

Hunter Operations Plan

November 2018

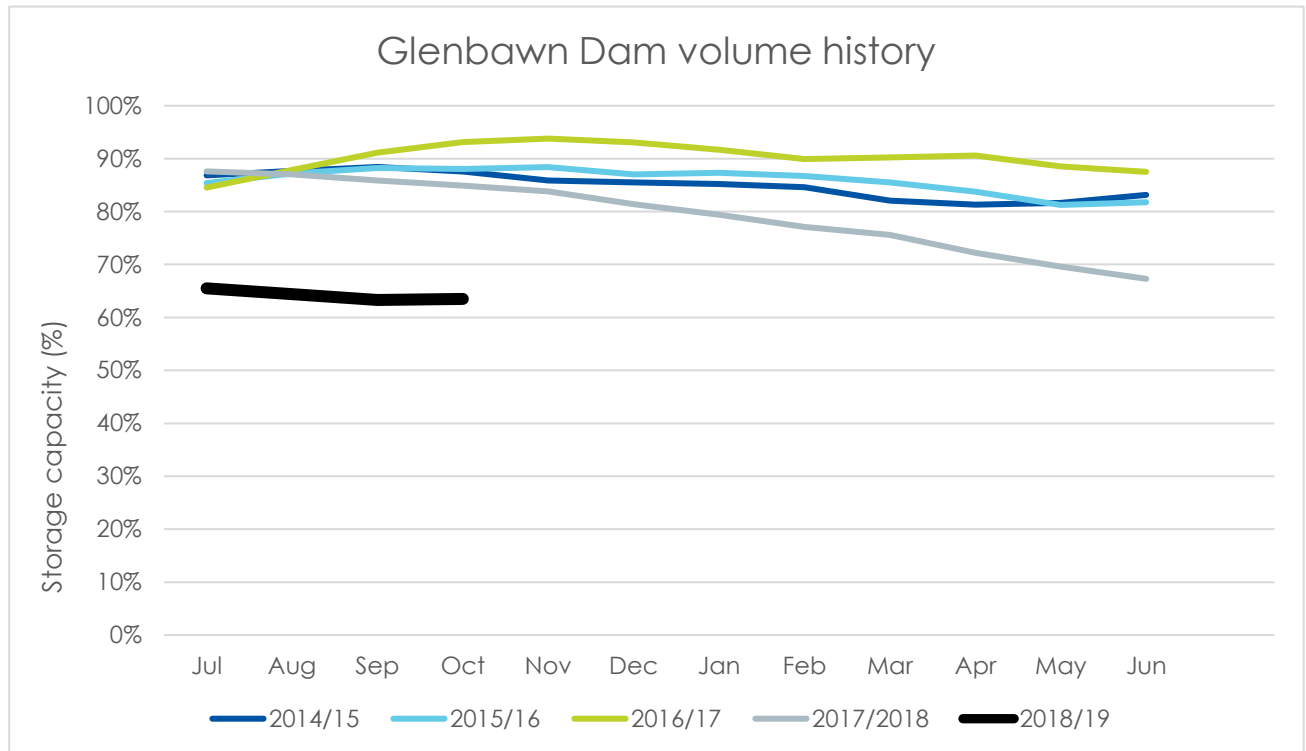
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2. Dam storage

2.1 Glenbawn Dam storage

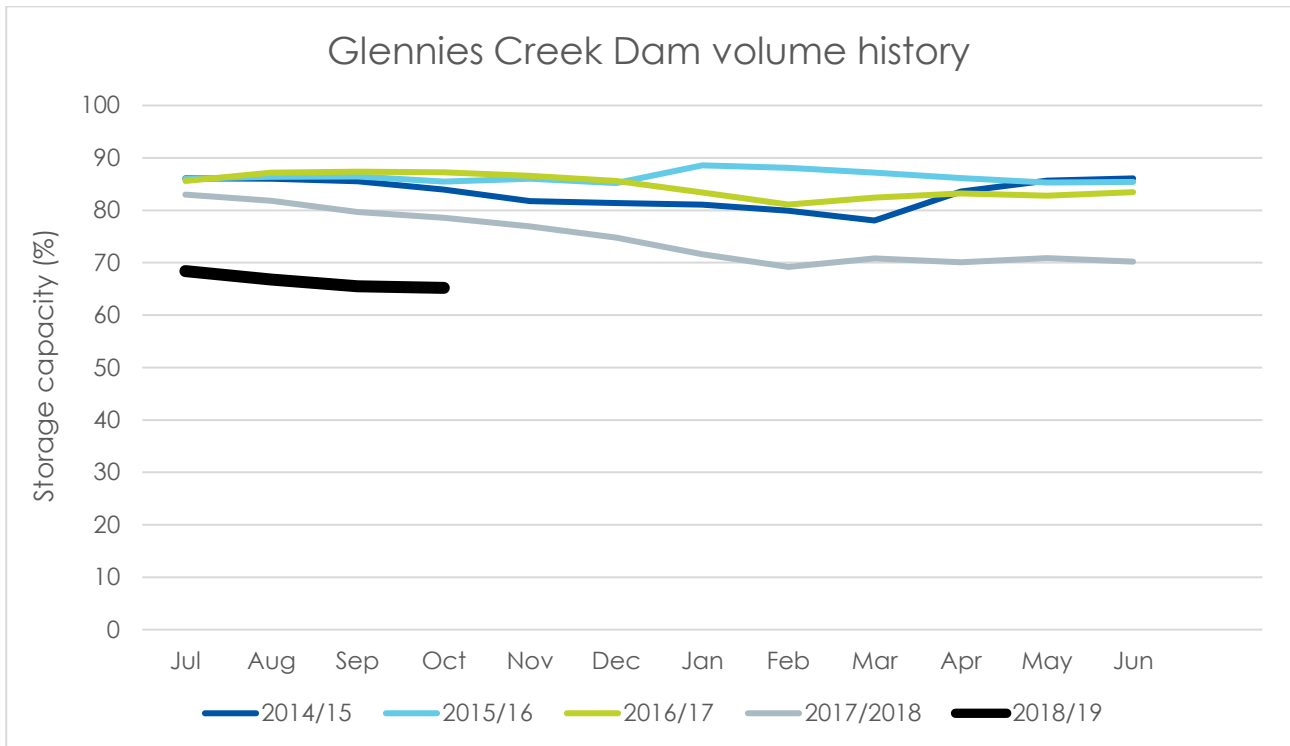
The figure below shows the Glenbawn Dam behaviour for the current water year (2018-19) and for the last four water years.



