and processing, and consistent with this, many submissions have suggested a need for ‘real time’ trade.<sup>33</sup> However, in recognition of the barriers that may restrict this from occurring such

<sup>33</sup> At present, slower processing times make supplementary trade uncertain and it can be difficult to know whether a trade will be processed in time to allow take from supplementary event. This issue was also raised in the Water Resource Plan status and issues paper.



as water accounting rules and investigation of third party impacts, alternatives may need to be explored. One potential solution could include the implementation of pre-application and expressions of interest prior to an event occurring, which could then be triggered if and when an event occurs. It is understood that these methods are not currently used in other jurisdictions, and therefore this will need to be fully investigated in consultation with WaterNSW and tested with water users.

There are potential benefits from having greater ability to trade supplementary water. For example, an irrigator with no current water requirement may trade supplementary water to another licence holder with a need for water who may use the allocation for crop production purposes. Environmental water holders have also expressed interest in being able to maximise environmental outcomes by obtaining additional supplementary water at the time of a flow event. Similarly, irrigators have expressed frustration at the loss of productive water during a supplementary event. Given the level of stakeholder interest in this, there is merit in further investigation.

**Recommendation**

6. DOI - Water and WaterNSW should work together to develop and implement provisions to better facilitate trade of supplementary water.

## Appendix A

The *Murray-Darling Basin Plan 2012* (the Basin Plan) came into effect in November 2012 and determines the amount of water that can be extracted from the Basin for consumptive uses including urban, industrial and agricultural use, this volume cap is referred to as the sustainable diversion limit (SDL). A timeframe of seven years (2012–2019) was established to reduce extraction levels to the nominated SDL's that are scheduled to commence in 2019 through the State Government Water Resource Plans (WRPs).

The NSW Government is developing 22 water resource plans (WRPs) in accordance with its role in implementing the Basin Plan. These plans will go to the Murray-Darling Basin Authority (MDBA) for accreditation in 2019.

In NSW WRPs will be developed according to the following guiding principles:

- Basin Plan principles:
  - there will be no adverse impacts on water available to a water access licence holder
  - there will be no net reduction in the protection of planned environmental water<sup>34</sup>
  - the Commonwealth is responsible for bridging the gap between existing limits and Sustainable Diversion Limits (DL) water
  - the water resource plan will meet the requirements set out in the Basin Plan.
- Additional NSW Government principles for WRPs:
  - balance social, cultural, economic and environmental needs of the community and catchments
  - are cost neutral for NSW licence holders
  - minimise change for water sharing plans within their initial ten year period<sup>35</sup>

WRPs will build on existing NSW water planning and management arrangements, and will incorporate the water sharing plans established under the *NSW Water Management Act 2000*. Policy components and water planning arrangements that will feed in to WRP including the development of Long Term Watering Plans (LTWPs) are outlined in Figure A1. Additional policies and strategy reviews occurring in NSW in parallel with WRP development not listed in Figure A1 that may impact on the Border Rivers Plan include:

- the Healthy Floodplains Project
- NSW Planning assumptions for surface water resources
- NSW management of extreme events; and
- Regional strategies.

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<sup>34</sup> The Basin Plan (s.10.28) requires that there is 'no net reduction in the protection of planned environmental water' provisioned in the water sharing plans. This is because the Basin Plan and associated targets were based on existing planned environmental water volumes provided for under State water management law before the Basin Plan commenced.

<sup>35</sup> The Commission notes that this principle does not apply to the Plan for the Border Rivers regulated water source as it has reached its term of expiry.

The Office of Environment and Heritage is leading the development of LTWP in parallel with the WRP process. These plans will play an important role in managing water to maximise environmental outcomes within catchments and across the Basin.

