

Murrumbidgee River Operations Plan

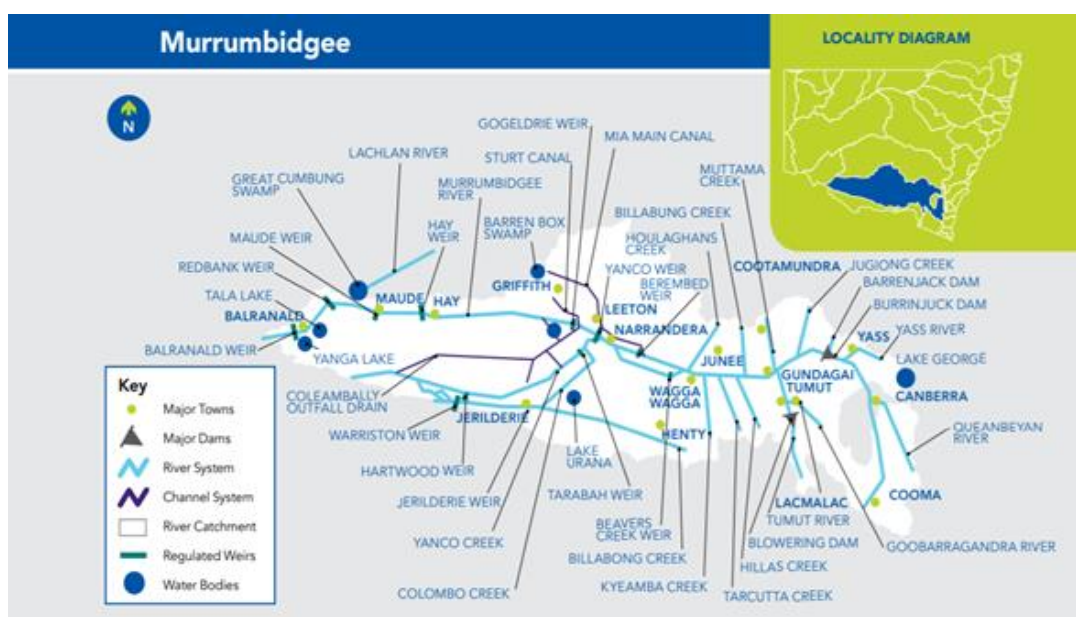
February 2019

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1. Highlights

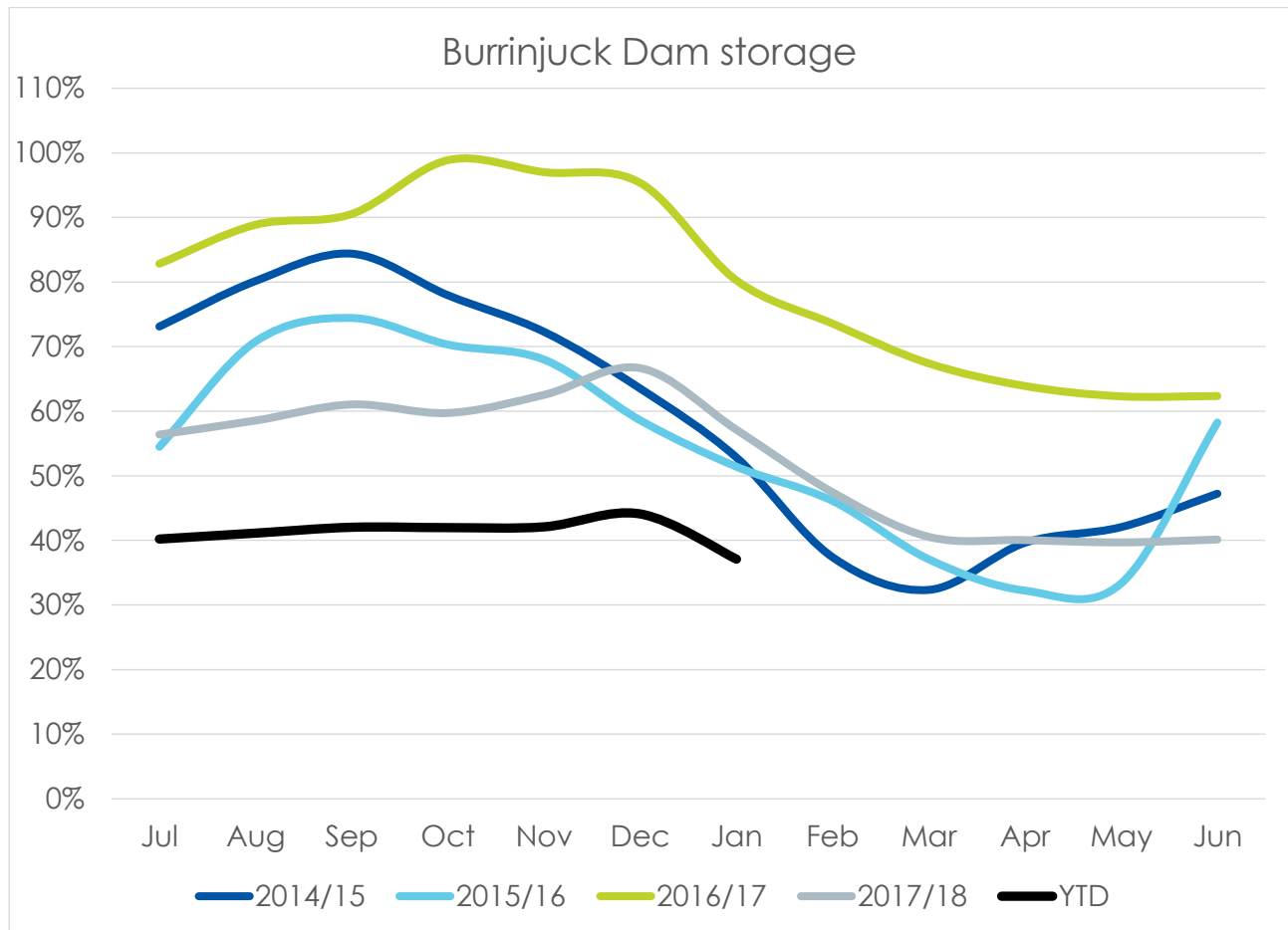
- The Water Allocation Statement published on 15th February 2019 indicated that there was no increase in AWD. The shortfall for delivery of next year's high priority needs is currently at least 150,000 ML. This shortfall is likely to be filled before 1 July by inflows greater than about 95th percentile. Inflows drier than this are likely to trigger measures under the department's Extreme Events Policy.
- The initial Available Water Determinations (AWD) are 100% for towns and 95% for high security, while general security has increased from an initial announcement of zero to 7%. Carryover into 2018-19 was about 22% of general security share components.
- BOM Climate outlook indicates that most of southern Australia in the March to May period is likely to be neither wetter nor drier than average conditions. The temperature warmer than average days and nights are likely. ENSO is currently neutral and the Outlook is at El Niño WATCH, meaning an approximately 50% chance of El Niño developing from autumn.
- Water account balances on 15th February 2019 consist of the following components:
 - Total Licensed water is about 409GL (allocation plus carryover minus usage to date).
 - Planned Environmental water - Discretionary component of about 1GL.
 - Planned Environmental water - End of system flows of about 43GL.
 - Operational losses, including transmission and evaporation losses and operational surplus of about 158GL.
 - IVT balance is remaining positive at present.