The dam was around 88% full at the start of last water year (2017 -18) and by the end of October 2018, it is about 63% full. No significant inflow has arrived at the dam over the last water year and that trend continues into the current year. Therefore, the line shows continuous decreasing trend over the last water year and current water year. In this current water year, the starting dam volume is lower than that of the last four years.

2.2 Glennies Creek Dam storage

The figure below shows the Glennies Creek Dam behaviour for the current water year (2018-19) and for the last four water years.



The dam was around 84% full at the start of last water year (2017 -18) and by the end of October 2018, it is about 65% full. No significant inflow has arrived at the dam except two small autumn inflows. The dry continues into the current year. In this current water year, the starting dam volume is lower than that of the last four years.

3. Supplementary access

3.1 Commentary

There have not been any supplementary events in the Hunter River since the start of the 2018/19 water year.

3.2 Explanation

In the Hunter River, the taking of water under the supplementary water access licenses is only permitted when flow thresholds are met as per the following table:

| Flow reference point number | Flow reference point | Date for which flow target applies | Flow threshold (ML/D) |
|-----------------------------|------------------------------------------|------------------------------------|-----------------------|
| 1 | Hunter river at Liddell gauge (210083) | 1 May to 30 September | 100 |
| | | 1 October to 30 April | 150 |
| 2 | Hunter River at Singleton Gauge (210001) | 1 May to 30 September | 120 |
| | | 1 October to 30 April | 300 |
| 3 | Hunter River at Greta Gauge (210064) | 1 March to 31 May | 80 |
| | | 1 June to 31 August | 146 |
| | | 1 September to 30 November | 122 |
| | | 1 December to 28/29 February | 72 |

Access to supplementary water access licenses is from uncontrolled flows from tributaries and water spilled from the dams.

Access to uncontrolled flows by regulated river (high security) access licences and regulated river (general security) access licences is permitted only when AWDs for high security and general security licences are less than 100%.

4. Water availability

4.1 2018/2019 water availability for Hunter

| Licence category | Share component | Carryover in | AWD volume | Allocation assignments in | Allocation assignments out | Usage | Balance |
|------------------------------------|-----------------|---------------|----------------|---------------------------|----------------------------|---------------|----------------|
| Domestic and stock | 1,569 | -8 | 1561 | 0 | 0 | 55 | 1,506 |
| Domestic and stock (domestic) | 145 | 0 | 145 | 0 | 0 | 0 | 145 |
| Domestic and stock (stock) | 103 | 0 | 103 | 0 | 0 | 11 | 92 |
| Local water utility | 10,832 | 0 | 10,832 | 0 | 0 | 2,164 | 8,668 |
| Major utility (power generation) | 36,000 | 21,574 | 36,000 | 0 | 0 | 5,069 | 52,505 |
| Regulated river (general security) | 128,544 | 25,843 | 127,815 | 5,059 | 5,084 | 16,781 | 137,686 |
| Regulated river (high security) | 21,740 | 4,108 | 21,737 | 325 | 300 | 4,301 | 17,477 |
| Supplementary water | 48,519 | 0 | 48,502 | 0 | 0 | 0 | 48,519 |
| Grand total | 247,452 | 51,518 | 246,695 | 5,384 | 5,384 | 28,381 | 266,598 |

