

Lachlan Operations Plan

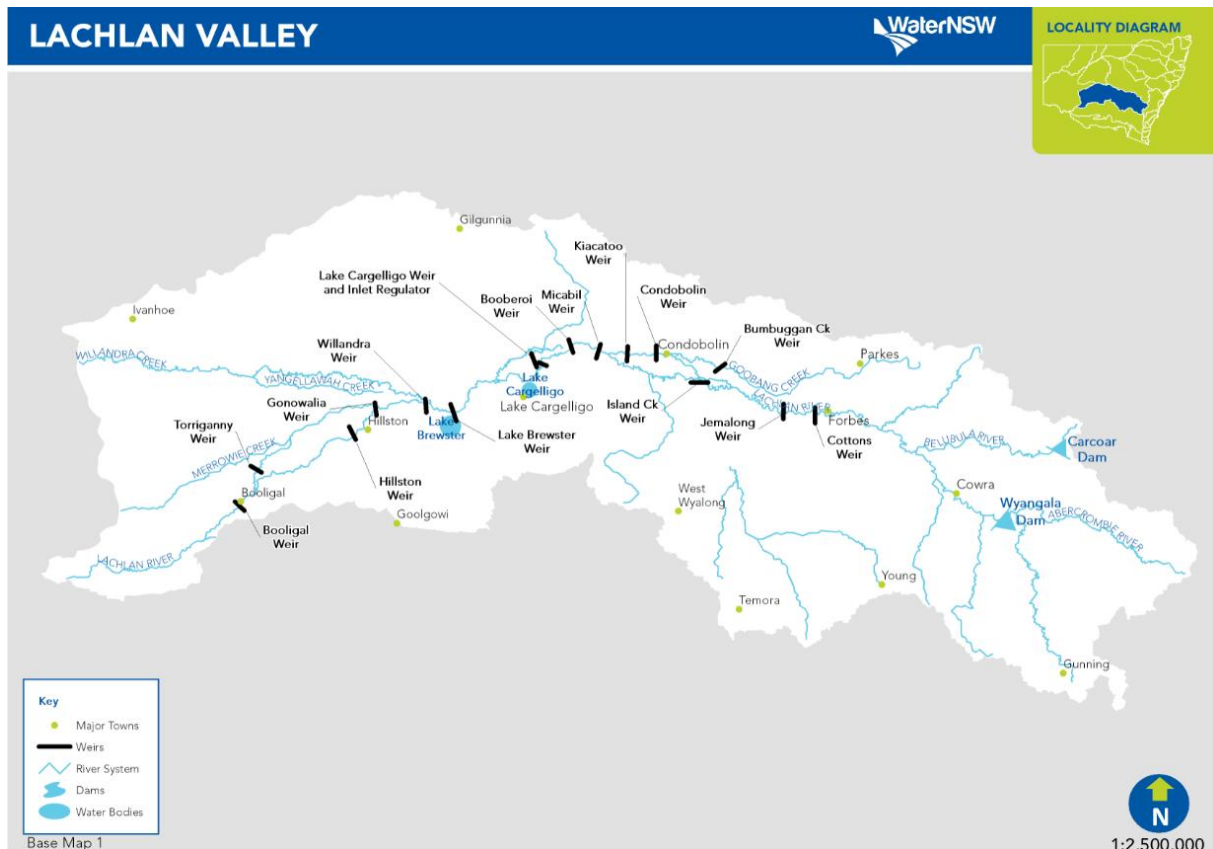
November 2018

Contents

1. Highlights	3
2. Dam storage	4
2.1 Wyangala Dam storage	4
2.2 Carcoar Dam storage	4
3. Supplementary access	5
3.1 Commentary	5
3.2 Explanation	5
4. Water availability	6
4.1 2018/2019 water availability for Lachlan	6
4.2 2018/2019 water availability for Belubula	8
4.3 Resource assessment - Lachlan	9
5. Rainfall	13
6. Inflows	15
7. Operational losses	21
8. Storage forecast	22
9. Outage planning	23
10. Prognosis	23

1. Highlights

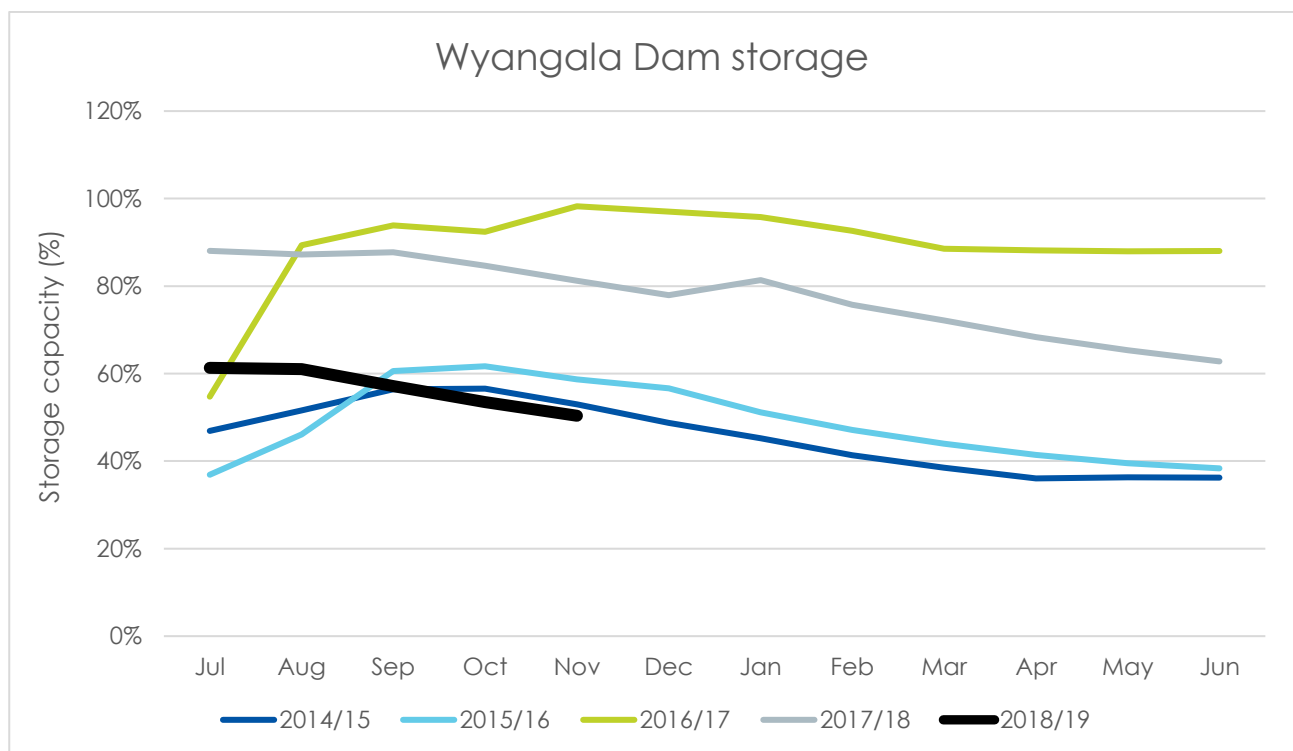
- It is planned to deliver about 304 GL of licensed allocations in 2018-19 and 190 GL in 2019-20.
- Delivery of annual stock and domestic replenishment flows to effluent creeks in the lower Lachlan is 100% complete.
- As Lake Brewster is currently empty all demand for water in the lower Lachlan in 2018-19 will be delivered from Wyangala Dam.
- Delivery of licenced environmental water into Lake Brewster outflow wetlands is continuing with the aim to building the seedbank through a full growth cycle of wetland vegetation.
- It is planned to maintain a small contingency volume in Lake Cargelligo storage to manage any sudden changes to water orders in the lower Lachlan this summer. Consequently, Lake Cargelligo storage level is likely to range between 40% and 80% this summer.