2. Dam storage

2.1 Burrinjuck Dam storage

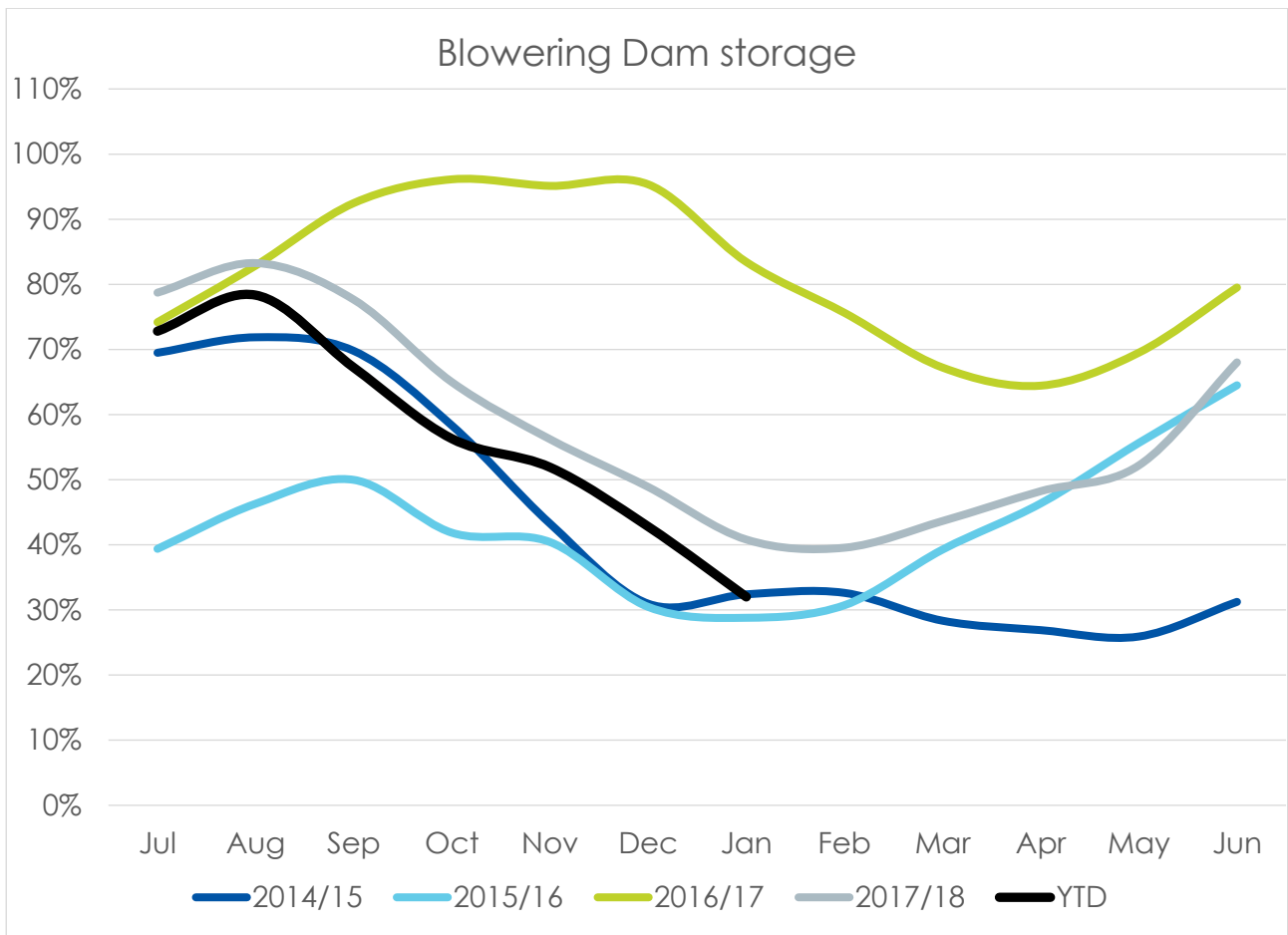
The figure below shows the Burrinjuck Dam storage behaviour for the current water year (2018-19) and for the last four water years.



Burrinjuck Dam was around 40% full at the start of water year and by the end of December has risen to 44%. The storage has fallen again to 37% by the end of January. The minimal increase is because of the inflows from mid-December rainfall event.

2.2 Blowering Dam storage

The below figure shows the Blowering Dam behaviour for the 2018-19 water year compared to the last four water years.



Blowering Dam volume was around 73% at the start of the current water year and has fallen to about 32% at the end of January 2019. This year's higher initial inflows from Snowy Hydro have been subsequently offset by significant releases made from Blowering Dam for irrigation and environmental watering.

3. Supplementary access

3.1 Commentary

No supplementary event has been triggered so far in 2018-19.

3.2 Explanation

Supplementary water, formerly known as off-allocation water, is surplus flow that cannot be captured or re-regulated in storages. When rain events result in flows that cannot be captured (regulated) in storage structures such as dams or weirs for future use, and the water is not needed to meet current demands or commitments, then supplementary access may be announced. Supplementary flow events can occur at any time and therefore access is purely opportunistic.

Supplementary access is made available when flows are in excess of those needed for; environmental water rules, domestic stock and native title rights, and water orders for other licence categories. Supplementary access announcements also consider the water required to fill Lake Victoria when Murrumbidgee general security Available Water Determinations (AWD) are above 70% and the NSW Murray valley's AWD plus carryover is less than 60%.

3.3 Uncontrolled flow access to general security licences

During announced supplementary events, those holding General Security Water Access Licenses may also pump water 'without debit' during these periods under the following circumstances.

Whenever the effective available water for general security is less than or equal to 0.7 ML/unit of share component, and until the total amount extracted without debit, plus the effective available water is less than 0.85 ML/unit of share component.

NOTE: The effective available water for the general security is defined as AWD plus "the maximum of zero or the average carryover from the previous water year less 0.15 ML per unit share".

$$\text{Average Carryover} = \frac{\text{Volume of water carried over by all general security licences as of 1 July}}{\text{Total share entitlements of general security category}}$$

4. Water availability

4.1 2018/19 water availability for Murrumbidgee at 15 February 2019

Licence category	Share component	AWD Volume	Carryover In*	Allocation assignments in	Allocation assignments out	Usage	Account Balance
Coleambally irrigation (conveyance)	130,000	111,605	4,557	0	6,411	89,691	20,060
Domestic and stock	20,993	20,993	-1	0	0	12,995	7,997
Domestic and stock [domestic]	271	271	-20	0	0	25	226
Domestic and stock [stock]	12,883	12,883	0	0	0	8,796	4,087
Local water utility	23,816	23,816	0	109	500	5,214	18,211
Murrumbidgee irrigation (conveyance)	243,000	154,111	7,376	0	14,314	127,359	19,815
Regulated river (conveyance)	2,968	208	79	0	0	0	287
Regulated river (general security)	1,891,995	132,436	407,068	264,756	234,430	300,275	269,555
Regulated river (high security)	360,298	336,281	-2	12,497	38,464	259,894	50,418
Regulated river (high security) [Aboriginal cultural]	2,150	2,150	0	0	0	0	2,150
Regulated river (high security) [research]	300	300	0	0	0	283	17
Regulated river (high security) [town water supply]	19,769	19,769	0	0	0	19,769	0
Supplementary water	198,780	198,300	0	26,309	26,496	0	198,113
Supplementary water (Lowbidgee)	747,000	747,000	0	393,117	393,117	0	747,000
Grand total	3,654,222	1,760,123	419,057	696,788	713,732	824,300	1,337,936

* Includes the carryover by the licences held by Ministerial Corporation for Snowy River Water Savings

