Introduction

This plan considers the current volume of water in storages of the tributary catchments and weather forecasts. This plan may be updated as a result significant changes to weather patterns.

This year’s plan outlines WaterNSW’s response to the drought in the Barwon-Darling Valley including:

- Identification of critical dates.
- Our operational response.

The NSW Department of Planning, Industry and Environment’s Extreme Events Policy and Incident Response Guides outlines the 4 stages of drought.

The Barwon-Darling unregulated river system is assessed to be in stage 4, which is categorised as ‘critical drought/ water shortage’.

The Barwon-Darling river system

The Barwon–Darling river system is in north-western New South Wales. It takes in the Barwon River, from upstream of Mungindi at the confluence of the Macintyre and Weir rivers, to where the Barwon meets the Culgoa River. At this point the river channel becomes the Darling River and the Barwon–Darling system extends downstream to the Menindee Lakes. According to the Water Sharing Plan (WSP) 2012, the Barwon-Darling unregulated river system extends to the upper limits of the Menindee lakes downstream of Wilcannia.

Multiple tributaries enter the Barwon-Darling River as it travels through the valley including:

- Weir River
- Moonie River
- Mehi River
- Gwydir River
- Namoi River
- Macquarie River
- Marra Creek
- Bokhara River
- Culgoa River
- Bogan River
- Warrego River
- Paroo River
Unregulated system flow

Although it is considered an unregulated river, from time to time, the Barwon-Darling river system receives flows from the regulated river tributaries. These flows create river flow connectivity into the Barwon-Darling river system and maybe either end-of-system flows or licensed environmental water (also referred to as held environmental water).

The Barwon-Darling river system is mostly dependent on rainfall-generated flows from tributaries - not just the regulated river systems.

The Wilcannia gauging station is the last flow measurement point near the end of the Barwon-Darling. There are very few extractions beyond Wilcannia and once water has passed Wilcannia it then flows into the Menindee Lakes, where the water is re-regulated.

The average total annual discharge (flows) from the Barwon-Darling river system measured at Wilcannia are 2,048,000 megalitres (ML). This amount fluctuates significantly over time, which illustrates the significant variability in flows between wet and dry years. Variability in flow levels also occur across the valley and between seasons due to rainfall variability in different catchments.

Rainfall trends

For the period April 2017 to March 2019, lowest on record rainfall was observed over southern inland Queensland and areas of north and northwestern New South Wales. Over most of this area, rainfall for the period was less than 50% of the 1961–1990 average. Large areas from central to southwestern Queensland, and northcentral and northwestern New South Wales, into northeastern South Australia, have seen rainfall totals between 40% to 60% of this average, implying that nearly one year’s worth of average rainfall has been missed over this two-year period. Rainfall for January to August 2019 was lowest on record in the Southern Downs (Queensland) and Northern Tablelands (New South Wales).

The recent dry periods have been especially severe during the cooler months of April to September, an important time for agriculture and the replenishment of surface and groundwater storages across southern Australia. Over the Murray-Darling Basin (MDB), the total average rainfall over two consecutive April to September periods was the lowest on record, at 217.5 millimetres (mm). This is around 15% below the previous record, which saw 255.7 mm over the 1940–41 April to September period. It was also the only instance of an April to September rainfall total below 125 mm in two consecutive years.

Rainfall for the combined two-year 2017 and 2018 April to September period was the lowest on record and very much below average (lowest 10% of all such periods) for large parts of southeastern and southwestern Australia. Around 50% of NSW was lowest on record for these two periods combined.

The 2019 winter was also dry, which means three consecutive winters of below average rainfall.

Over the 24-month period, there has been a large decline in water resources in the northern half of the MDB, including over the Namoi and Upper Macquarie catchments. The Namoi has had the second lowest on record rainfall for equivalent 24-month periods, with rainfall around 62% of the 1961–1990 average. Rainfall in the Upper Macquarie catchment is around 71% of the average.
Water users in the valley

Basic Land Holder Rights (BLR)

BLR includes water for Domestic and Stock extracted from a water source fronting a landholder’s property, or from any aquifer underlying the land, and for native title rights. As outlined in the Barwon-Darling Water Sharing Plan, the estimated BLR requirements are:

a. 2.26 megalitres per day (ML/day) in the Barwon-Darling Unregulated River Water Source; and
b. 6.25 ML/day in the Upper Darling Alluvial Groundwater Source.

Domestic and Stock

The current share components of Domestic and Stock access licences authorised to take water from these water sources will total 967.5 ML/year, distributed as follows:

a. 891 ML/year in the Barwon-Darling Unregulated River Water Source; and
b. 0 ML/year in the Upper Darling Alluvial Groundwater Source.