2. Dam storage

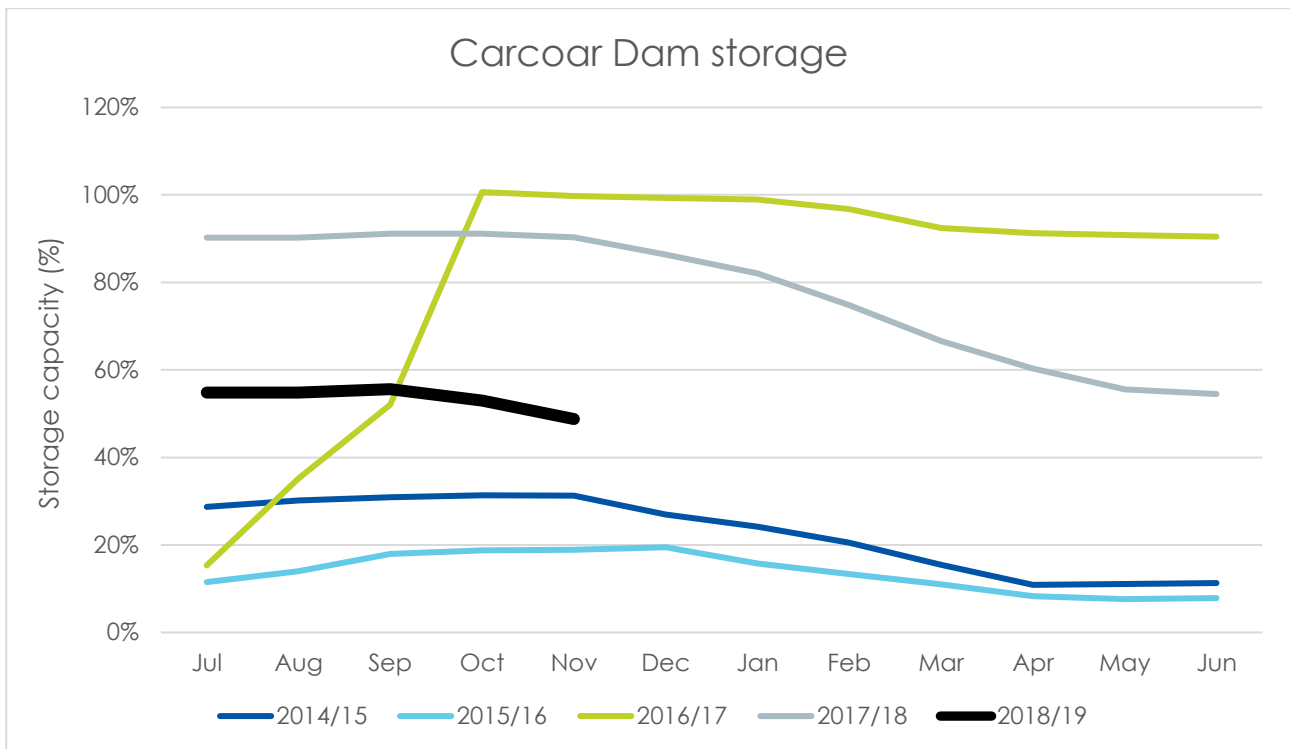
2.1 Wyangala Dam storage

The below figure shows the Wyangala Dam behaviour for the 2018-19 water year compared to the last four water years. The dam was around 61% full at the start of the current water year, and by the end of October 2018, it was about 50% of capacity. No significant inflow has arrived at the dam since December 2017 resulting in a continuous decreasing trend. The inflows to Wyangala Dam from January 2018 to end of October 2018 have totalled to 40 GL, and another 210 GL's of dam inflows are required to trigger any delivery of translucent environmental water. The translucent flow period is from mid-May to mid-November at the dam.



2.2 Carcoar Dam storage

The below figure shows the Carcoar Dam behaviour for the 2018-19 water year compared to the last four water years. The Carcoar Dam volume was around 55% full at the start of the current water year (2018-19) and has dropped to about 49% by the end of October 2018. No significant inflow has arrived at the dam since end of last water year.



3. Supplementary access

3.1 Commentary

There was only one supplementary event announced in Belubula River so far in the current water year.

System	Commence	Cease	Volume pumped (ML)
Belubula	2/09/2018	5/09/2018	0

Access to supplementary events are not provided for in the Lachlan Water Sharing Plan (WSP).

3.2 Explanation

In the Belubula River taking of water under the supplementary water access licence is only permitted when flows at the Helensholme gauge (412033) are equal to or greater than 20 ML/day. Access to supplementary water access licence is from unregulated flows and not from water released from the dam.

4. Water availability

4.1 2018/2019 water availability for Lachlan

This information was current as 31 October 2018.

Licence category	Share component	Carryover in	AWD volume	Allocation assignments in	Allocation assignments out	Usage	Balance
Domestic and stock	10,980	0	10,980	0	0	879	10,101
Domestic and stock (domestic)	181	0	181	0	0	2	179
Domestic and stock (stock)	1,599	-10	1,599	0	0	128	1,462
Local water utility	15,545	0	15,545	0	0	2,523	13,023
Regulated water (conveyance)	17,911	0	16,657	0	0	16,657	0
Regulated river (general security - irrigation)	469,309	268,157	0	37,473	37,743	40,550	227,261
Regulated river (general security - environment)	123,492	100,746	0	8,668	42,340	4,939	70,277
Regulated river (high security - irrigation)	24,952	-5	24,952	11,431	6,556	5,564	24,259
Regulated river (high security - environment)	2,728	0	2,728	30,000	933	14,776	17,019
Grand total	666,697	368,888	72,642	87,572	87,572	86,018	363,581

Note: The general security balance includes hold account volume of 21,050 ML, all the values in the table are in ML

General security available water determination

Date	AWD (ML/share)	Total
01/07/2018	0	62%

A total of 368,903 ML of General Security (GS) water has been carried over into 2018-19, which is equivalent to 62% of the share entitlement. The announced use limit for 2018-19 has been 100%. Therefore, of the 368,903 ML of GS account balances on 1 July 2018, about 347,900 ML is in the 'take' sub-accounts and about 21,000 ML is in the 'hold' sub-accounts.

As in the past years, water allocations have been traded from general security licence into high security licence accounts, mainly for the ease of operation of accounts. To date a total of 33,942 ML net has been traded into high security accounts.

In the current water year (2018-19), 0% AWD (Available water determination) has been announced on 1st July 2018 for GS. For other water users (e.g. High Security and Town Water Supply), the announced AWD is 100%.

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.

4.2 2018/2019 water availability for Belubula

This information was current as 31 October 2018.

Licence category	Share component	Carryover in	AWD volume	Allocation assignments in	Allocation assignments out	Usage	Balance
Domestic and stock	170	0	170	0	0	0	170
Domestic and stock (domestic)	8	0	8	0	0	0	8
Domestic and stock (stock)	44	0	44	0	0	0	44
Regulated river (general security)	22,454	15,483	0	632	632	2,863	12,620
Regulated river (high security)	1,095	0	1,095	0	0	113	982
Supplementary water	3,125	0	3,125	0	0	0	3,125
Grand total	26,896	15,483	4,442	632	632	2,976	16,949

Note:., all the values are in ML

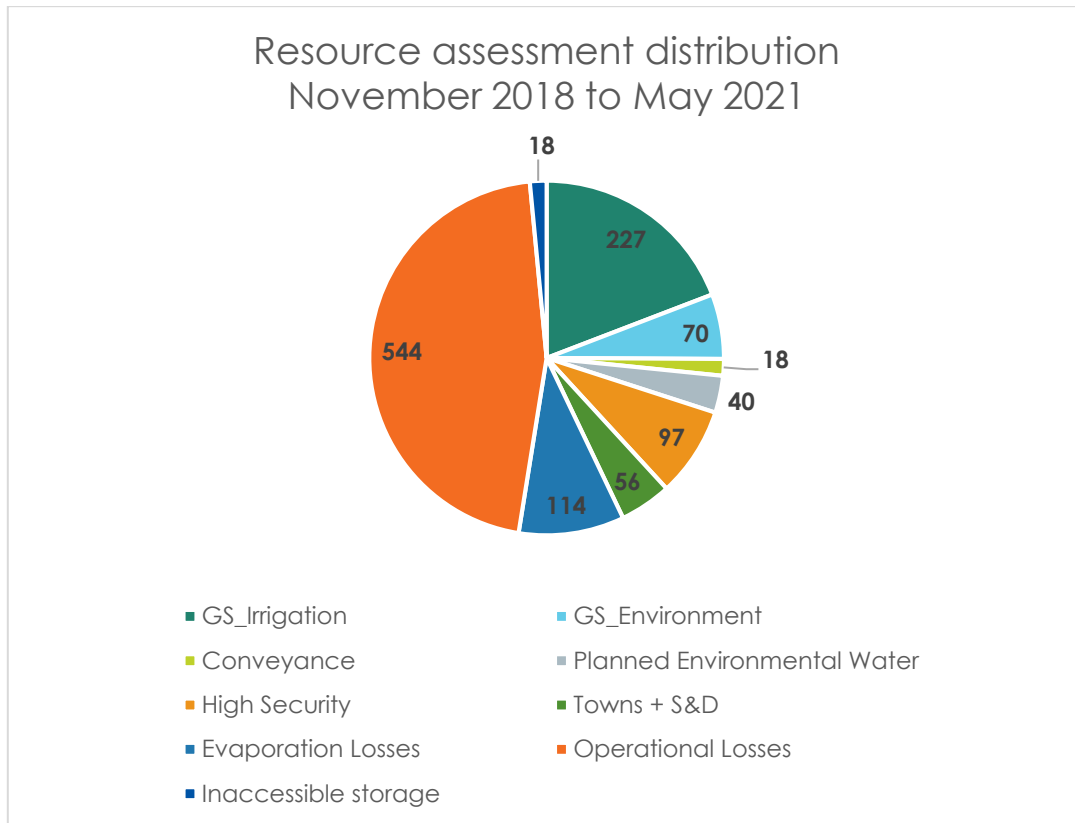
General security available water determination