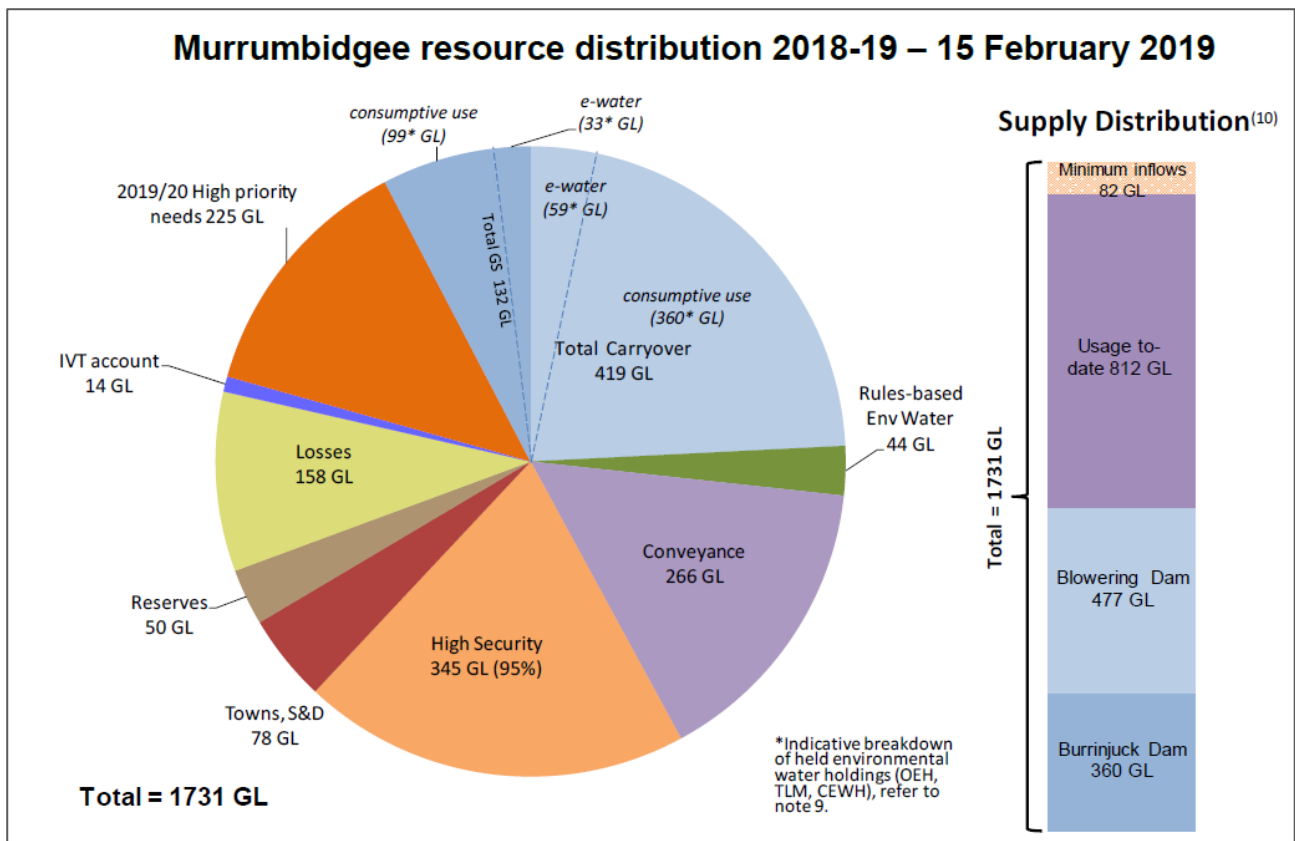
General security available water determination

Date	AWD (ML/share)	Total %
1-Jul-18	0.03	3%
16-Jul-18	0.02	5%
1-Aug-18	0.01	6%
17-Sep-18	0.01	7%

In the current water year, 7% of general security Available Water Determinations (AWD) has been announced since 1st July 2018. For High Security licenses the AWD is 95%, while all higher categories; Domestic and Stock, Local Water Utility, and other high security sub-categories' AWD is 100%. Conveyance AWDs are 85% for Coleambally, 63% for Murrumbidgee Irrigation and 7% for Regulated River Conveyance.

The total share component of regulated licenses is 2,708,442ML (excluding supplementary categories) and the sum of AWD volume is about 814,823ML. The sum of account balance refers to the amount of water available in the license accounts after adjusting for trade and usages. As of 15th February 2019, a total volume (excluding supplementary categories) of 392,823ML remained in account balances, including carryover from last water year.

4.2 Resource assessment



Note: Volumes in the pie chart are in Gegalitres. General Security volumes represent 100% carryover balance. Source: industry.nsw.gov.au/__data/assets/pdf_file/0016/216511/WAS-Murrumbidgee-190215.pdf

4.2.1 Significance of this resource assessment

The Water Allocation Statement published on 15th February 2019 indicated that there was no increase in AWD. The shortfall for delivery of next year's high priority needs is currently at least 150,000 ML. This shortfall is likely to be filled before 1 July by inflows greater than about 95th percentile. Inflows drier than this are likely to trigger measures under the department's Extreme Events Policy. The future inflows of 82GL include estimated minimum natural inflows to dams and downstream tributaries, as well as undelivered Required Annual Release (RAR) by Snowy Hydro. Burrinjuck and Blowering storages hold about 360 GL and 477 GL respectively.

4.2.2 Resource assessment process

Resource Assessment is the process of calculating how much water resource is available in the valley based on the rules of the Water Sharing Plan. The above resource assessment chart (Section 4.2) depicts the latest resource assessment done on 15th February 2019. The planning horizon for this resource assessment is from February 2019 to June 2019. There is not yet sufficient volume of water

from minimum inflows into this water source (including Snowy RAR) in 2019-20 to supply higher category requirements in that year.

The essential components of the assessment are:

- Calculation of the water currently available, including active water in storage, minimum inflows and the Snowy Hydro Required Annual Release (RAR) into Blowering Dam and partly to Burrinjuck Dam as Montane flows.
- Volumes remaining in licence accounts, planned environmental water, undelivered inter-valley trades and allowances for transmission and storage evaporation losses.
- Typically, the resource assessment is undertaken twice every calendar month from late June until there are full allocations.

The main feature in the assessment process is that at no point of time in the forecast period do Burrinjuck or Blowering Dam fall below the dead storage level before the end of the assessment period (i.e. before the 2nd winter inflows).

The resource assessment data is communicated by WaterNSW to the Department to allow the Available Water Determination on the first business day on/after the 1st and 15th of each month. On receipt of the AWD Order WaterNSW makes the necessary changes to the license accounts in the Water Accounting System and disseminates the information to the customers through customer notices and weekly report.

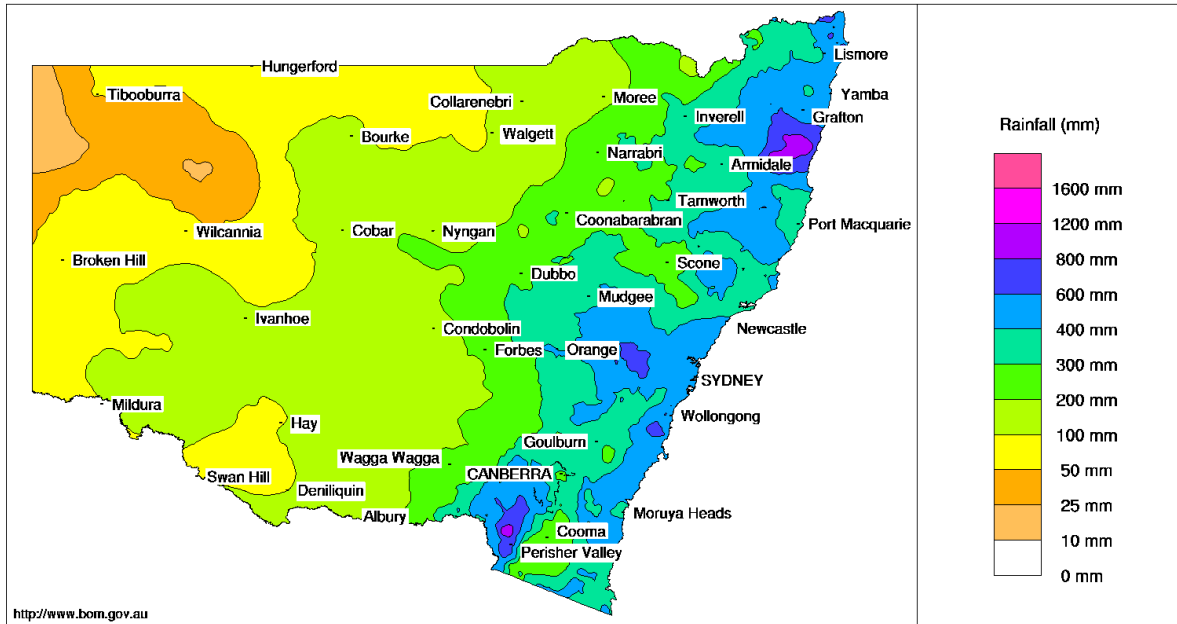
4.3 Prognosis

The chances of improved General Security Allocation, based on various possible inflow scenarios will be included in the next release.

