

Connectivity in the Northern Basin

Water flowing across connected catchments supports essential human and ecological needs in the Barwon-Darling River and Lower Darling River.

Overview of connectivity in the Northern Basin

Over 90% of the flows in the Barwon–Darling system originate from Queensland or the NSW valleys (Border Rivers, Gwydir, Namoi, Macquarie-Waambul and the Intersecting Streams valleys), mainly during periods of high flow.

Maintaining connectivity during extended dry periods is most challenging

The Barwon-Darling and Lower Darling rivers naturally stop flowing from time to time - Even at the turn of last century, when there was little agricultural development upstream, there were long periods when the river did not flow. This is because when it is dry downstream, it is often dry upstream, with little water available to flow across systems.

Climate change could mean more extreme wet and dry periods – Our analysis suggests that under a worst case dry climate change scenario, there could be less water flowing into the Barwon–Darling from tributaries in NSW and Queensland.

Water management tools have limited influence in extended dry periods – Tweaking water sharing rules and how we manage water can help to support drought recovery and manage short cease-to-flow events and low-flow events but cannot address extended dry periods or maintain a constantly flowing river.

Changes to address long cease to flow and low flow periods will require significant reform to how we share water or to the infrastructure within the system.

What are we trying to achieve by improving connectivity?

We have heard a range of feedback about improving connectivity, but there is no clear agreement on what we are aiming to achieve. Ultimately any rules or infrastructure changes that aim to improve connectivity need to be based on agreed objectives.

Proposed connectivity objectives:

- Reduce the impact of cease to flow periods and improve low flow connectivity
- Protect the first flush of water after an extended drought
- Support water quality and reduce risk of algal blooms forming
- Support fish migration

The work is not intended to:

- reduce the overall amount of water being taken out of rivers, consistent with the limits set by the Basin Plan
- move productive use of water from one valley to another
- secure connectivity between groundwater and surface water

How can we achieve these objectives?

The options in the draft Western Regional Water Strategy focus on enabling water to flow across connected river valleys and downstream at important times for specific achievable outcomes. All options to improve connectivity will be considered in the draft strategy, but not all will be progressed.

Options for investigation have been grouped into the following 3 categories:

1. **Use emergency powers in the legislation (temporary water restrictions)**
2. **Change the timing around when lower priority licence holders can take water**
3. **Major reform programs**
 - Overhaul water sharing arrangements
 - New or larger infrastructure

Further information about the options can be found in the Draft Western Regional Water Strategy Consultation Paper and the long list of options (Attachment B).

Proposed triggers for temporary water restrictions

The proposed triggers for implementing and lifting temporary water restrictions under section 324 of the *Water Management Act 2000* are in table 1 below

Table 1: draft critical dry conditions triggers for temporary water restrictions

Proposed Trigger for implementing temporary water restriction	Proposed Trigger for lifting temporary water restriction
When there is a high confidence forecast cease-to-flow period of 120 days at Wilcannia (20ML/day at Darling River at Wilcannia 425008)	Forecast 400 ML/day for 10 days (or 4,000 ML)
High confidence forecast cease-to-flow for 60 days at Bourke (0ML/day at Darling River at Bourke 425003)	Forecast 972 ML/day for 10 days (or 9,720 ML)