Date	AWD (ML/share)	Total
01/07/2018	0	69%

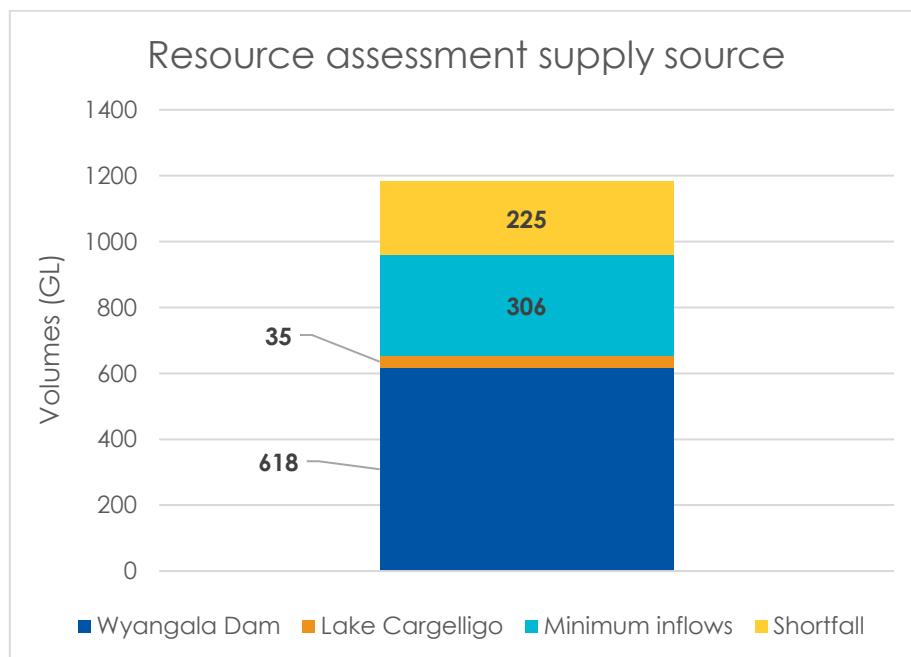
A total of 15,483 ML of allocations has been carried forward into 2018-19 by GS Accounts, which is equivalent to 69% of share component.

In the current water year (2018-19), 0% AWD has been announced on 1st July 2018 for GS. For other water users (e.g. High Security and Town Water Supply), the announced AWD is 100%.

4.3 Resource assessment - Lachlan



Note: Volumes in the pie chart are in GL.



Based on the above resource distribution chart, total amount of water required to fulfil the demand from November 2018 to May 2021 is 1,184 GL, whereas, total resource available is 959 GL, which results in a shortfall of about 225 GL. Total resource availability has been calculated based on the end of October storages volume in Wyangala Dam, Lake Cargelligo and Lake Brewster, plus minimum forecast inflow from November 2018 to May 2021.

Total General Security account balance is the combination of AWD volume plus carryover from the previous water year less any use and trades, which is 297 GL in the pie chart above. This general security account balance of 297 GL is made up of balances in irrigation licences of 227 GL and environmental licences of 70 GL.

For Towns, Stock, Domestic and High Security, reserves are set aside to meet 100% of these high priority entitlements to 31 May 2021. Balances in high security accounts (97 GL) include water traded in from general security licences and about 22.5 GL allocations held by environmental licences. Towns, and S&D commitments are 56 GL till 31 May 2021.

Operational losses are the conservative estimate of the volume required to run the river under dry conditions through to May 2021 to meet all demands. This mostly comprises natural transmission losses as water evaporates and soaks into the river bed. This volume includes access to basic landholder rights, end of system flows, operational surpluses and S&D replenishment deliveries in autumn 2019 and 2020. It is assumed that current tributary inflows will return to dry conditions from now onward. The loss allowance is 544 GL for the period of November 2018 to May 2021.

Resource assessment	Nov 2018	Oct 2018	Sept 2018	August 2018	July 2018	June 2018	May 2018	April 2018	March 2018
Wyangala storage Volume	618	657	701	747	750	769	800	838	882
Lake Brewster storage volume	0	0	0	0	0	0	0	0	9
Lake Cargelligo storage volume	35	27	25	31	33	26	22	21	25

Surplus water from Tribs in transit	0	0	0	0	0	0	0	0	0
Plus minimum dam inflows	189	50	62	93	132	137	145	150	154
Plus minimum trib. inflows	117	25	30	40	80	86	93	97	100
Less dead storage	-1	-1	-1	-1	-1	-1	-1	-1	-1
Less unallocated storage	-17	-16	-16	-15	-16	-15	-15	-17	-16
Less evaporation losses: Wyangala	-52	-44	-46	-46	-43	-43	-44	-46	-53
Less evaporation losses: Lake Brewster	-6	0	0	0	0	0	0	0	-3
Less evaporation losses: Lake Cargelligo	-56	-36	-36	-38	-38	-39	-38	-39	-40
Less essential supplies	-544	-368	-391	-419	-423	-431	-446	-465	-481
Less General Security balance	-297	-320	-334	-364	-368	-339	-347	-359	-384
Less other licenses balance	-171	-121	-132	-131	-126	-173	-175	-177	-184
Less planned environmental water balance	-40	-30	-30	-30	-30	-32	-41	-41	-44

Less tribs. In transit but not saved	0	0	0	0	0	0	0	0	0
Surplus/shortfall	-225	-177	-168	-133	-50	-55	-47	-39	-36

4.3.1 Significance of this resource assessment

Current resource assessment at 1st of November 2018 indicate that there will be no increment in AWD for General Security licenses as there is shortfall in supplies. It is estimated that inflows of around 225 GL are required in November 2018 before increment in AWD can be recommended.

4.3.2 Resource assessment process

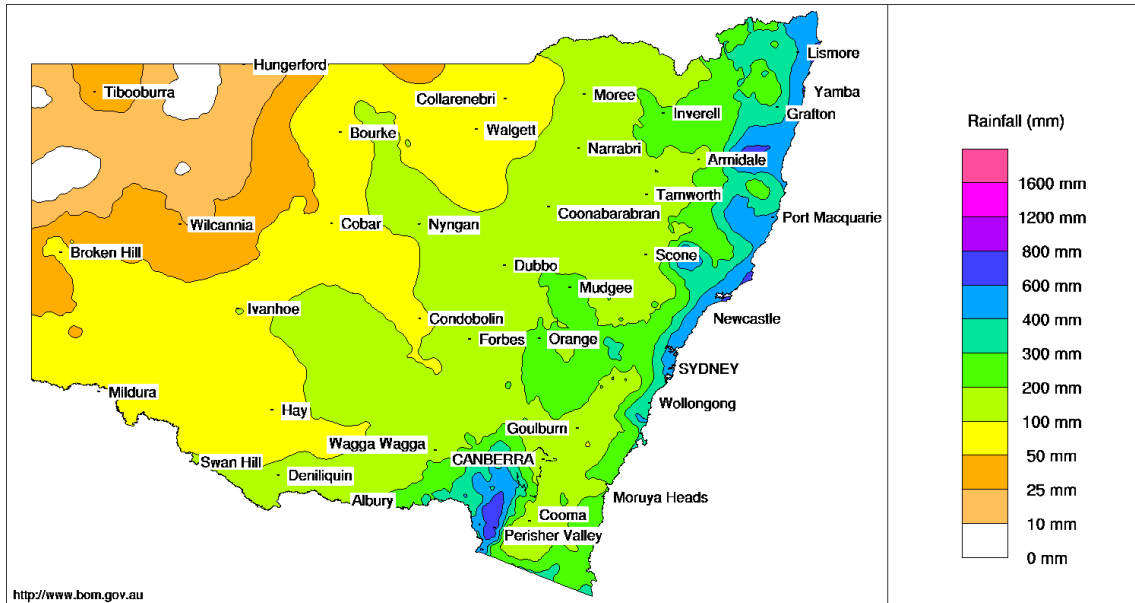
Resource Assessment is the process of calculating how much water resource is available based on the rules of the Water Sharing Plan and work approvals. This is done periodically during the year, typically at the end of the month and when any significant inflow event happens. The above resource assessment table indicates that the latest resource assessment has been done for 1st of November 2018. The planning horizon for this resource assessment is November 2018 to May 2021.