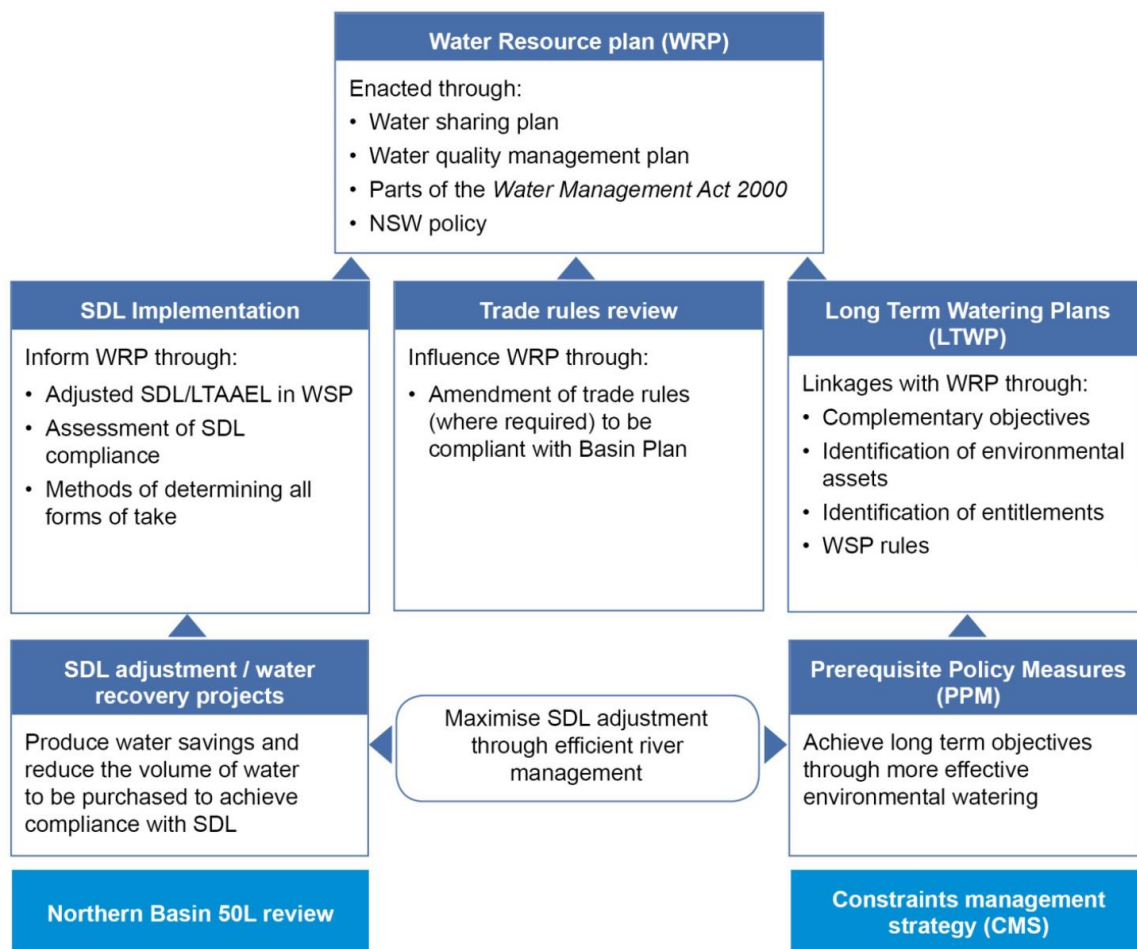


Figure A1. Development of Water Resource Plans (NSW Department of Primary Industries, 2017)

## Appendix B

The Commission developed eight questions to determine the contribution of the Plan to State Priorities to Local Land Services. These were included in the *New South Wales Border Rivers Water Resource Plan, Surface Water – Status and Issues Paper*, with submissions asked to focus particularly on question one and two. Submissions received were made public on the Commission's website.