Local Water Utilities

The current share components of local water utility access licences authorised to take water from these water sources will total 5,373 ML/year, distributed as follows:

a. 5,373 ML/year in the Barwon-Darling Unregulated River Water Source; and
b. 220 ML/year in the Upper Darling Alluvial Groundwater Source.

Unregulated River (A class) access

The current share components of unregulated river (A class) access licences in the Barwon-Darling Unregulated River water source totals 9,856 unit shares.

Unregulated River (B class) access licences

The current share components of unregulated river (B class) access licences in the Barwon-Darling Unregulated River water source totals 133,069.2 unit shares.

Unregulated River (C class) access licences

The current share components of unregulated river (C class) access licences in the Barwon-Darling Unregulated River water source totals 45,745.6 unit shares.

Aquifer access licences

The current share components of aquifer access licences in the Upper Darling Alluvial Groundwater Source totals 5 unit shares.

Salinity and water table management access licences

The current share components of salinity and water table management access licences authorised to take water from the Upper Darling Alluvial Groundwater Source total 3,300 ML/year.
Environmental water

Planned Environmental Water (PEW) in the Barwon-Darling unregulated river water source includes water in the system that is below the ‘commence to pump conditions’ for access licences specified in the Division 2 of Part 8 of the Water Sharing Plan.

Water availability

The water allocations in the Barwon-Darling Unregulated River water source for 2019/20, as of 1 July 2019 are:

• Local Water Utility, Domestic and Stock and salinity and water table management water access licence holders will receive 100 per cent of entitlement.

• Unregulated River and Unregulated River A Class, B Class and C Class water access licence holders will receive an allocation of 1 megalitre per unit share.

Current account balances of Barwon-Darling unregulated valley as of 16 October 2019 are summarized below:

<table>
<thead>
<tr>
<th>Component</th>
<th>Sum of Component (ML)</th>
<th>Sum of Carryover In (ML)</th>
<th>Sum of Available Water Determination Volumes (ML)</th>
<th>Sum of usage (ML)</th>
<th>Sum of Account Balance (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic and Stock</td>
<td>891.5</td>
<td>0</td>
<td>891.5</td>
<td>0</td>
<td>891.5</td>
</tr>
<tr>
<td>Domestic and Stock - domestic</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Domestic and Stock - stock</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Domestic and Stock - Town Water Supply</td>
<td>63</td>
<td>0</td>
<td>63</td>
<td>0</td>
<td>63</td>
</tr>
<tr>
<td>Local Water Utility</td>
<td>5,373</td>
<td>-34.8</td>
<td>5,373</td>
<td>0</td>
<td>5,338.2</td>
</tr>
<tr>
<td>Unregulated River</td>
<td>1,488</td>
<td>1,488</td>
<td>1,488</td>
<td>0</td>
<td>2,976</td>
</tr>
<tr>
<td>Unregulated River (A class)</td>
<td>9,856</td>
<td>47,641.2</td>
<td>9,856</td>
<td>0</td>
<td>57,497.2</td>
</tr>
<tr>
<td>Unregulated River (B class)</td>
<td>133,069.2</td>
<td>773,899.7</td>
<td>133,069.2</td>
<td>0</td>
<td>906,968.9</td>
</tr>
<tr>
<td>Unregulated River (C class)</td>
<td>45,745.6</td>
<td>371,349.9</td>
<td>45,745.6</td>
<td>0</td>
<td>417,095.5</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>196,499.3</td>
<td>1,194,344</td>
<td>196,499.3</td>
<td>-34.8</td>
<td>1,390,843.3</td>
</tr>
</tbody>
</table>

The Barwon-Darling system receives inflows from four regulated valleys in northern NSW. The water allocation as of 1 July 2019 and account balances in those valleys are summarised below:

<table>
<thead>
<tr>
<th>Valleys</th>
<th>Local Water Utilities and Domestic and Stock</th>
<th>High Security</th>
<th>General Security</th>
<th>General Security Carryover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Border</td>
<td>100% (1,600 ML)</td>
<td>100% (1,500 ML)</td>
<td>0%</td>
<td>4,600 ML*</td>
</tr>
<tr>
<td>Gwydir</td>
<td>100% (3,800 ML)</td>
<td>100% (20,200 ML)</td>
<td>0%</td>
<td>13,400 ML</td>
</tr>
<tr>
<td>Upper Namoi</td>
<td>100% (600 ML)</td>
<td>75% (60 ML)</td>
<td>0%</td>
<td>2,700 ML**</td>
</tr>
<tr>
<td>Lower Namoi</td>
<td>100% (4,200 ML)</td>
<td>75% (2,900 ML)</td>
<td>0%</td>
<td>12,300 ML***</td>
</tr>
<tr>
<td>Peel</td>
<td>70% (11,600 ML)</td>
<td>50% (400 ML)</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Macquarie</td>
<td>80% (19,800 ML)</td>
<td>70% (11,100 ML)</td>
<td>0%</td>
<td>109,000 ML***</td>
</tr>
</tbody>
</table>

*Can access 50% of carryover volume
**Can access 75% of carryover volume
***Not allowed to access carryover volume
Current Drought Conditions

The Barwon-Darling system continues to experience low inflows from both the NSW and QLD contributing catchments. The Barwon-Darling river system is also currently at drought stage 4. Over the last 10 years:

- high inflows occurred in two years: 2010-11, 2011-12;
- reasonably good inflows occurred in three years: 2009-10, 2012-13 and 2016-17; and

The 2018-19 water year recorded only 6,300 ML at Wilcannia - a record low.