From the above table, at 1st of November 2018, total available resource is $618 + 35 + 306 = 959$. Afterwards, commitments for the planning horizon are subtracted, to find the remaining available resource for GS AWD announcement. From the table, total commitment is about 1,184 GL, which is higher than the total available resource. Therefore, no general security AWD announcement is currently possible.

5. Rainfall

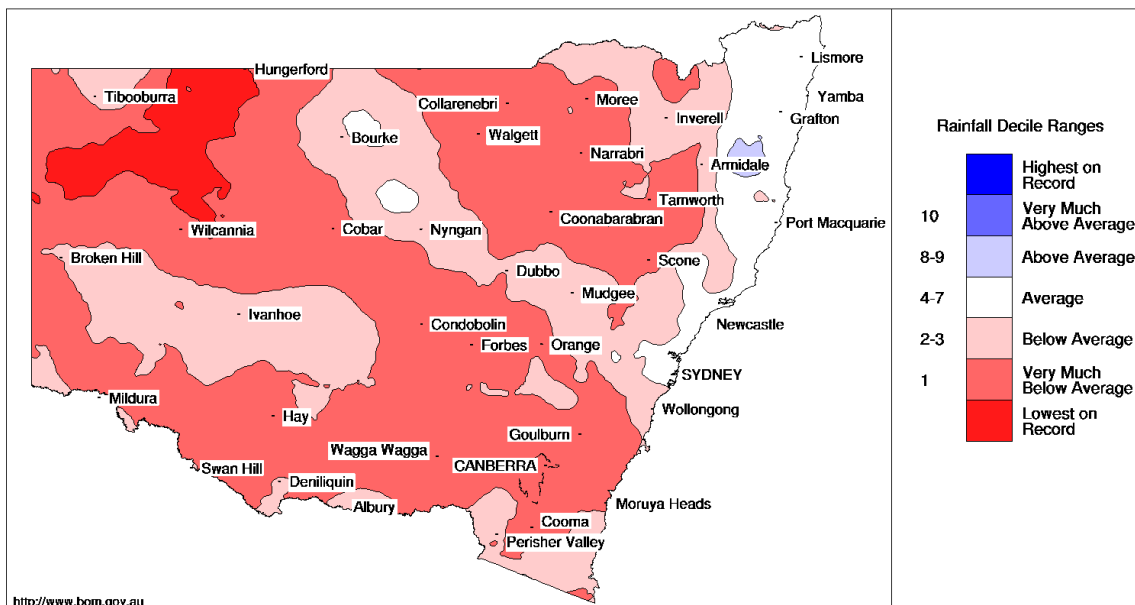
5.1 6-month rainfall

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

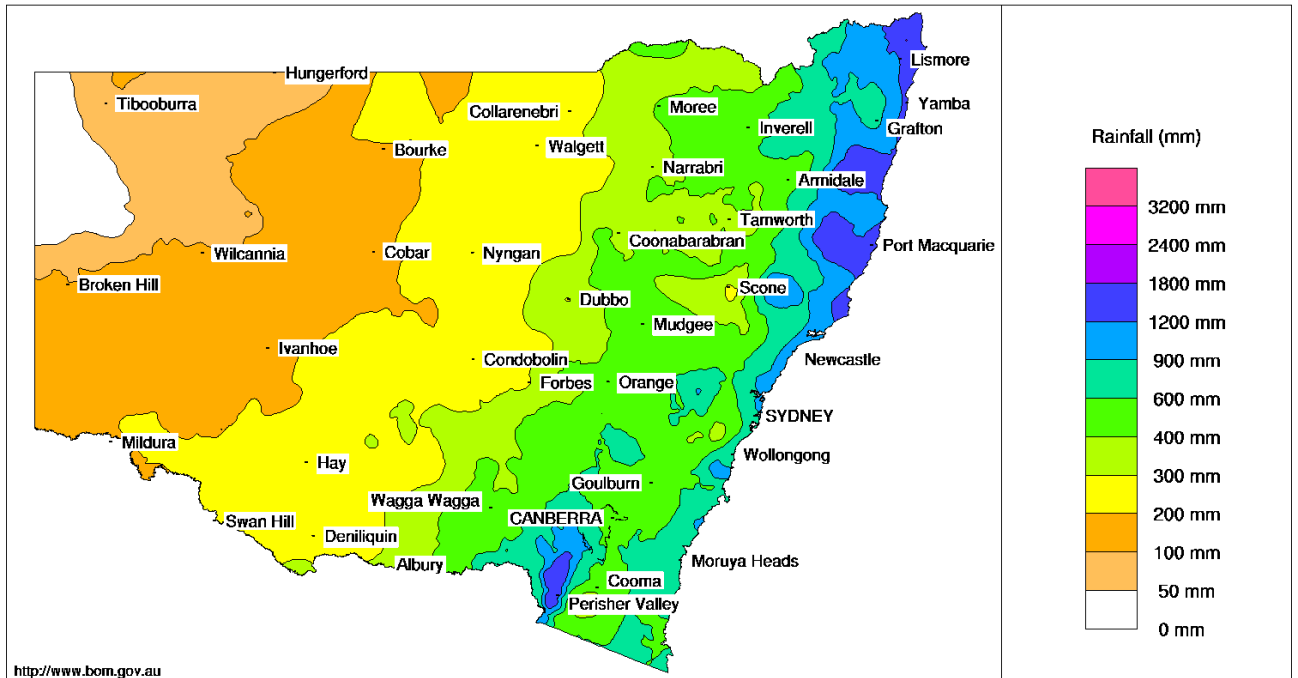


http://www.bom.gov.au © Commonwealth of Australia 2018, Australian Bureau of Meteorology ID code: AWAP Issued: 03/11/2018

From the above figures the last 6-month total rainfall is in between 100 to 200 mm, which is in the very much below average.

5.2 12-month rainfall

New South Wales Rainfall totals (mm) 1 November 2017 to 31 October 2018
Australian Bureau of Meteorology