Notes: volumes in the table are in ML

General security available water determination

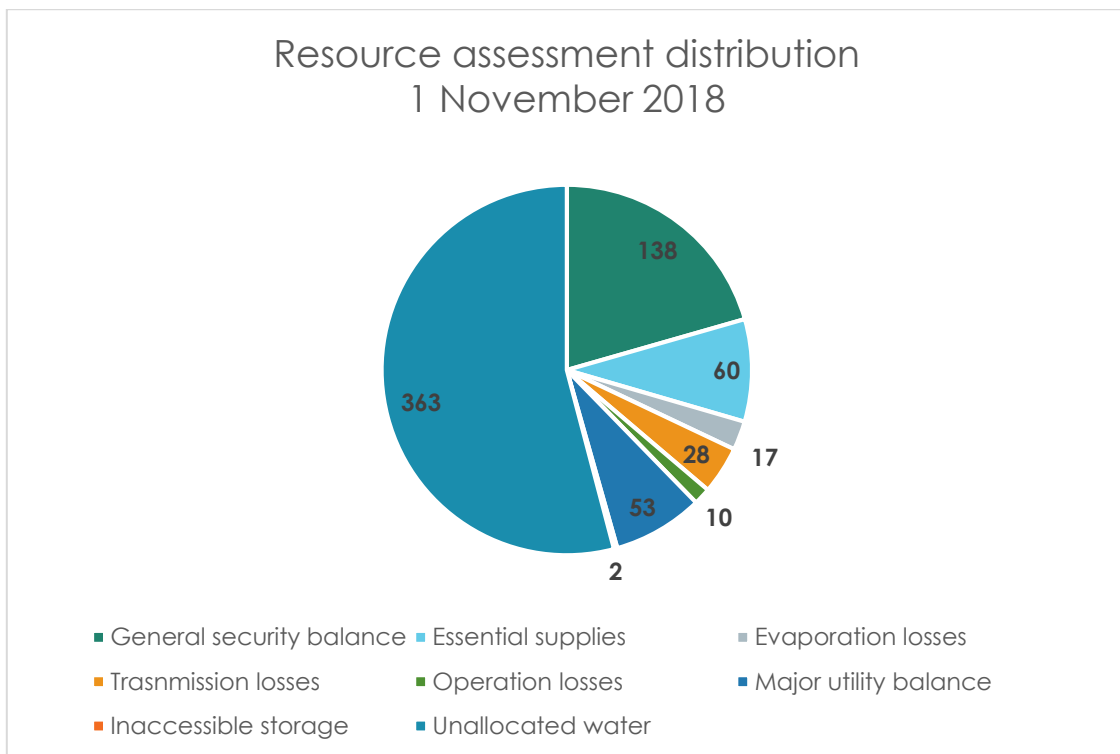
| Date | AWD (ML/share) | Total |
|----------|----------------|-------|
| 1-Jul-18 | 1 | 120% |

A total of 26,023 ML of General Security (GS) water has been carried forward into 2018-19, which is equivalent to 20% of GS share component.

In the current water year (2018-19), 100% AWD (Available water determination) has been announced on 1st July 2018 for all water users including GS, High Security, Town Water Supply and Major Utility.

The sum of account balance in the table refers to the amount of water remaining in accounts as of 31 October 2018 after trade and use. For example, Local Water Utility (LWU) has 8,668 ML of water in their account, they have used $10,832 - 8,668 = 2,164$ ML of water so far in this current water year. To date in the current water year, the total amount of GS water usage is 16,781 ML and Major Utility usage is 5,069 ML.

4.2 Resource assessment



Note: volumes in the pie chart are in GL.

| Hunter resource assessment | 1/11/18 |
|-------------------------------|---------|
| Storage volume | 655.4 |
| Plus minimum inflows | 15.4 |
| Less dead storage | 2 |
| Less storage & operation loss | 27 |
| Less essential supplies | 60 |
| Less major utility | 53 |
| Less transmission loss | 28 |
| Less general security | 137.9 |
| Allocation | 100% |

4.2.1 Significance of this resource assessment

Resource assessment at 1st of November 2018 indicate that there is sufficient water in storage for the 100% AWD announcement, and it will remain the same over the current water year. Minimum inflows are expected to be around 15.4 GL until June 2019.

Transmission losses are the conservative estimate of the volume required to run the river under dry conditions through to June 2019 to meet all demands, which is estimated at 28 GL for the remaining months in the current water year. This mostly comprises natural transmission losses as water evaporates and soaks into the river bed.

Essential supplies are estimated at 60 GL at 1st of November for the remainder months of the current water year, which includes town water, high security licenses, environmental water allowance and S&D replenishment. Storage evaporation and operational losses are estimated at 27 GL for the remaining months of the current water year.

4.2.2 Resource assessment process

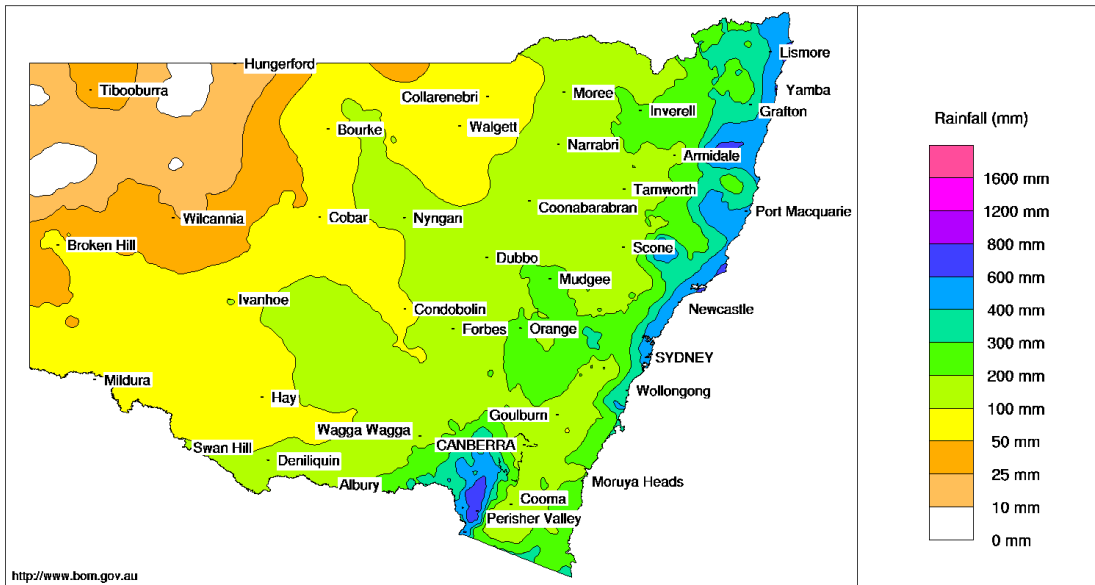
Resource assessment is the process of calculating how much water resource is available based on the rules of the Water Sharing Plan. This is reviewed periodically during the year, typically at the end of the month and when any significant inflow event happens.