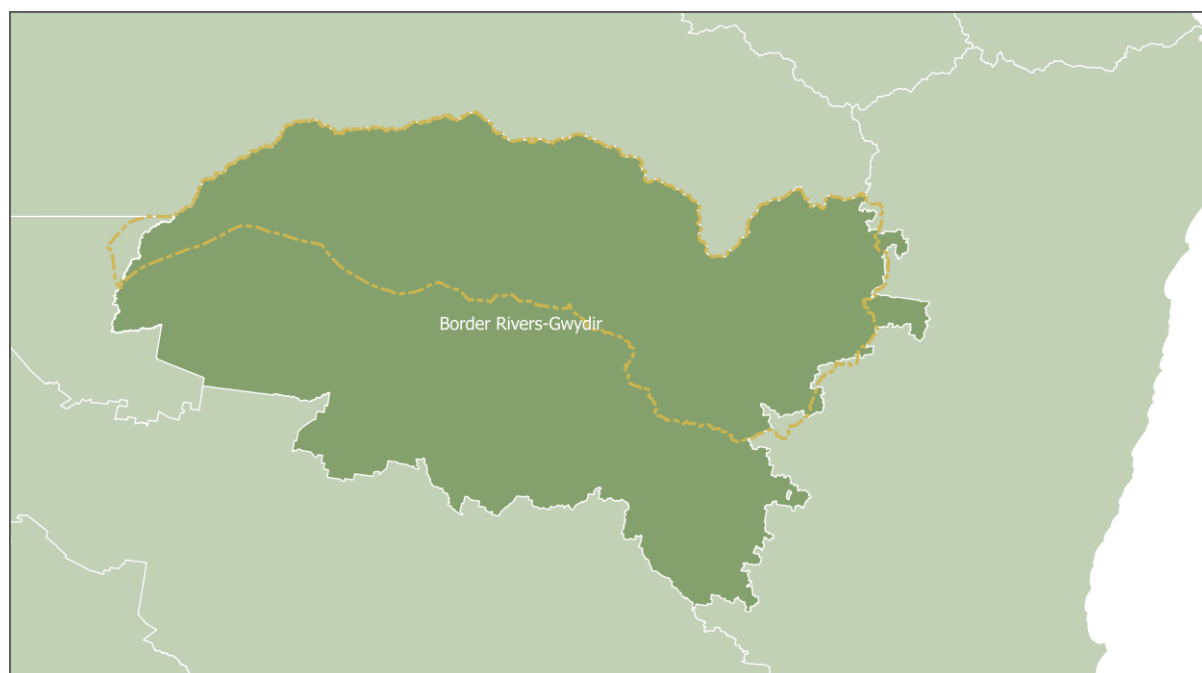
- 1 In what ways have the plan provisions materially contributed to these goals?
  7. What changes to plan provisions are warranted to better achieve these goals?
  8. How could plan provisions be improved to reduce complexity and cost of implementation?
  9. How could plan provisions be improved so that regulatory obligations on businesses are reduced or made easier to understand and implement?
  10. How could plan objectives, performance indicators, monitoring and reporting be improved?
  11. How could plan provisions better address risks, commensurate with benefits and costs?
  12. Is the knowledge on which the plan provisions are based commensurate with the potential level of risk, scale and local importance?
  13. Is there significant new information on the underpinning science and assumptions?

## Appendix C



Document Name	Source
Water Sharing Plan - NSW Border Rivers regulated river water source June 2009	Legislation
Water Sharing Plan - NSW Border Rivers regulated river water source – Guide June 2009	Department of Water and Energy
Water Sharing Plan - NSW Border Rivers regulated river water source – Background Document June 2009	Department of Water and Energy
NSW Border Rivers regulated river water sharing plan report card – Prepared for the period between 1 July 2009 to 30 June 2014 [ <i>unpublished</i> ]	DOI - Water
Border Rivers Water Resource Plan Surface Water (SW16) - Status and issues paper	DOI - Water
Risk Assessment for the Border Rivers Water Resource Plan Area (SW16) [ <i>unpublished</i> ]	DOI - Water
Modelling - INT17 245954 NSW Border Rivers SW WRP - Modelling -SAP Scenario Report -Pindari Stimulus [ <i>unpublished</i> ]	DOI - Water
Modelling - INT17 246289 NSW Border Rivers SW WRP - Modelling -SAP Scenario Report -Dumaresq Supplementary Access [ <i>unpublished</i> ]	DOI - Water
Modelling - INT17 246291 NSW Border Rivers SW WRP - Modelling -SAP Scenario Report - Supplementary Multi Year Usage Limit [ <i>unpublished</i> ]	DOI - Water
Modelling - INT17 246285 NSW Border Rivers SW WRP - Modelling -SAP Scenario Report -General Security Account Balance Limit [ <i>unpublished</i> ]	DOI - Water
Modelling - INT17 246286 NSW Border Rivers SW WRP - Modelling -SAP Scenario Report -Supplementary Access Triggers [ <i>unpublished</i> ]	DOI - Water
Border Rivers - Permanent Trade Data 2008 – 2017 [ <i>unpublished</i> ]	DOI - Water
Border Rivers - Temporary Trade Data 2008 – 2017 [ <i>unpublished</i> ]	DOI - Water
Commonwealth Environmental Water Portfolio Management Plan Border Rivers 2017–2018	Commonwealth Environmental Water Office
NSW – Queensland Border Rivers Intergovernmental Agreement 2008	Agreement between the State of NSW and the State of Queensland
Pre-requisite Policy Measure Implementation Plan – June 2017	DOI - Water