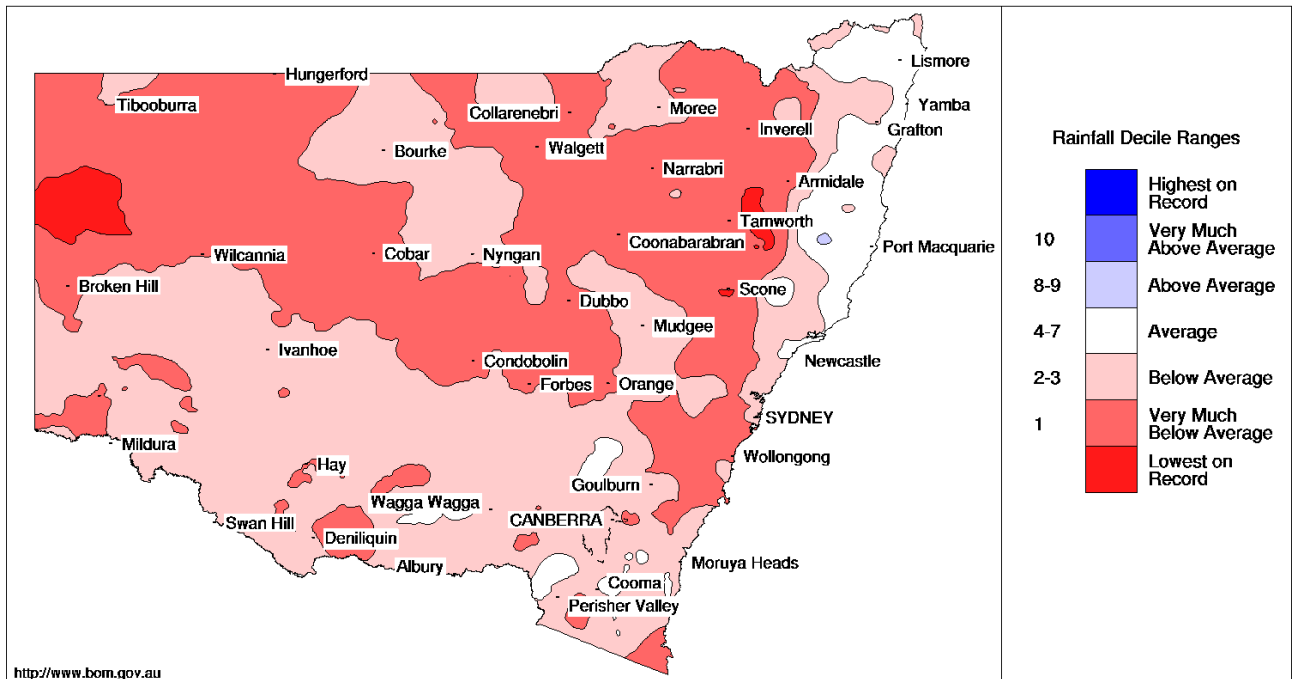
<http://www.bom.gov.au>

© Commonwealth of Australia 2018, Australian Bureau of Meteorology ID code: AWAP

Issued: 03/11/2018

New South Wales Rainfall Deciles 1 November 2017 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

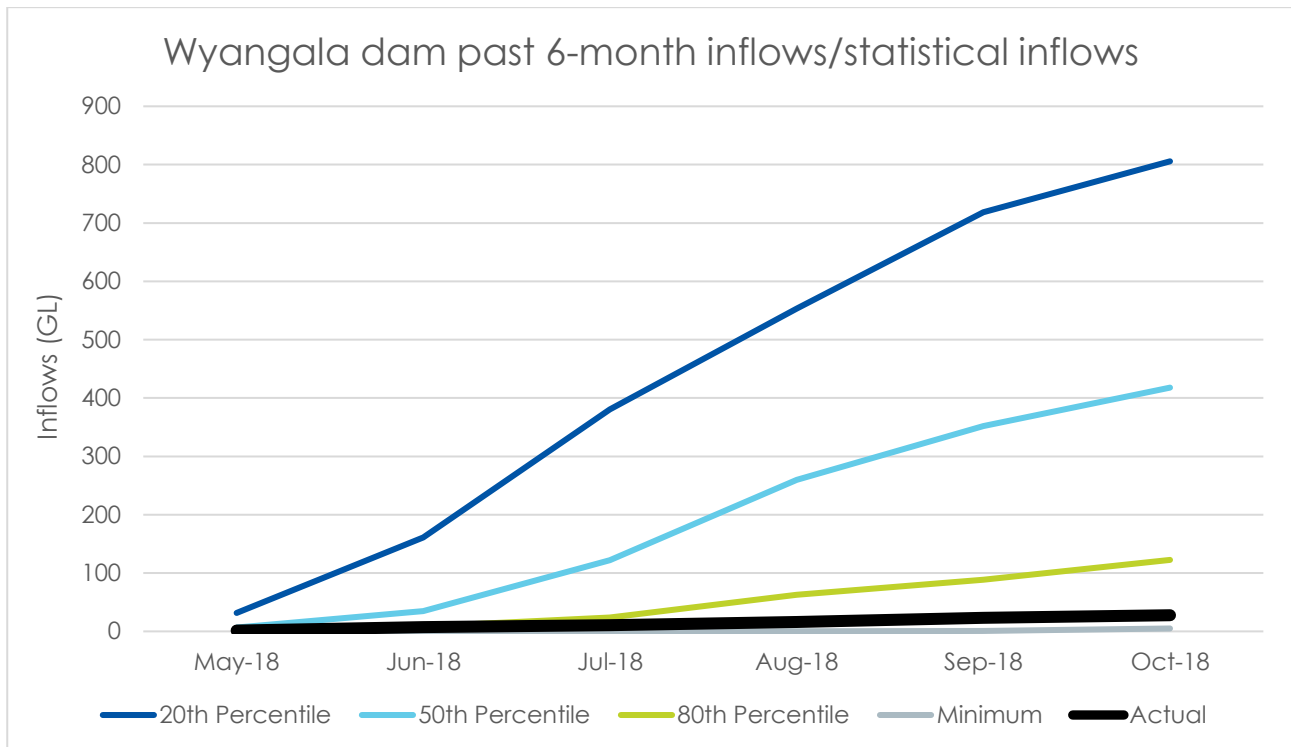
Issued: 03/11/2018

From the above figures the last 12-month total rainfall is in between of 200 to 300 mm, which is very much below average.

6. Inflows

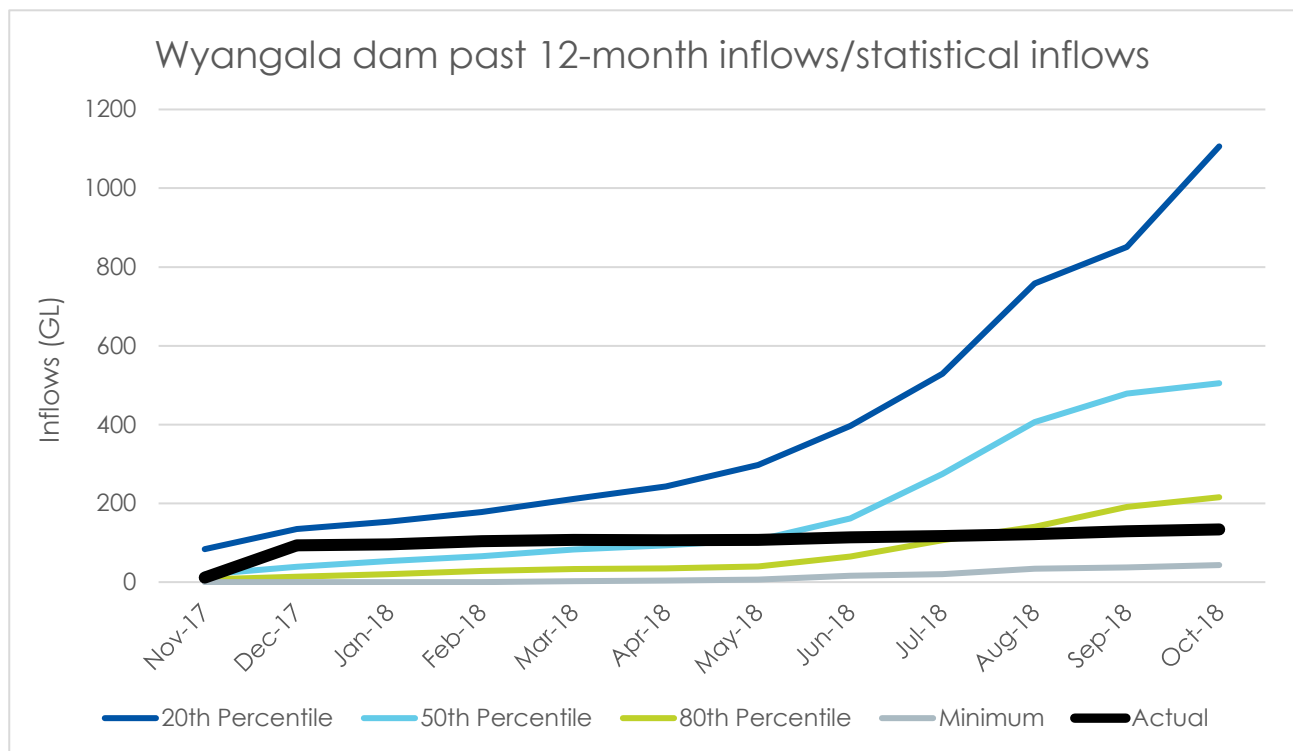
6.1 Wyangala Dam inflows

6.1.1 Wyangala Dam past 6-month inflows/statistical inflows



Inflows are consistent with rainfall over the past 6-month period. Actual inflow for last 6 months is around 28 GL, currently better than 99th percentile inflow condition but very much below the 80th percentile inflow condition.