5. Rainfall

5.1 6-month rainfall

New South Wales Rainfall totals (mm) 1 August 2018 to 31 January 2019
Australian Bureau of Meteorology

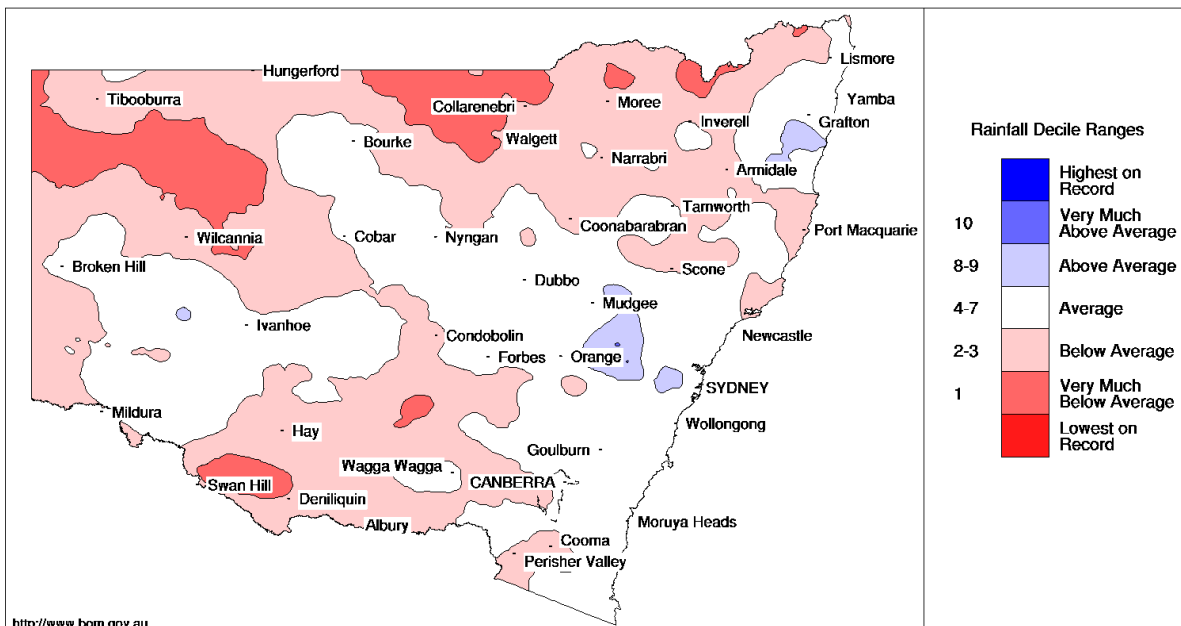


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New South Wales Rainfall Deciles 1 August 2018 to 31 January 2019
Distribution Based on Gridded Data
Australian Bureau of Meteorology



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

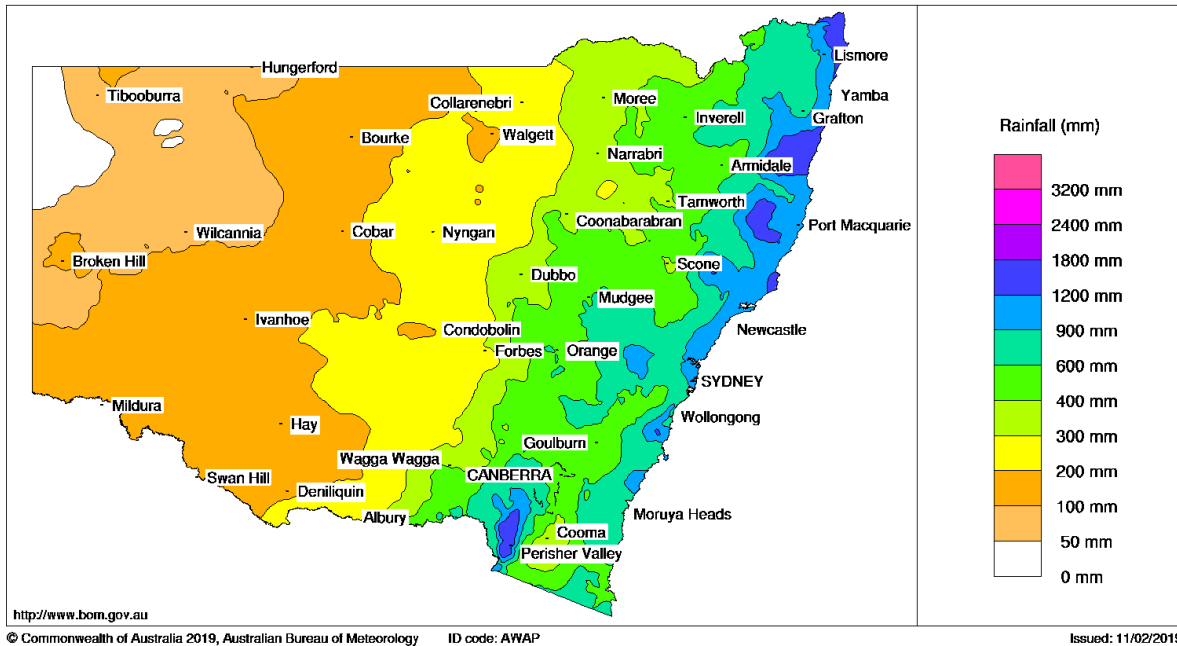
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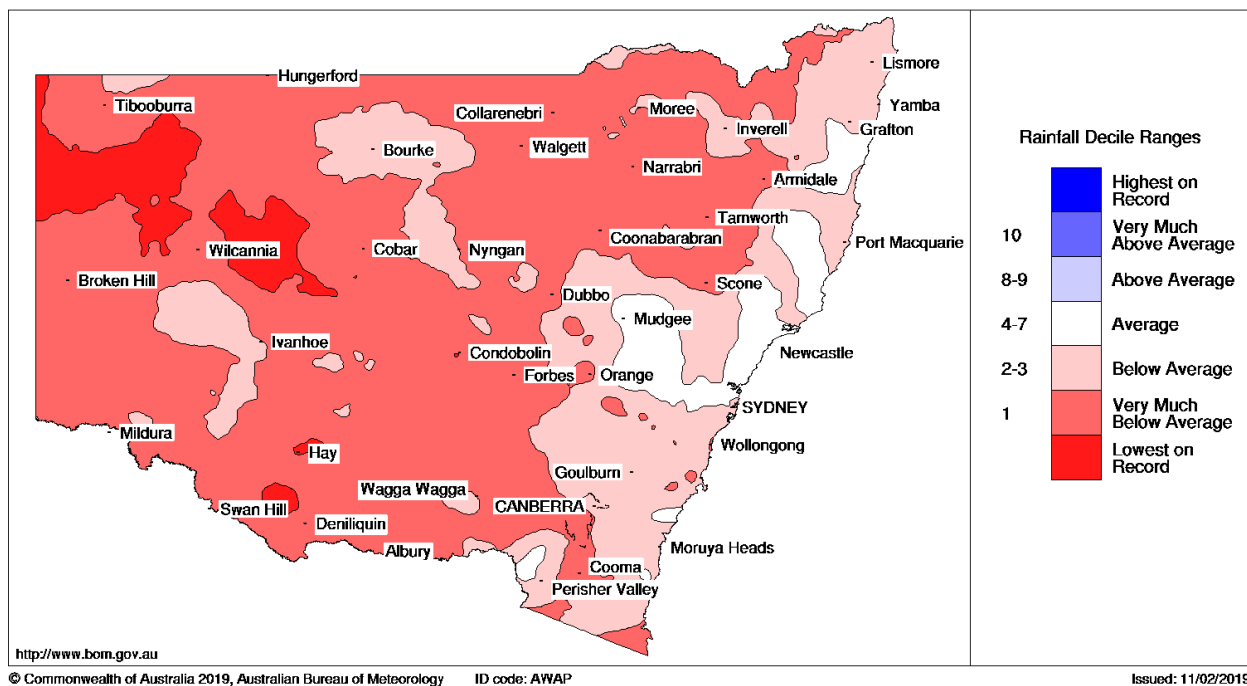
Above figures indicate that rainfall varies across the catchment. During the last 6-months, total rainfall lies in the range of 100 to 600mm which is average to below average.