The northern NSW regulated river systems continue to experience low inflows with all valleys except the Cudgegong currently at drought stage 3 or 4 - severe to critical drought.

In the northern regulated river systems, over the last 10 years:

- good inflows occurred in three years: 2010-11, 2011-12 and 2016-17; and

Over the last six years, the drought has caused a significant reduction in inflows to the northern valleys with average inflows in all valleys well below their long-term averages.
The Barwon-Darling system experienced extended periods of cease-to-flow before the Northern Fish Flow event of 2019. The table below shows the number of days of cease-to-flow at various locations both before and after the northern fish flow event.

<table>
<thead>
<tr>
<th>Gauging Stations</th>
<th>Mungindi</th>
<th>Collarenebri</th>
<th>Walgett</th>
<th>Brewarrina</th>
<th>Bourke</th>
<th>Tilpa</th>
<th>Wilcannia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cease-to-flow days since the Northern Fish Flow event, as of 18 Oct 2019</td>
<td>113</td>
<td>75</td>
<td>79</td>
<td>70</td>
<td>417</td>
<td>95</td>
<td>61</td>
</tr>
<tr>
<td>Number of cease-to-flow days before the Northern Fish Flow event</td>
<td>21</td>
<td>176</td>
<td>327</td>
<td>192</td>
<td>N/A</td>
<td>263</td>
<td>249</td>
</tr>
</tbody>
</table>

**Resource assessments in the Northern Regulated Valleys**

The resource assessment is the process of calculating how much water is available based on the rules of the WSP. This is done at the end of the month and when any significant inflow event occurs. There is no resource assessment process for the Barwon-Darling as it is an unregulated valley.

The planning horizon for the following resource assessment for the tributary northern valleys is 24-months. Taken into consideration is the volume of water held in storage, plus the expected minimum inflow based on historical records for the 24-month period. Commitments for the planning horizon were then subtracted to find the remaining available resource for Available Water Determination (AWD) announcement.

If the total commitment is higher than the available resource, the difference is recorded as shortfall and no additional allocation is possible for that resource assessment.
The combined water account balances (of major licence categories) for the tributary northern valleys are presented below.

The Barwon-Darling river system receives inflows from four NSW regulated river valleys; Border Rivers, Gwydir, Namoi and Macquarie. In addition, it receives inflows from several Queensland catchments; Weir, Moonie, Culgoa, Warrego and Paroo. The below figure shows the total active volumes available in the Dams of all four NSW regulated valleys (stated as Northern Valleys). This includes Pindari, Glenlyon, Copeton, Keepit, Split Rock, Chaffey, Burrendong and Windamere Dams. This information is current as of 7 October 2019.

Northern valleys storage status (ML)

Northern valleys storage breakdown (ML)

The above figure shows the account balances of different license categories in the Northern valleys as of 1 October 2019. A total of 141,000 ML is available in General Security accounts – 95,000 ML is for irrigation and 46,000 ML is for environment.

In the Macquarie:

- About 64,000 ML of General Security irrigation water is restricted and 33,000 ML of General Security environmental water is also restricted due to the drought.
- About 37,000 ML of planned environmental water is quarantined due to the drought.
In the other valleys:

- About 31,000 ML of General Security irrigation water is available in accounts, however:
  - 50% of Border Rivers General Security carryover is restricted; and
  - 100% of Lower Namoi General Security carryover is restricted.
  - About 69,000 ML is available in High Security, Domestic and Stock accounts; and
  - 55,000 ML is the combined account balance for planned environmental.

- Other reserves such as storage loss, delivery loss, minimum releases and replenishment flows are not included in this diagram.

**Water resource forecast**

**Barwon-Darling - past 24-month rainfall**

Over the last 24-months, the total rainfall across the Barwon-Darling catchment was in the range of 200 mm to 600 mm, which is very much below average to lowest on record.

**NSW rainfall totals (mm) for 24 months - 1 October 2017 to 30 September 2019**
Northern NSW River Systems - past 24-month flows at Wilcannia and Bourke

The inflows for last the 24-months were the lowest on record. Only 26,000 ML of inflow was recorded at Wilcannia from October 2017 to September 2019. This represents only 60% of the previous lowest 24-month period of inflows. The previous 24-months of flow at Bourke was only 63,000 ML which is about 40% of previous lowest 24-month flow.