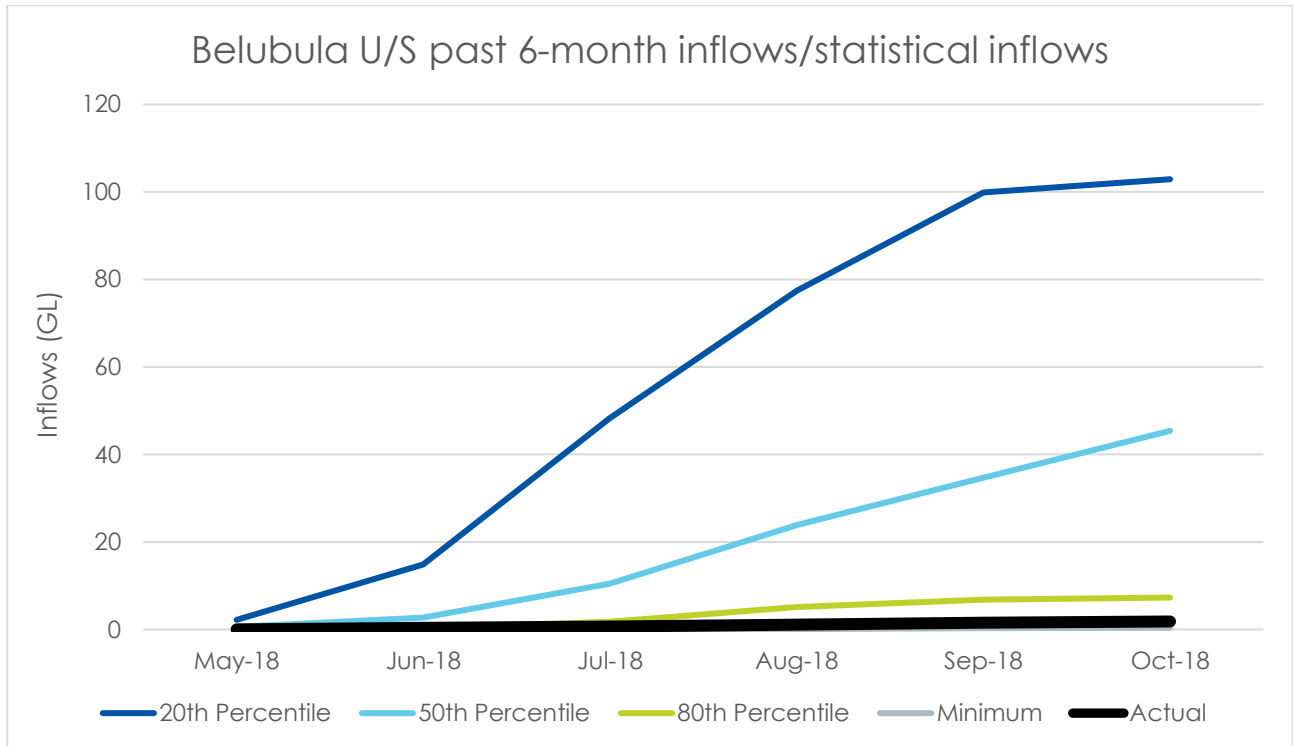
6.1.2 Wyangala Dam past 12-month inflows/statistical inflows



Inflows are consistent with rainfall over the past 12-month period. Actual inflow for the last 12 months is 134 GL, currently better than 99th percentile inflow condition but below the 80th percentile inflow condition. No significant inflows were recorded after Dec 2017.

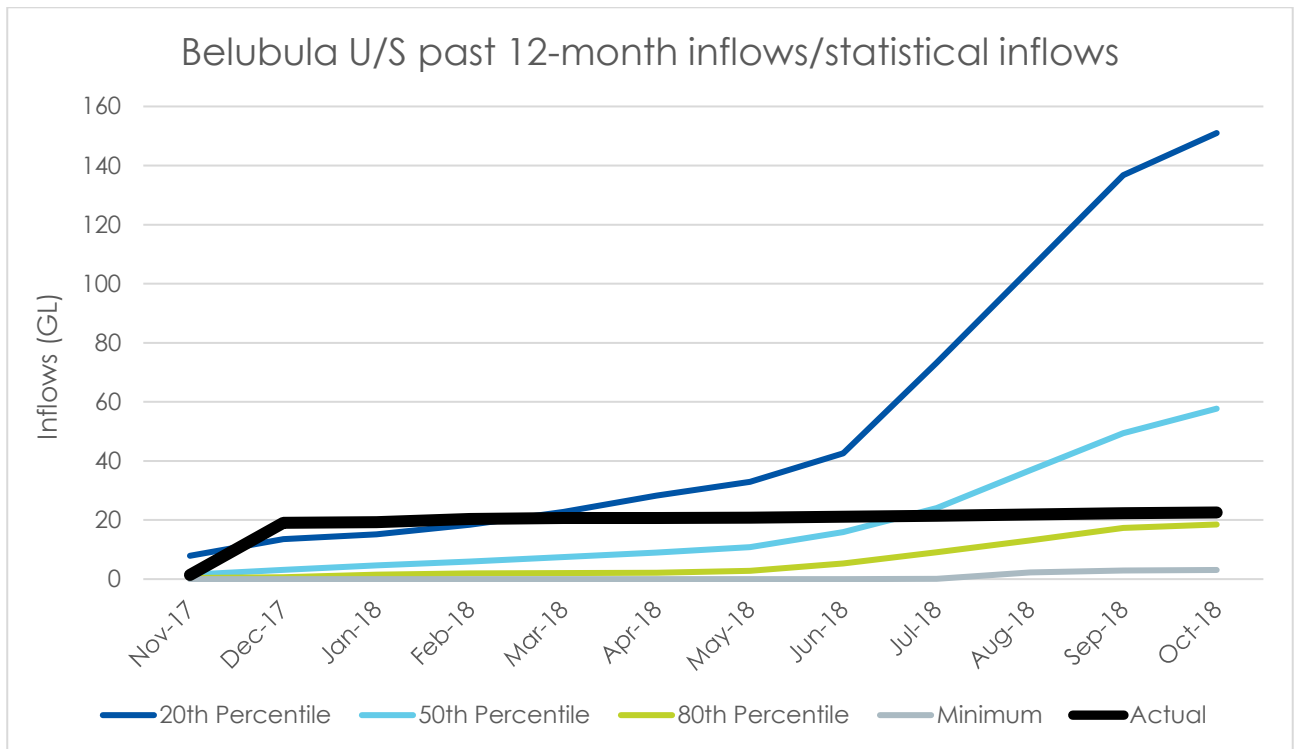
6.2 Tributary inflows U/S Belubula Junction

6.2.1 Belubula U/S past 6-month inflows/statistical inflows



Inflows are consistent with rainfall over the past 6-month period. Actual inflow for the last 6 months is around 2 GL, currently better than 99th percentile inflow condition but below the 80th percentile inflow condition.