Proposed Trigger for implementing temporary water restriction	Proposed Trigger for lifting temporary water restriction
<p>Menindee Lakes storage¹ forecast to fall below 195 GL capacity².</p>	<p>Restrictions will be lifted once Menindee Lakes are forecast to have enough water to provide up to 12 months supply for human needs and allow the river to be restarted in a way that reduces the risk to water quality issues downstream and fish deaths.</p> <p>This will depend on conditions at the time and any operating constraints. For example:</p> <ul style="list-style-type: none"> • If the Lower Darling river hasn't ceased to flow, triggers could be lifted once the Lakes are above 195GL • If the Lower Darling River has ceased to flow, additional water above the 195GL, such as 60GL, may be required to restart the river³ • If evaporation rates are extreme and operational constraints require water to be held in inefficient lakes, more water will be required in the Lakes before the restrictions can be lifted <p>The trigger for lifting restrictions may need further refinement following consultation.</p>
<p>All or most of the northern valleys and/or Barwon–Darling River system are classified as Drought Stage 4 criticality under the Department's drought stages.</p> <p>AND/OR</p> <p>cease to flow for 30 days or more extended periods for any of the following locations ⁴:</p> <ul style="list-style-type: none"> • Border Rivers - Macintyre at Goondiwindi (416201A) • Gwydir River - Mehi at Moree (418002) • Macquarie - below Warren Weir (421004) • Namoi - below Mollee Weir (419039) 	<p>Resumption of flow targets for the Northern tributaries such as:</p> <ul style="list-style-type: none"> • Border Rivers - Macintyre at Goondiwindi –3,600 ML over 7 days • Gwydir River - Mehi at Moree – 3,600 ML over 7 days • Macquarie - below Warren Weir – 21,000 over 7 days • Namoi: below Mollee Weir – 8,000 ML over 7 days⁵

¹ Menindee Lakes Storage has the same meaning as it does under the Murray-Darling Basin Agreement – it applies to total storage across all

² A 195GL floodplain harvesting restriction is also being proposed which would be eased when local valley targets are forecast to be met

³ A 60 GL Lower Darling River Flow Re-start allowance has been proposed to be included in the water sharing plan for the Lower Darling

⁴ Locations and cease to flow period to be determined following feedback from consultation

⁵ The northern valley triggers are interim proposals and linked to when the regulated valleys are in Drought Stage 4. We will continue to research the most appropriate trigger locations and durations.

How effective are the options in meeting connectivity objectives?

We have heard concerns that water may be taken by lower priority licences upstream when high priority needs downstream have not been met. Our analysis suggests that changing the timing of when lower priority licences can take water can have some connectivity benefits in some circumstances, but will not solve all connectivity issues (Table 2).

Table 2: benefits and impacts of restricting lower priority licences to meet downstream needs.

Objective	How effective is restricting supplementary, B-class and C-class licences in meeting the objective?	Impacts on diversions over the long-term
Reducing cease to flow	N/A Water can only be taken by supplementary, B-Class and C-class licences when there is water in the rivers. These licences cannot take water when there is a cease-to-flow	
Protecting the first flush⁶	✓ 3% reduction in time Menindee Lakes is below 195GL	<ul style="list-style-type: none"> • Border Rivers, Gwydir, Namoi: 1% reduction • Barwon-Darling, Macquarie: small change
Algal Suppression⁷	✓ Approximately 16 additional years over a 119-year period with at least one algal suppression event at Wilcannia which could help break up and disperse algal blooms.	<ul style="list-style-type: none"> • Border Rivers: 4% reduction • Gwydir and Namoi: 3% reduction • Macquarie and Barwon-Darling: small change
Fish Migration	Minimal benefits Approximately 5 additional years with at least one fish spawning and migration flow events over a 119-year period, and one additional year with a dispersal event. ⁴	

In the interests of exploring all options we have also analysed how effective general security held environmental water could be in meeting the connectivity objectives. Our analysis suggests:

⁶ The assumptions used to model the impacts and benefits included: (1) Restricting supplementary licences, B-Class licences, C-Class licences when the lakes were below 195GL and lifted when lakes were above 250GL (total storage, not active storage) (2) 195GL applies to total storage (not active storage) across all lakes (3) data from the 2017-2020 drought is not included

⁷ The impact analysis for the algal suppression and fish migration targets is based on applying restrictions, and assuming perfect flow forecasting capacity – this means only restricting upstream access in years when we know the resulting flows will meet the downstream targets which is currently not feasible. In reality the impacts may be larger. The potential impacts make no allowance for possible compensatory increases in access at other times, which have not yet been explored

- Held environmental water licences could be better at meeting lower flow targets, but with limited effect given its smaller volume.
- Restrictions on supplementary licences could be better at meeting higher flow targets but the timing of supplementary access events often doesn't align with the times when the algal suppression or fish migration targets are required⁵

Progressing these actions will require further investigation of options to reduce the impacts and ways to operationalise the triggers.