The figures below and on the next page compare the cumulative inflows (for Wilcannia and Bourke respectively) of previous droughts over 36-months to the current drought period for the last 24-months.

Comparison of Drought Inflows at Wilcannia

- Oct 1991 - Sep 1994
- Oct 2001 - Sep 2004
- Oct 2004 - Sep 2007
- Oct 2013 - Sep 2016
- Oct 2017 - Sep 2019
The current drought is impacting the whole northern region that contributes inflows to the Barwon-Darling system. The figure below shows the combined 24-month inflows for all upstream dams (Pindari, Glenlyon, Copeton, Keepit, Split Rock, Chaffey, Burrendong and Windemere) compared to the previous four lowest inflows. The last 24-month inflow is lowest on record and less than half of the previous lowest.
Three-month weather forecast

Forecasts from the Bureau of Meteorology (BoM) indicate a warmer and drier November to January period. BoM have indicated that the positive Indian Ocean dipole is likely to remain the dominant driver for Australia until early summer. A prolonged period of negative SAM (Southern Annular Mode) may also contribute to the dry and warm outlooks for eastern Australia during October and November.

The figure below shows that there is a 30-50% probability of the Barwon-Darling and its contributing tributary catchments receiving above average rainfall during late Spring to early summer.

Barwon-Darling flow forecast

The river system and the broader catchment is currently extremely dry, and no inflow is en route to the Barwon-Darling. Based on the BoM three monthly forecast, no significant rainfall or inflow to the Barwon-Darling system is expected before the end of 2019. WaterNSW is regularly monitoring the catchment conditions and BoM rainfall forecasts.
Annual operations

Barwon-Darling flow class map

Based on access conditions outlined in the Barwon-Darling Unregulated Water Sharing Plan, the Barwon-Darling management zone flow class map is available on the WaterNSW website with real-time data including management zones and flow classes for each licence category.

Customers can check the WaterNSW web site to determine if access triggers have been met. WaterNSW will continue to provide real time information about access availability including any restrictions in place; such as s324 orders.

Critical human needs

Several towns along the Barwon-Darling river system rely upon the river. These towns include Mungindi, Collarenebri, Walgett, Bourke, Louth, Tilpa and Wilcannia.

The Northern Fish flow event of 2019 and inflows from Warrego provided flow connectivity along the river system and filled up all the weir pools except for the Bourke Weir pool.

Critical environmental needs

The Barwon–Darling corridor connects all the rivers, lakes and wetlands in the northern Basin; and then provides a connection to the southern Basin through the Lower-Darling. The river system provides habitat during dry periods and travel pathways in the semi-arid inland. There are many billabongs and lagoons along the Barwon–Darling corridor, as well as lakes and wetlands on the floodplains, which provide major bird breeding sites. Around 36,000 ML of environmental water was released from the Gwydir and Border valleys as a part of the Northern Fish Flow event. The purpose of the event was to create flow connectivity and help fish to survive drought. The event was successful and provided flows from Mungindi to Warraweena except for a small section downstream of Mogil Mogil to upstream of the Mehi junction with Barwon. As upstream storages are dry and there is not enough environmental water available, no such event is planned for near future.
Basic Landholder Rights & Domestic and Stock

Under the Water Management Act 2000, extraction of water for Basic Landholder Rights (BLR) does not require a licence, although in the case of accessing groundwater under BLR the water supply work must still be approved. BLR includes water for Domestic and Stock purposes extracted from a water source fronting a landholder’s property or from any aquifer underlying the land.

Scenarios

Inflow scenarios and management outcomes:

1. **Major inflow event > 100,000 ML**
   
   As the system has been extremely dry for a long time, the first flows from a major inflow event maybe protected to allow it to flow through the system. If the next inflow event is a major inflow event, some water may become available for extraction.

2. **Medium tributary inflows ~ 30,000 - 100,000 ML**
   
   If the next inflow event is approximately 30,000-100,000 ML, it is more likely that some flows will be protected from extraction. Medium tributary flows may be protected to provide for critical human and environmental needs in the Barwon-Darling Valley and/or in the Lower-Darling depending upon the conditions downstream. If Town Water Supply and Domestic and Stock have not received flow for an extended period, the flows may be protected through a Section 324 Order.

3. **Small tributary inflows**
   
   Small tributary flows will be used to meet critical needs including critical environmental or Domestic and Stock use along the system. Depending upon the conditions in the downstream systems, water will be diverted to the system that is most at risk for critical human needs or environmental risk.

Projects

There are no emergency drought response projects being undertaken by WaterNSW in the Barwon-Darling region.