From the above resource assessment summary table, it can be seen that the latest resource assessment has been done on 1st of November 2018. For this current water year, total resource available is the sum of Glenbawn and Glennies storage volume and the minimum expected inflow to the dam and usable inflows in the downstream over the year. From the resource assessment summary table, it can be seen that the total available resource is 671 GL. The sum of commitments for the current water from the above summary table is $2 + 27 + 60 + 53 + 28 + 138 = 308$ GL. Therefore, the amount of unallocated water is $671 - 308 = 363$ GL.

5. Rainfall

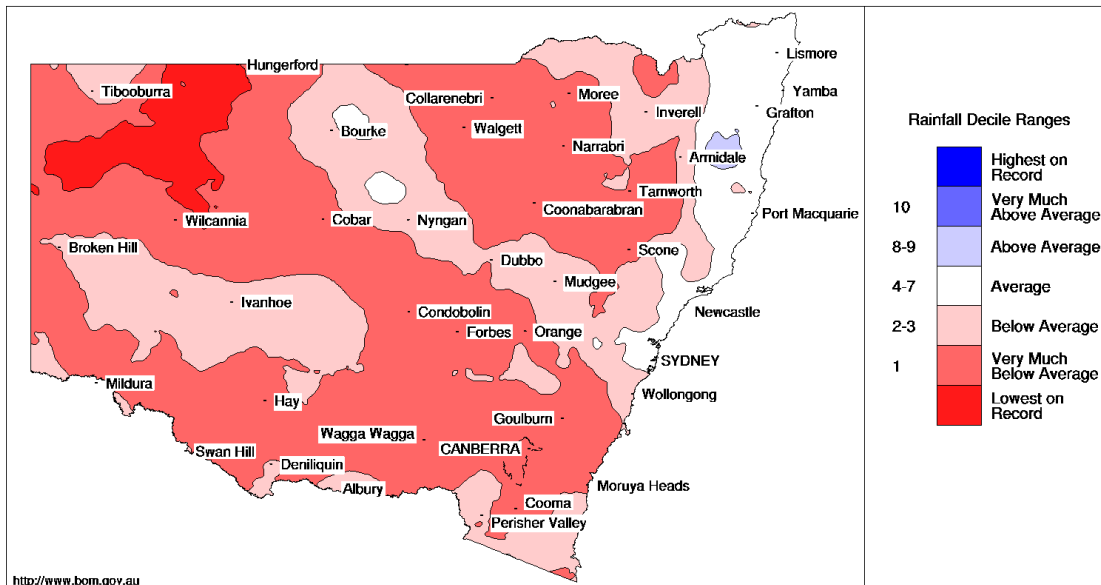
5.1 6-month rainfall

New South Wales Rainfall totals (mm) 1 May to 31 October 2018
Australian Bureau of Meteorology



http://www.bom.gov.au © Commonwealth of Australia 2018, Australian Bureau of Meteorology ID code: AWAP Issued: 03/11/2018

New South Wales Rainfall Deciles 1 May to 31 October 2018
Distribution Based on Gridded Data
Australian Bureau of Meteorology

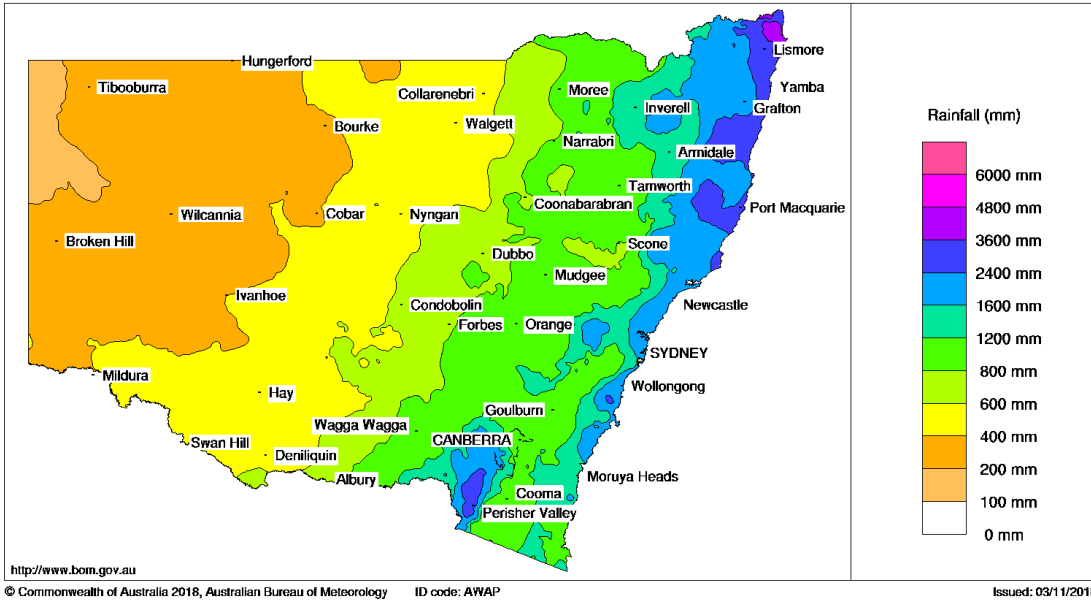


http://www.bom.gov.au © Commonwealth of Australia 2018, Australian Bureau of Meteorology ID code: AWAP Issued: 03/11/2018