5.2 12-month rainfall

New South Wales Rainfall totals (mm) 1 February 2018 to 31 January 2019
Australian Bureau of Meteorology

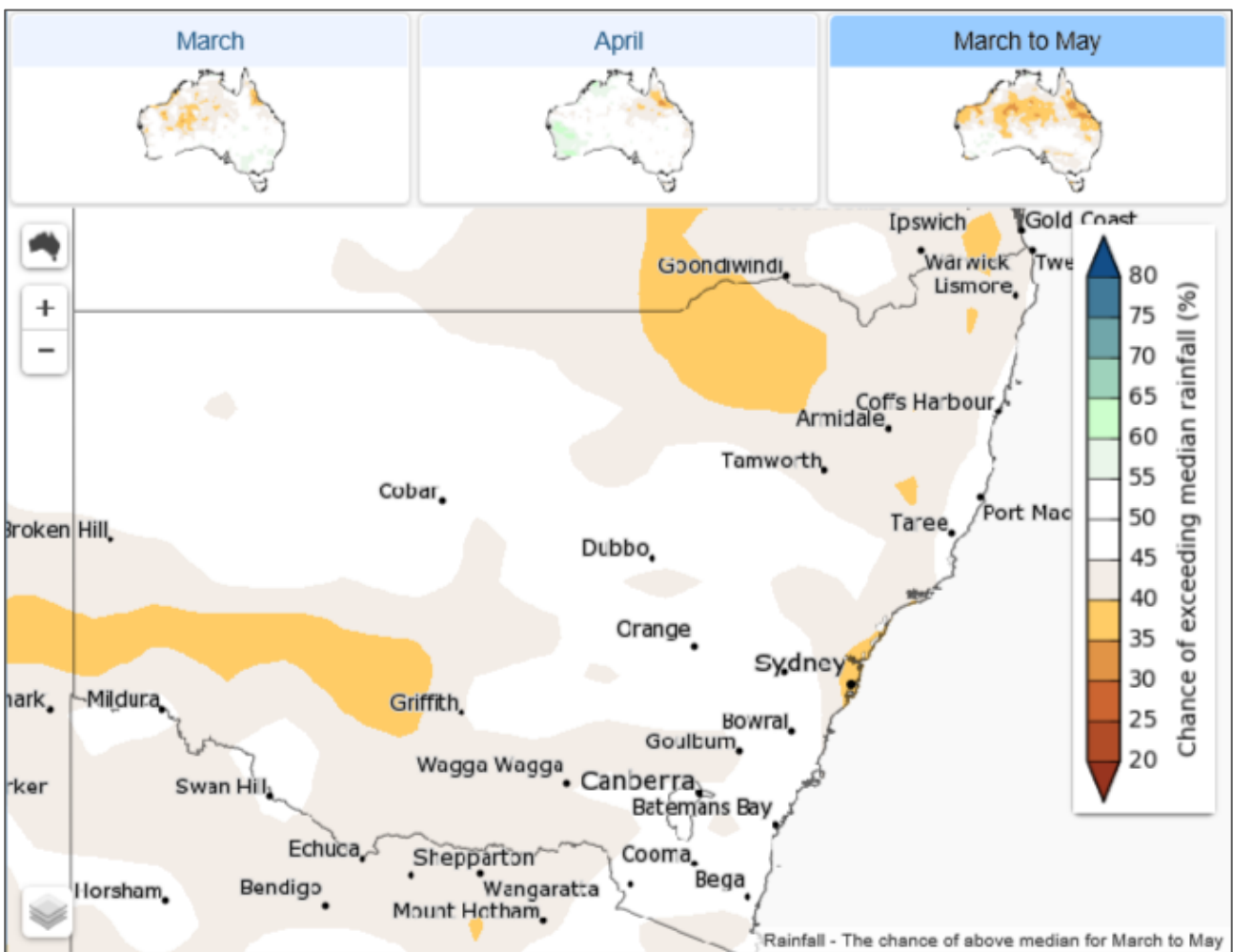


New South Wales Rainfall Deciles 1 February 2018 to 31 January 2019
Distribution Based on Gridded Data
Australian Bureau of Meteorology



Above figures indicate that 12 month rainfall varies across the catchment with total rainfall lies in the range of 100mm to 300mm in western part and 300mm to 900mm in the eastern part of the catchment. 12-month statistics indicate that Murrumbidgee catchment remained below average to very much below average conditions.

5.3 Next 3 months scenario based on BOM forecast

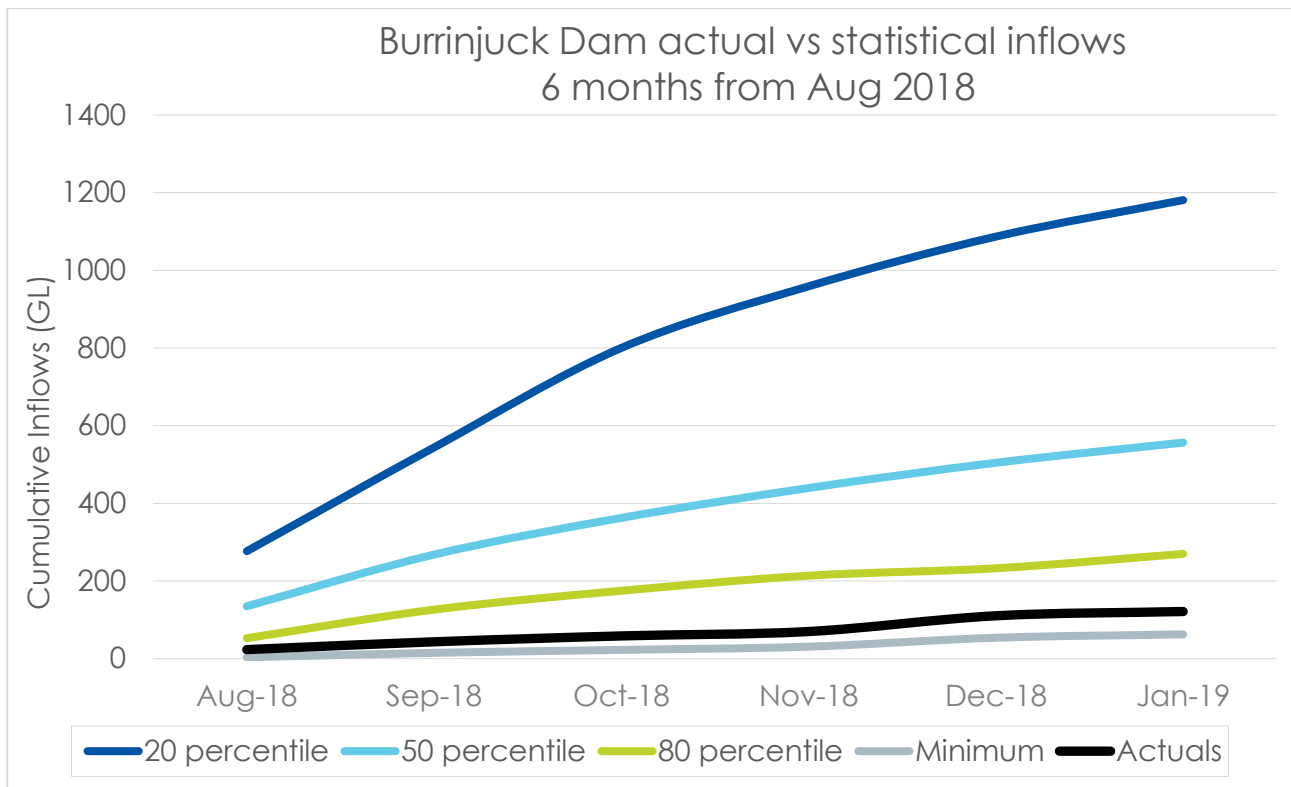


The above figure shows seasonal rainfall forecast over the next three months (March to May). The forecast rainfall is likely to be drier than median in the catchment.