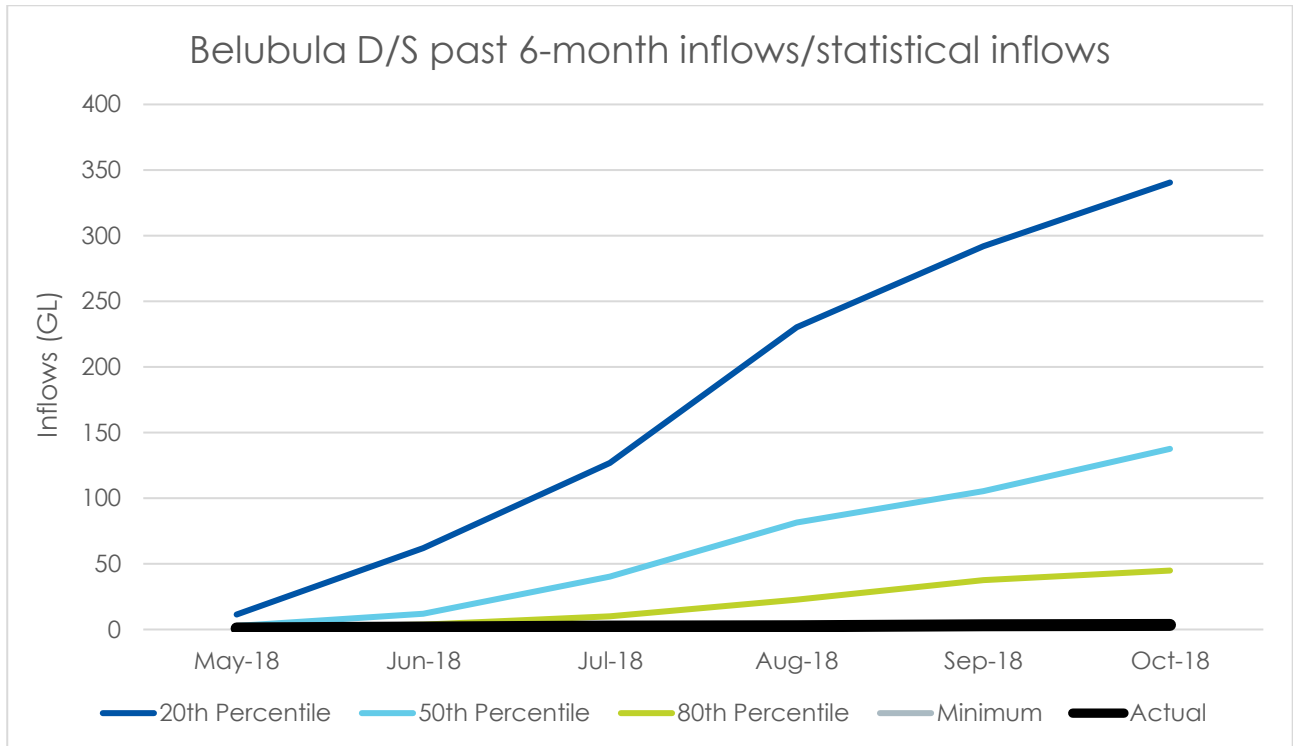
6.2.2 Belubula U/S past 12-month inflows/statistical inflows



Inflows are consistent with rainfall over the past 12-month period. Actual inflows for the last 12 months were 23 GL, currently trending at 80th percentile inflow condition. Significant inflow of around 18 GL was recorded in Dec 17 and dry conditions thereafter.

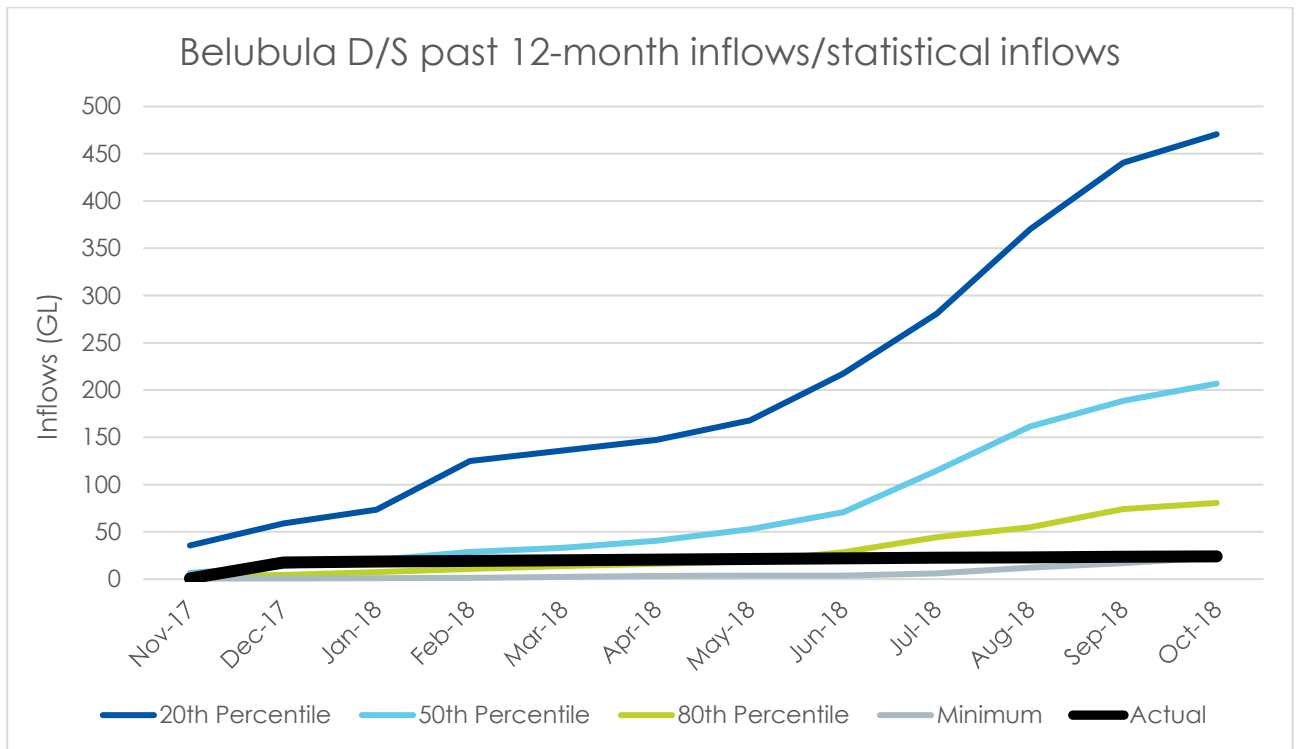
6.3 Tributary inflows D/S Belubula Junction

6.3.1 Belubula D/S past 6-month inflows/statistical inflows



Inflows are consistent with rainfall over the past 6-month period. Actual inflows for the last 6 months were around 3 GL. Current inflow conditions are following the 99th percentile inflow condition.

6.3.2 Belubula D/S past 12-month inflows/statistical inflows

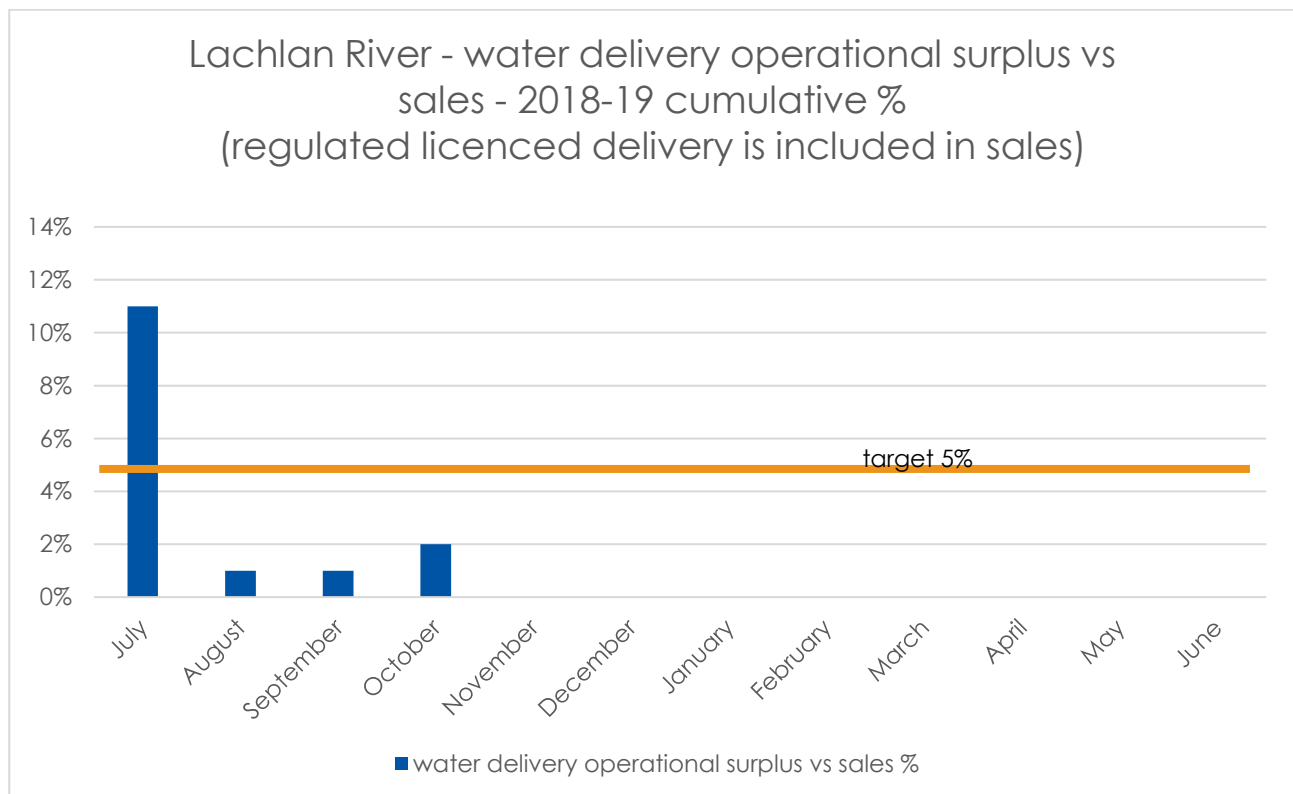


Inflows are consistent with rainfall over the past 12-month period. Actual inflow for the 12 months is 24 GL, which is following the minimum inflow conditions.