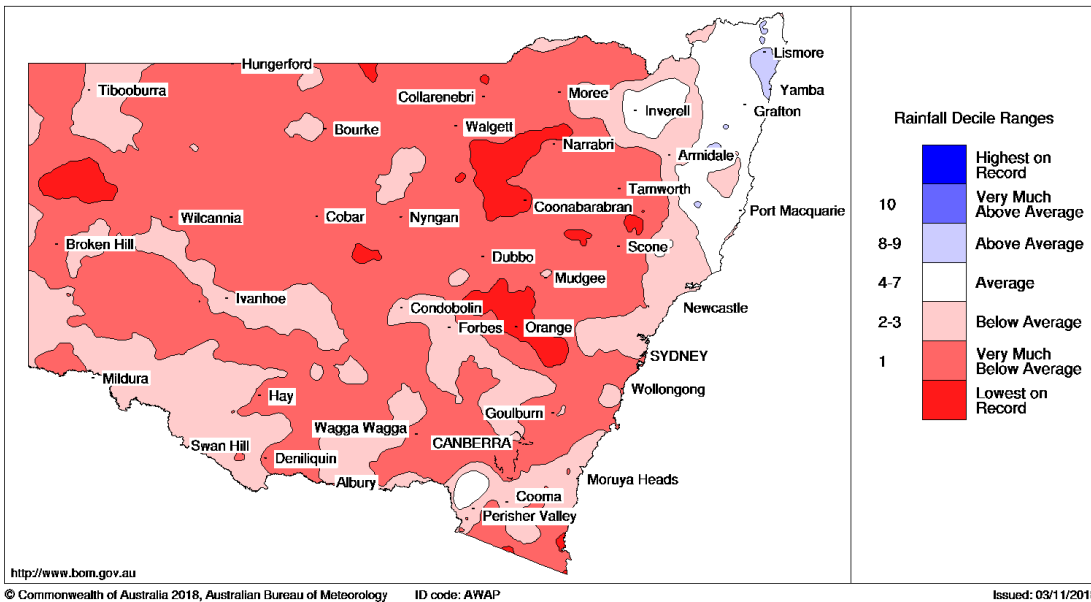
The last 6-month total rainfall lies in the range of 200 to 300 mm, which is in the average to below average range.

5.2 24-month rainfall

New South Wales Rainfall totals (mm) 1 November 2016 to 31 October 2018
Australian Bureau of Meteorology



New South Wales Rainfall Deciles 1 November 2016 to 31 October 2018
Distribution Based on Gridded Data
Australian Bureau of Meteorology

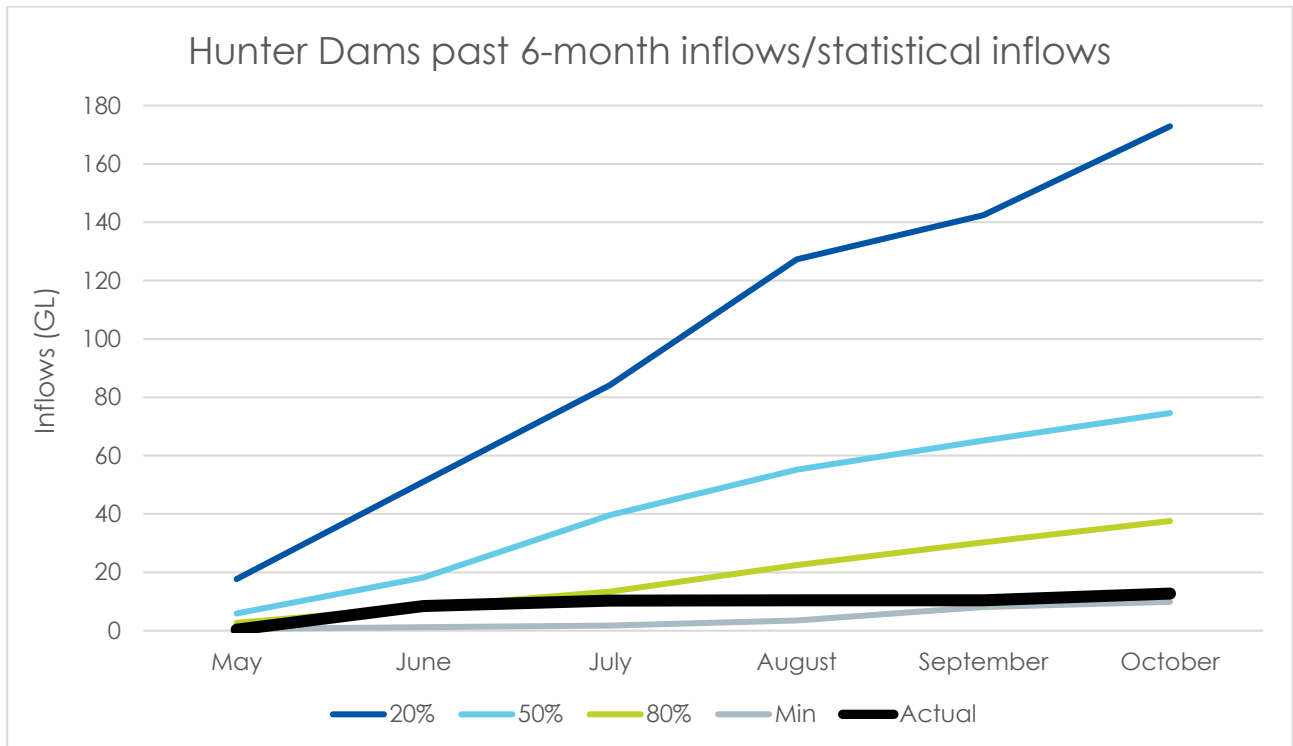


Rainfall in the last 24-months lies in the range of 1600 to 2400 mm, which is below average.