6. Inflows

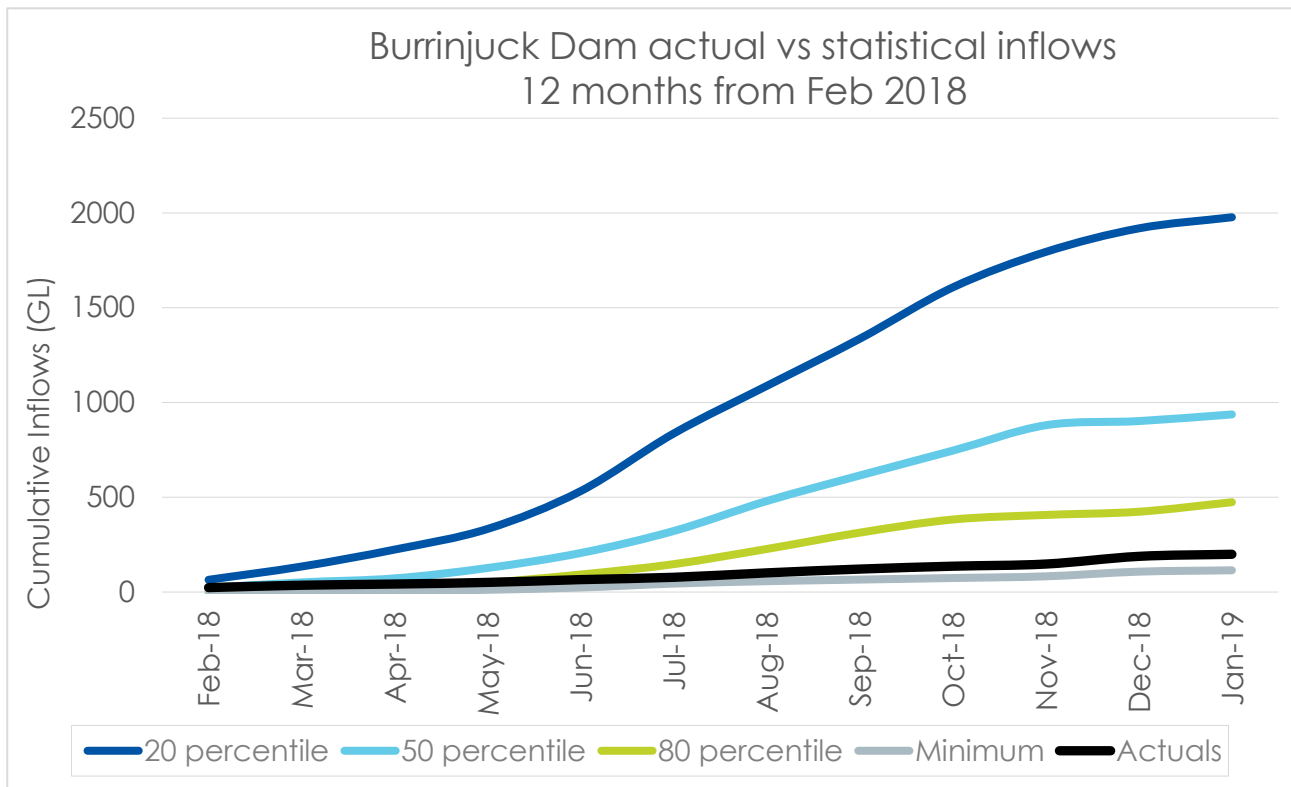
6.1 Burrinjuck Dam inflows

6.1.1 Burrinjuck past 6-month inflows - actual vs statistical



Inflows are consistent with rainfall over the past 6 months. Actual inflow for the 6 months is 121 GL in line with about 94 percentile inflows; while the minimum is 63 GL.

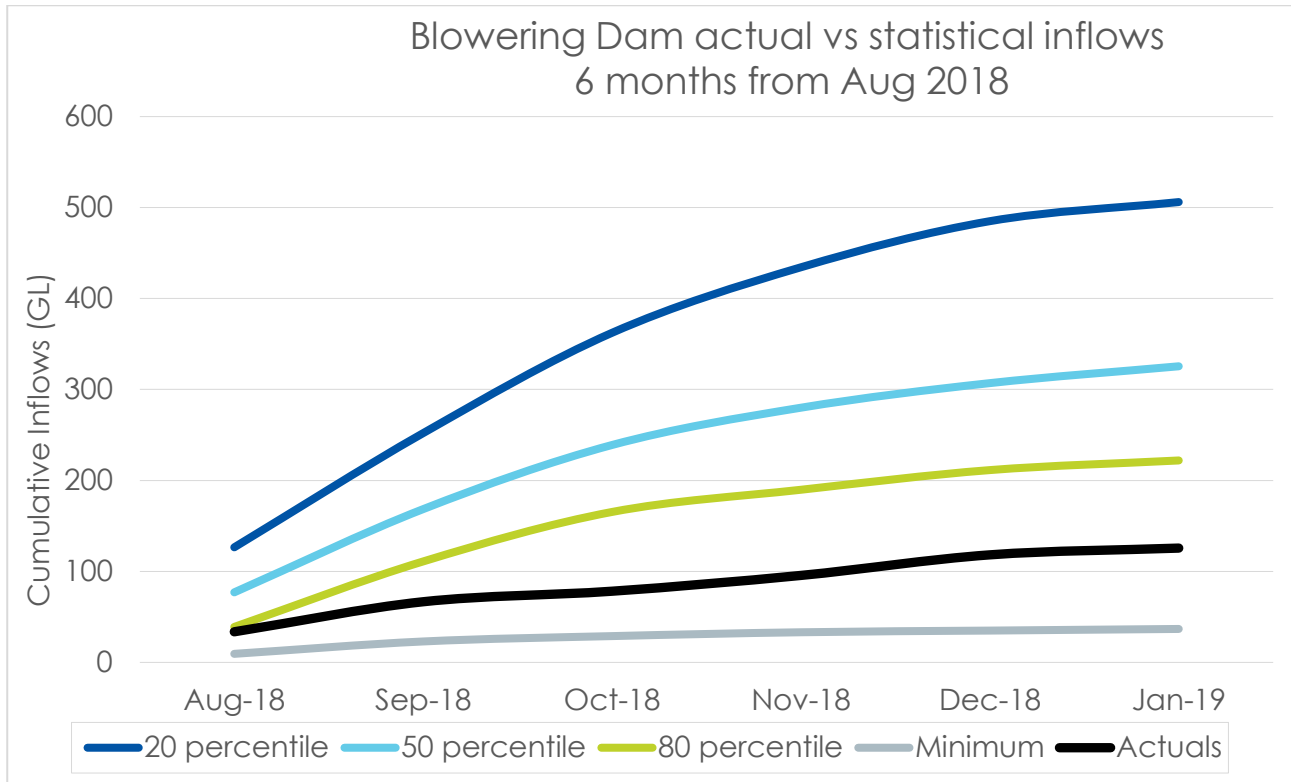
6.2.2 Burrinjuck past 12-month inflows – actual vs statistical



Inflows are consistent with rainfall over the past 12 months. Actual inflow for the 12 months is 199 GL in line with about 94 percentiles; while the minimum is 115 GL.