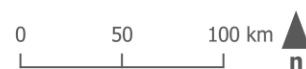
Evaluation of NSW Water Sharing Plans for the major regulated rivers in the Murray-Darling Basin [unpublished]	DOI - Water
Water markets in NSW - Report [unpublished]	Prepared by Aither for DPI Water
The Northern Basin Review	Murray–Darling Basin Authority
Environmental Flow Response and Socio-Economic Monitoring: Border Rivers Progress Report 2009	NSW Office of Water
Fish and Flows Intervention Monitoring in the Border Rivers	Fisheries NSW
Fish and Flows in the Northern Basin: Responses of fish to changes in flow in the Northern Murray-Darling Basin	Fisheries NSW
Applying the High Ecological Value Aquatic Ecosystem (HEVAE) Framework to Water Management Needs in NSW [unpublished]	DOI - Water
Border Standing Committee - Minutes of Meeting No. 1 [unpublished]	Border Rivers Standing Committee
Border Rivers Standing Committee - Integrated Environmental Monitoring Program Brief [unpublished]	Border Rivers Standing Committee
Border Rivers Standing Committee - Terms of Reference, Appointments and Operating Procedures [unpublished]	Border Rivers Standing Committee
Border Rivers Standing Committee - Draft Minutes Meeting No. 11 [unpublished]	Border Rivers Standing Committee
Border Rivers Long Term Water Plan: Presentation to SAP Meeting 1 March 2018 [unpublished]	Office of Environment and Heritage
Modelling - INT18 10692 - Supplementary Multi year and Annual Usage Limits [unpublished]	DOI - Water
Modelling - INT18 10690 - E2 Pindari Stimulus Flow [unpublished]	DOI - Water
Modelling - INT18 10682 - Border Supplementary Access Triggers Second Assessment [unpublished]	DOI - Water
NSW Border Rivers Water Resource Plan Surface Water - Issues Assessment Report - Draft [unpublished]	DOI - Water
Report on the Pindari Stimulus Flow 2015-2016 [unpublished]	DOI - Water and Fisheries NSW
Pindari Dam Stimulus Flow - An Assessment of the December 2012 Release [unpublished]	DOI - Water
Pindari Dam Fish Monitoring Project - Final Report to the NSW Office of Water[unpublished]	NSW Office of water and University of New England
Fish Communities and Threatened Species Distributions of NSW	NSW Department of Primary Industries

## Appendix D



**Legend**

-  NSW Border Rivers Regulated River Water Source
-  Natural Resource Management Region



Source: Aither 2016. Based on National NRM Regions and WSP boundaries provided by NSW DPI Water 2016

## Appendix E

### Objectives, strategies and performance indicators for the Border Rivers Plan

#### Objectives

- manage this water source to ensure equitable sharing of water between all uses,
- implement environmental flow rules that protect, maintain and enhance the environmental, cultural and heritage values of this water source,
- maintain and where feasible improve the flow related water quality in this water source,
- manage this water source to preserve and provide for basic landholder rights,
- manage this water source to preserve and enhance cultural and heritage values, and
- provide a market based trading of surface water entitlements in this water source.

#### Strategies

- establish environmental water provisions (Part 3 of this Plan),
- identify water requirements for basic landholder rights (Part 4 of this Plan),
- identify water requirements for extraction under access licences (Part 6 of this Plan),
- establish rules for granting of access licences (Part 7 of this Plan),
- establish provisions that place limits on the availability of water (Part 8 of this Plan),
- establish rules for making available water determinations in this water source (Part 8 of this Plan),
- establish rules for the operation of water accounts (Part 9 of this Plan),
- establish provisions specifying circumstances under which water may be extracted (Part 9 of this Plan), and
- establish access licence dealing rules (Part 10 of this Plan).

#### Performance indicators

- change in ecological condition of this water source and dependent ecosystems,
- change in low flow regime,
- change in moderate to high flow regime,
- change in water quality in this water source,
- extent to which domestic and stock rights requirements have been met,
- extent to which local water utility requirements have been met,
- change in economic benefits derived from water extraction and use,
- extent of recognition of spiritual, social and customary values of water to Aboriginal people, and
- extent to which native title rights have been met.