6. Inflows

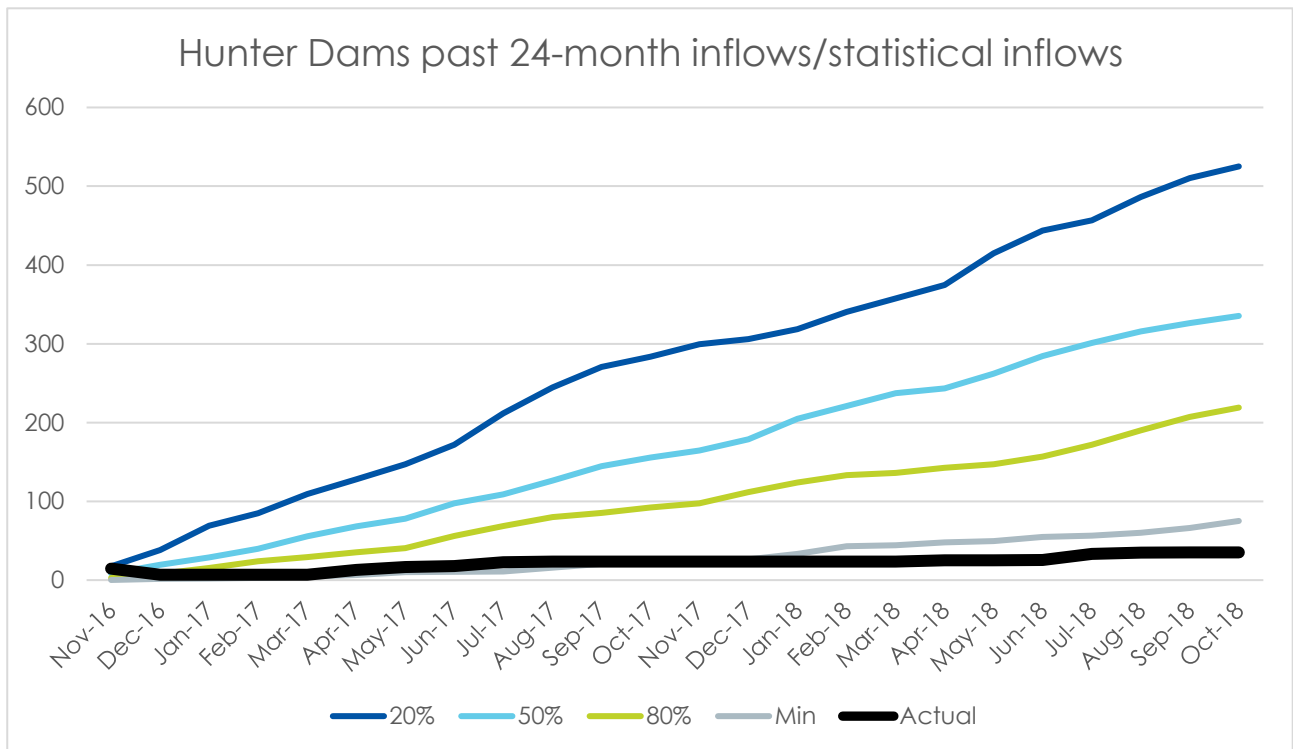
6.1 Hunter Dam inflows

6.1.1 Past 6-month inflows/statistical inflows



Inflows are consistent with rainfall over the past 6-month period. Actual inflow for 6 months is around 13 GL, currently following minimum inflow conditions.

6.1.2 Past 24-month inflows/statistical inflows



Inflows are consistent with rainfall over the past 24-month period. Actual inflow for the 24 months is 35 GL, which is below minimum inflow conditions.