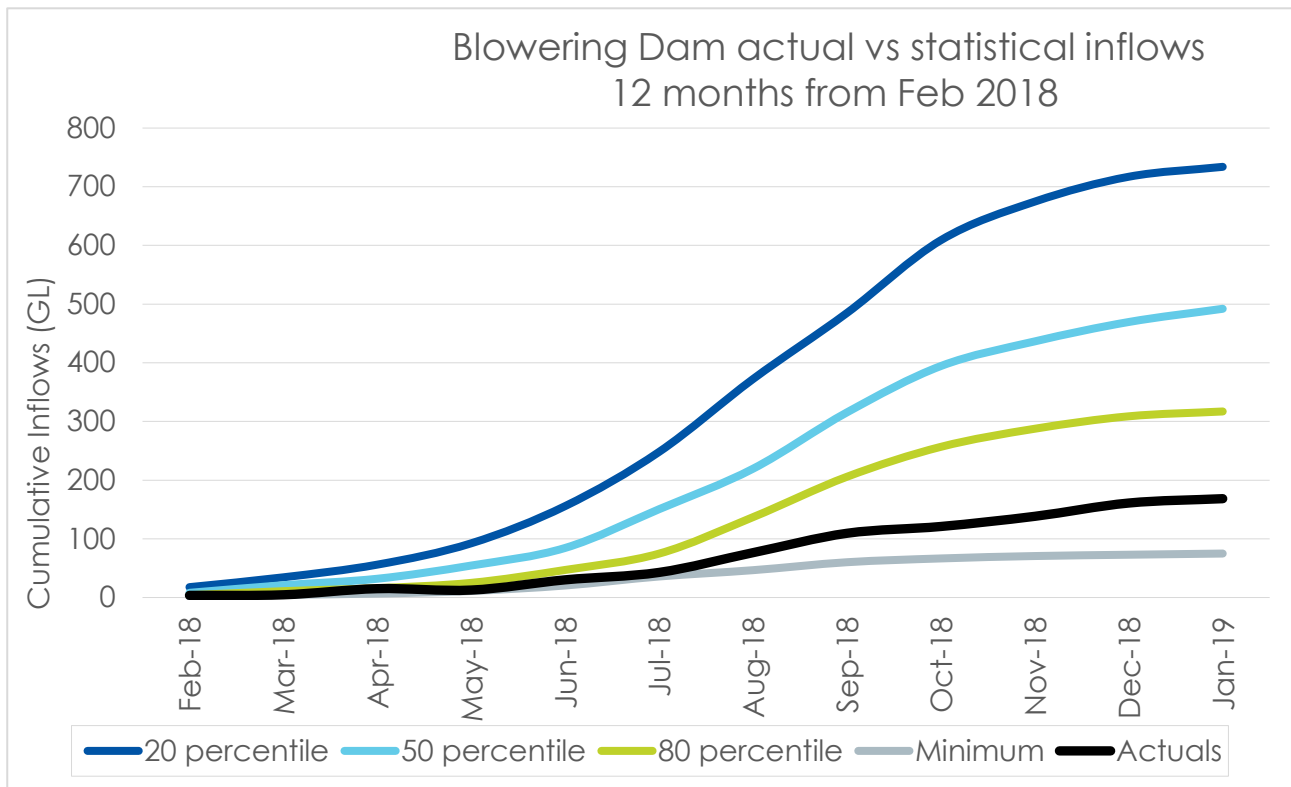
6.2 Blowering Dam inflows

6.2.1 Blowering past 6-month inflows – actual vs statistical



These inflows are exclusive of Snowy Hydro's Required Annual Release volumes. Inflows are consistent with rainfall over the past 6 months. Actual inflow for the 6 months is 126 GL in line with about 90 percentile inflows; while the minimum is 37 GL.

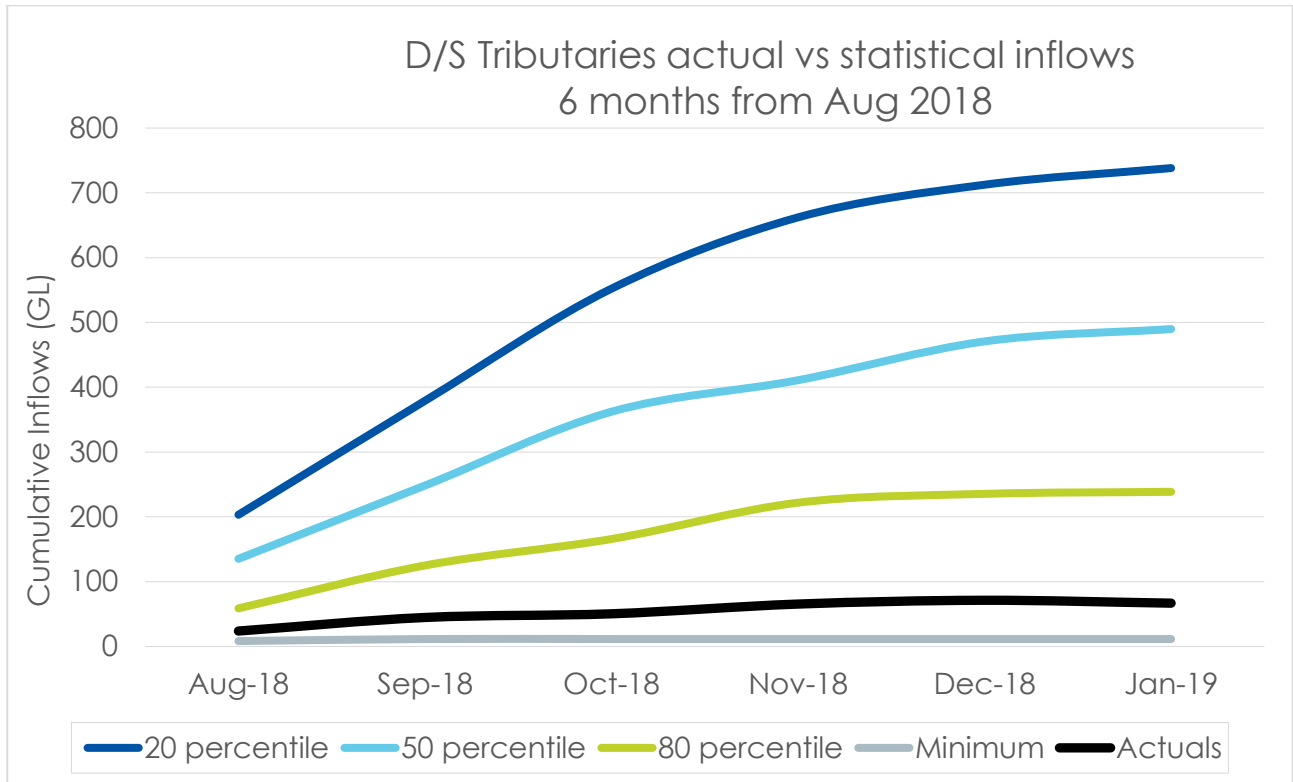
6.2.2 Blowering past 12-month inflows – actual vs statistical



Inflows are consistent with rainfall over the past 12 months. Actual inflow for the 12 months is 168 GL in line with about 92 percentile inflows; while the minimum is 75 GL.

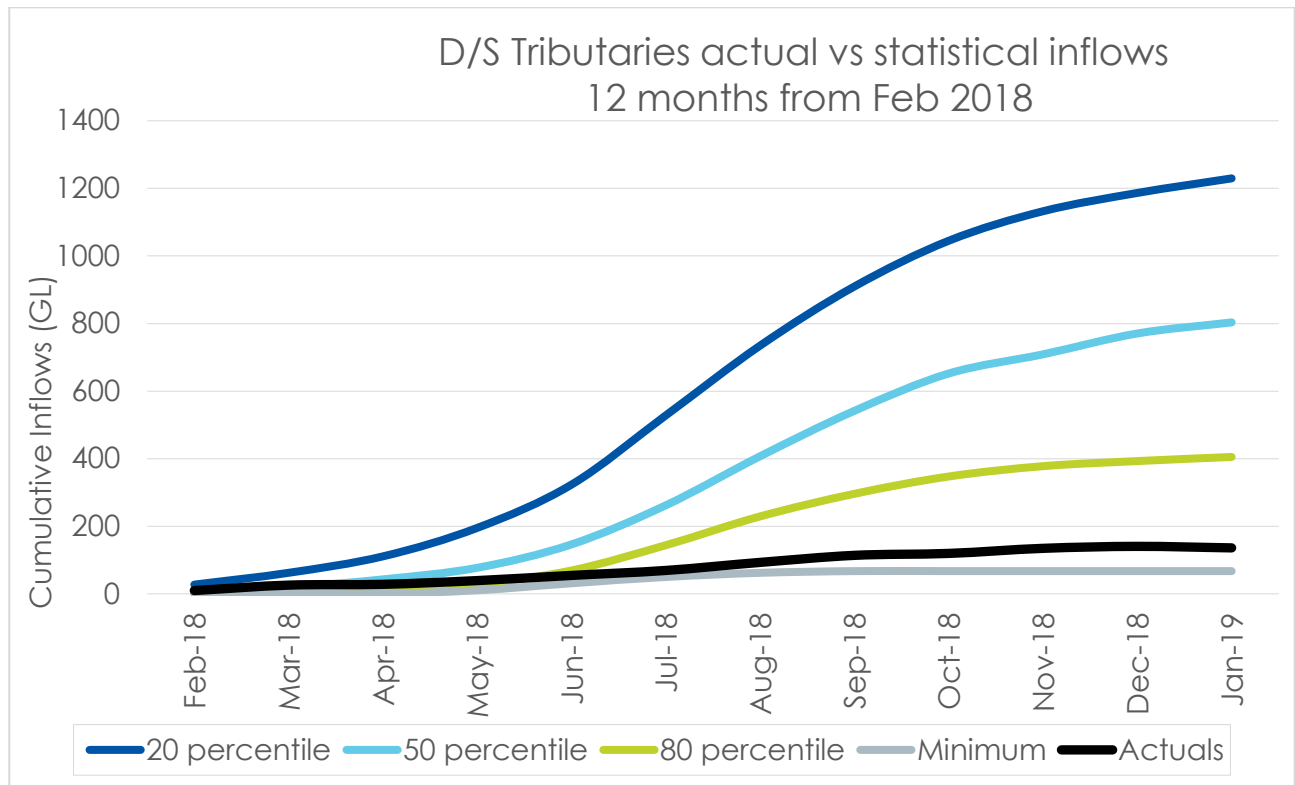
6.3 Downstream tributary inflows

6.3.1 Downstream tributary past 6-month inflows – actual vs statistical



Inflows are consistent with rainfall over the past 6 months. Actual inflow for the 6 months is 67 GL in line with about 94 percentile inflows; while the minimum is 11 GL.