7. Operational losses

7.1 Operational losses for Lachlan

Operational loss is water above that which could reasonably be expected to pass the last extraction point on each given river/creek 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 the current water year, 2018-19, which is around 4%. The average operational corporate target is 5%.



Lachlan cumulative totals

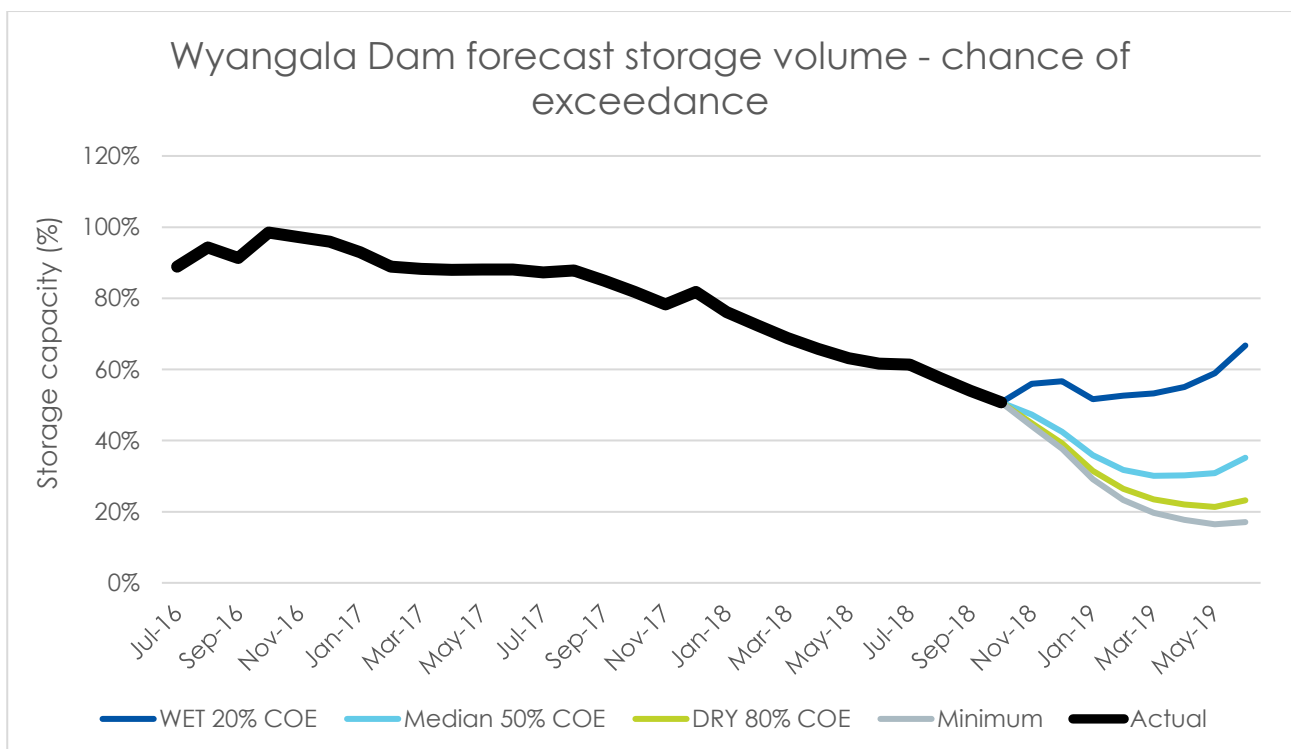
Dates	Sales + environmental delivery (ML)	Operational surplus (ML)	Actual	Target
July	3,658	392	11%	5%
July-Aug	32,122	468	1%	5%
July-Sep	58,452	351	1%	5%
July-Oct	86,017	1,328	2%	5%

Explanation:

Lachlan WSP requires a visible flow to be maintained in the Lachlan River at Geramy (Great Cumbung swamp). WaterNSW sets an operational target flow at Booligal to meet the requirements of the WSP. Normally an average flow of about 20-30 ML/day in cooler months and about 70-80 ML/day in warmer months at Booligal would maintain a visible flow at Geramy. Similarly, an operational target flow of about 10 ML/d is set at Homestead in regulated Willandra Creek to minimise operational shortfalls. Regulated flows past Booligal and Homestead in excess to operational target flows are accounted as operational losses.

8. Storage forecast

8.1 Wyangala storage forecast



Above figure demonstrate the behavior of Wyangala Dam under various inflow conditions until June 2019. For example, with 20th percentile inflow the dam may be around 66% full at the end of June 2019. With the minimum inflow conditions, the dam would be only at 17% at the end of June 2019. 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.

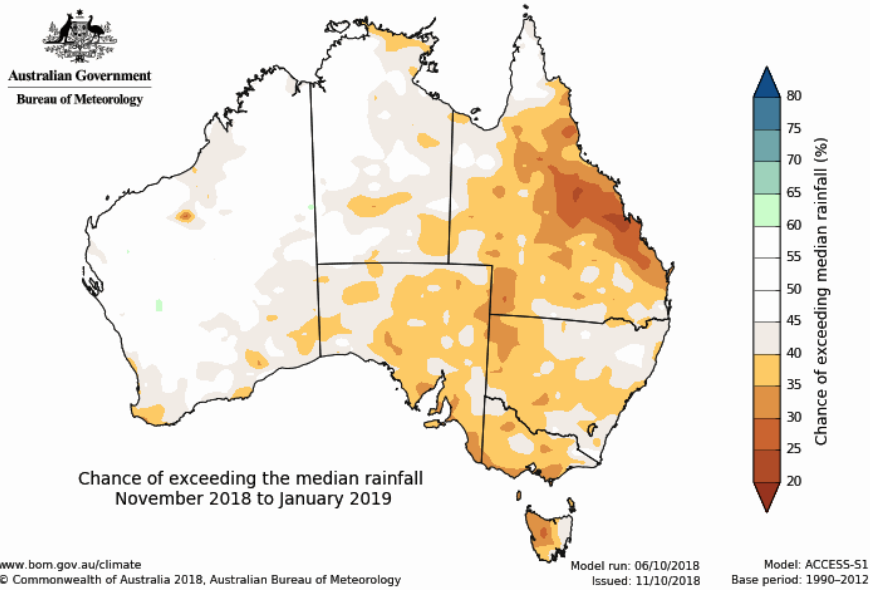
9. Outage planning

Item	Time	Description
Wyangala Dam	N/A	None
Carcoar Dam	N/A	None
Weirs	N/A	None
Regulators	N/A	None

10. Prognosis

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

	Dry (80 th percentile inflows)	Average (50 th percentile inflows)	Wet (20 th percentile inflows)
3-month forecast to 31-Jan -19	0% + 100% GS account water carried forward from 2017-18	0% + 100% GS account water carried forward from 2017-18	0% + 100% GS account water carried forward from 2017-18
8-month forecast to 30-Jun -19	0% + 100% GS account water carried forward from 2017-18	0% + 100% GS account water carried forward from 2017-18	42% + 100% GS account water carried forward from 2017-18



If the dry condition continues with 80th percentile inflow, then there will be no AWD announcement in this water year (2018-19), however 100% of carryover volume from 2017-18 will be available for the GS license holders. Even with 50th percentile inflow conditions, no increase in AWD possible. With high inflow conditions (i.e. 20th percentile inflow), AWD is likely to increase to 42% by 1st July 2019.

More information

Visit our website to view our water operations reports at waternsw.com.au/operations.

Subscribe to our customer information (weekly water availability reports, e-newsletters, etc.) at waternsw.com.au/subscribe.