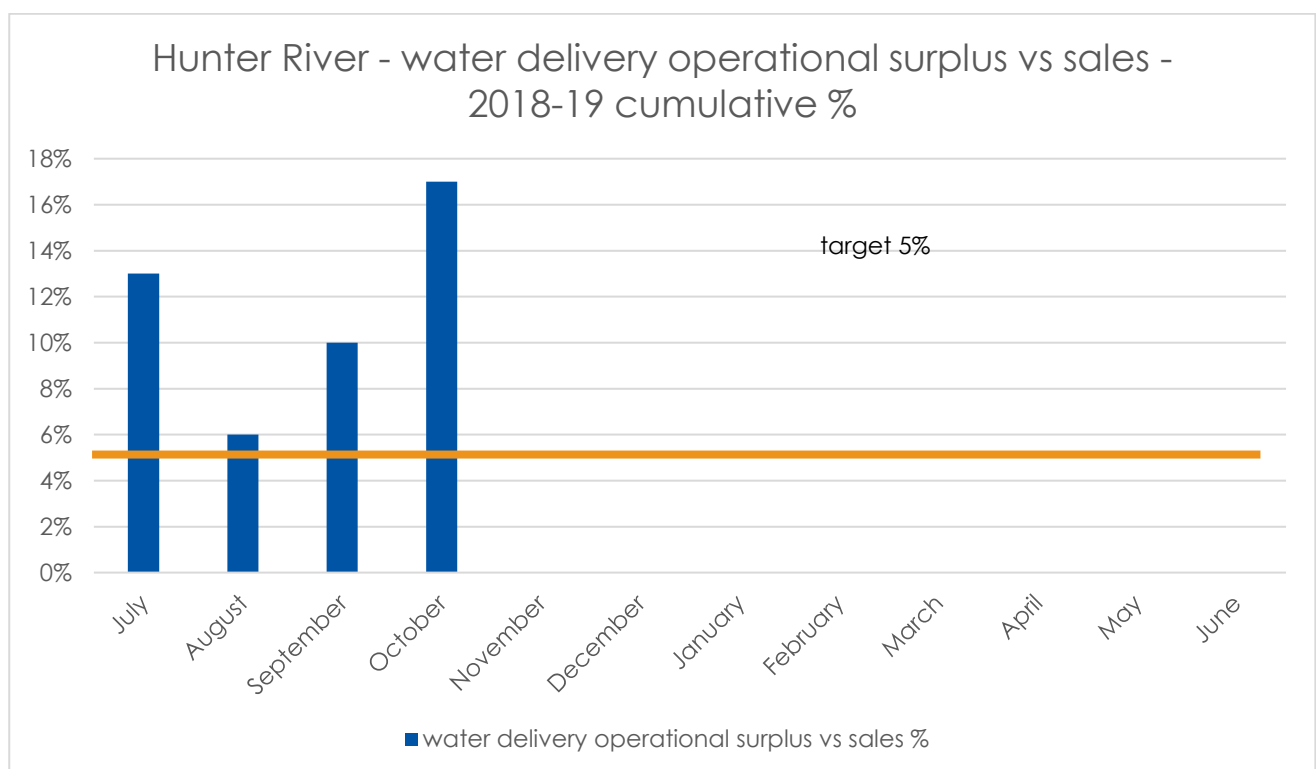
6.2 Downstream tributary inflows

There have been no significant downstream tributary inflows in this current year (2018 – 19).

7. Operational losses

7.1 Operational losses for Hunter

Operational loss is water above that which could reasonably be expected to pass the last extraction point being supplied with regulated flow (dam releases and controlled tributary inflows – not supplementary flows). The following table and graph show the operational loss over the last four months in water year, 2018-19. The cumulative operational loss over the four months was around 17% of deliveries, which is higher than the corporate target level of 5%.



Note: For the table above, regulated licenced is included in sales

Hunter cumulative totals

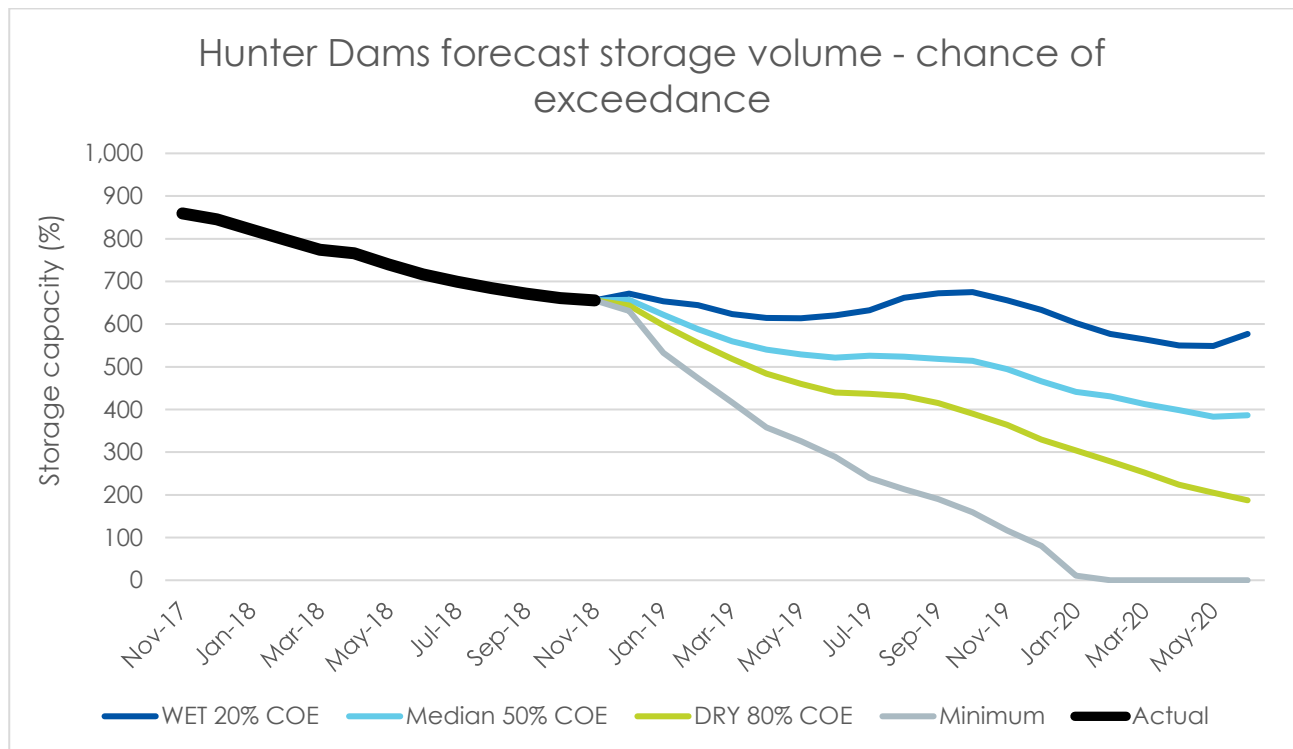
| Dates | Sales + environmental delivery | Operational surplus | Actual | Target |
|--------------|-----------------------------------------------|----------------------------|---------------|---------------|
| July | 8,855 | 1,108 | 13% | 5% |
| July-Aug | 18,300 | 1,187 | 6% | 5% |
| July-Sep | 19,086 | 1,955 | 10% | 5% |
| July-Oct | 24,801 | 4,228 | 17% | 5% |

Explanation:

Represents volume of flows in excess of 'End of System' flow targets at Greta as required in the Water Sharing Plan.

8. Storage forecast

8.1 Hunter Dams storage forecast



The above figure demonstrates the possible scenarios of the Hunter Storages (Glenbawn and Glennies Creek Dams) until June 2020. The scenarios are based on different expected inflow conditions. For example, with 20th percentile inflow the dam may be at around 577 GL volume at the end of May 2020. With the minimum inflow conditions, the dam would be empty at the end of January 2020.

The Chance of Exceedance (COE) in the figure refers to the chance of exceeding inflows and storage levels in the time frame. For example, Wet 20% COE indicate that there is only a 20% of chance that the dam volume will be greater than the projected level, and there is 80% chance that the dam volume will be less than the projected level.

9 Outage planning

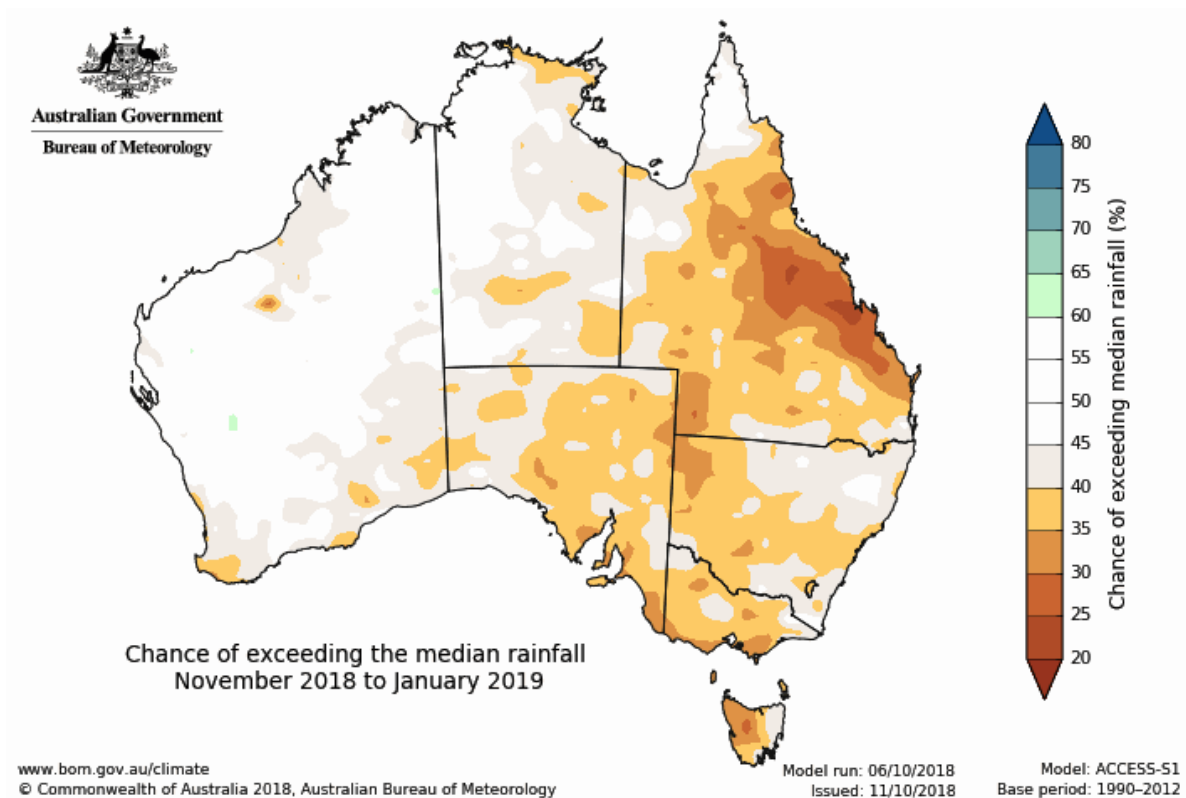
| Item | Time | Description |
|--------------------|------|-------------|
| Glenbawn Dam | N/A | None |
| Glennies Creek Dam | N/A | None |

10 Prognosis

The chances of improved General Security Allocation, based on different inflow scenarios are as follows:

| | Dry (80th percentile inflows) | Average (50 th percentile inflows) | Wet (20 th percentile inflows) |
|-----------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| For 2018-19 by 31 Dec 2018 | 100% + GS account water carried forward from 2017-18 | 100% + GS account water carried forward from 2017-18 | 100% + GS account water carried forward from 2017-18 |
| For 2018-19 by 30 June 2019 | 100% + GS account water carried forward from 2017-18 | 100% + GS account water carried forward from 2017-18 | 100% + GS account water carried forward from 2017-18 |

The above table shows that even in the dry condition, all remaining allocations from the announced 100% AWD for 2018-19 are deliverable unrestricted.



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