6.3.2 Downstream tributary past 12-month inflows – actual vs statistical



Inflows are consistent with rainfall over the past 12 months. Actual inflow for the 12 months is 136 GL which is following 95 percentile inflow condition; while the minimum is 67 GL.

7. Inter valley transfer (IVT)

The trading of allocated water is allowed in accordance with the Water Sharing Plans between the regulated Murrumbidgee River and Murray River, Lower Darling River and Snowy River catchments.

The Murrumbidgee inter-valley transfer (IVT) account keeps track of net allocation trade to and from the Murrumbidgee valley, and the delivery of that water to the Murray. A positive IVT account balance means there is currently net trade out of the valley that has not been delivered to the Murray. Trade into the Murrumbidgee can only occur as a back-trade of water that has been traded out but not yet been delivered to the Murray. A negative value would mean net trade into the valley from downstream which cannot be physically delivered from the Murray to the Murrumbidgee valley. A negative balance means further trade into the valley is not allowed as this water cannot be physically delivered upstream.

7.1 Tagged licences

An entitlement can be 'tagged' on a register, allowing the water to be taken at the different location in another hydraulically connected valley. Like other water licenses, the tagged licenses are also subject to water ordering conditions. The license holder should place a valid water order with WaterNSW before water is extracted. The approval of such water orders is subject to prevailing IVT trade conditions.

7.2 Current status

The 2018-19 IVT opening balance was -13.5 GL. Negative balance is resulted due to tagged licence usage.

- Account Balance as at 15th February 2019 is about 1.0 GL.
- As at 15 February the IVT trade into Murrumbidgee is closed.
- As at 15 February the IVT trade out of Murrumbidgee is open.

For most recent update refer to [Murrumbidgee IVT Account](#). Customers can subscribe to IVT email at waternsw.com.au/customer-service/news/subscribe.

8 Operational surplus

8.1 Operational surplus to date

Operational surplus is water released from storage above that which could reasonably be expected to pass the last extraction point on each given river/creek. Two main causes of operational surplus are over ordering, and rain rejection during the irrigation season when the river flow is being controlled to meet consumptive demands and environmental flow requirements to minimise surpluses.

The operational surplus is deemed as nil when the system spills due to tributary inflows under wet conditions, and when the dams are on minimum release.

Operational surpluses are a significant concern in the regulated system because lost water may not be providing significant environmental benefits and it compromises the long-term water security in the valley.

In the Murrumbidgee River system, the operational surplus is measured at Balranald and Darlot. However, at times operational surplus is also noted at Bundidgerry Escape and Warriston Weir. The following chart provides the operational surplus in the valley. The chart also shows the operational surplus as a percentage of diversions in the valley (regulated sales, planned and discretionary environmental flows, and IVT delivery). WaterNSW targets the operational surplus to be less than 5%. In the Murrumbidgee Valley, delivery of IVT assists in minimising the operational surplus as the IVT delivery rates and pattern is negotiated with MDBA so that during a period of IVT delivery the operational surplus is minimal.

Operations surplus for 2018/19 in the Murrumbidgee valley is forecast to be about 62GL (upper bound).

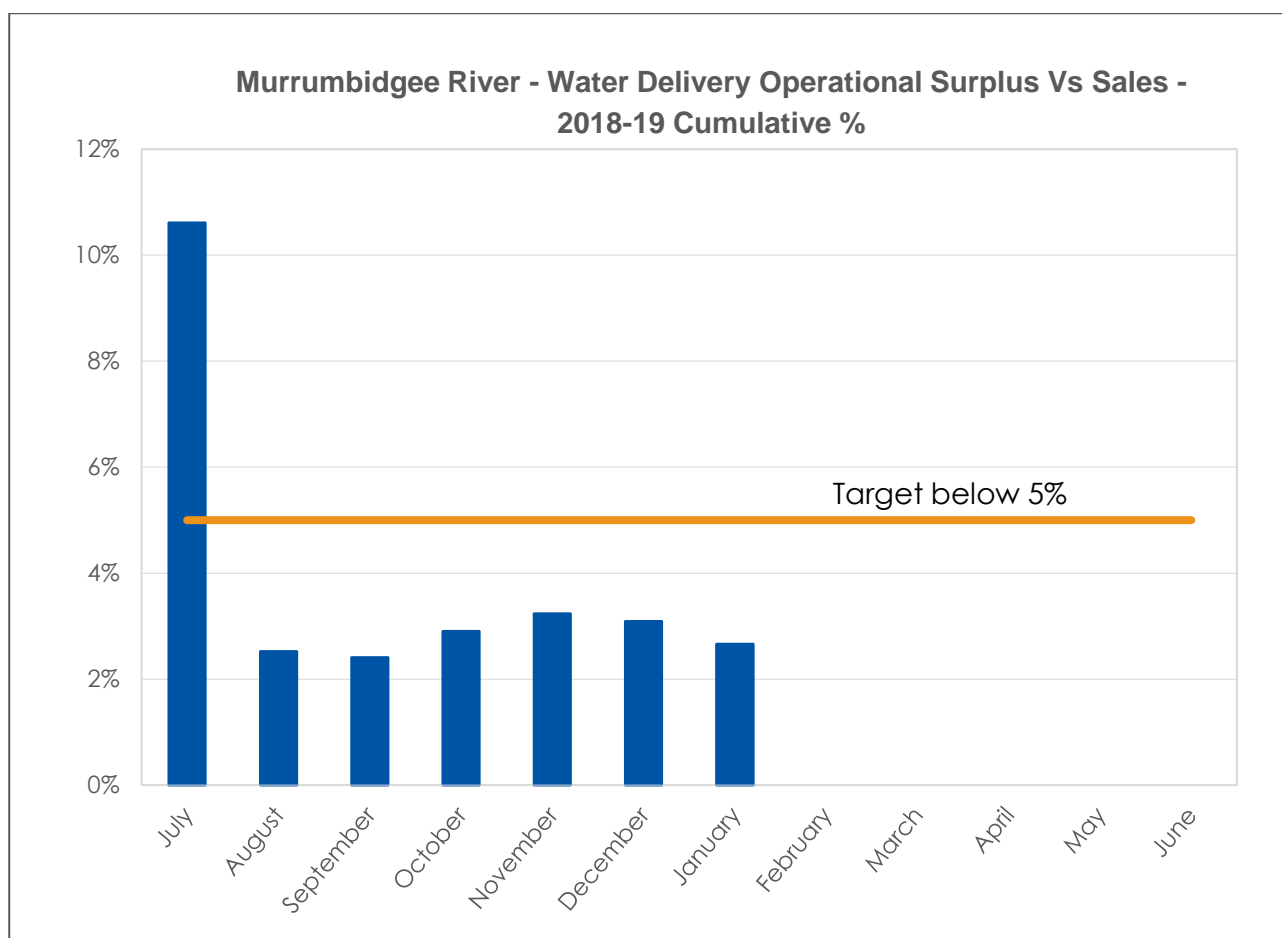


Table below shows the year to date sales & environmental delivery (998GL) and operational surplus(27GL).

Murrumbidgee cumulative totals

Dates	Sales + environmental delivery	Operational surplus	Actual	Target
July	36	4	11%	5%
July-Aug	162	4	3%	5%
July-Sep	327	8	2%	5%
July-Oct	523	15	3%	5%
July-Nov	645	21	3%	5%
July-Dec	790	24	3%	5%
July-Jan	998	27	3%	5%
July-Feb*	1,163	40	3%	5%

*Includes forecast operational surplus to end of Feb

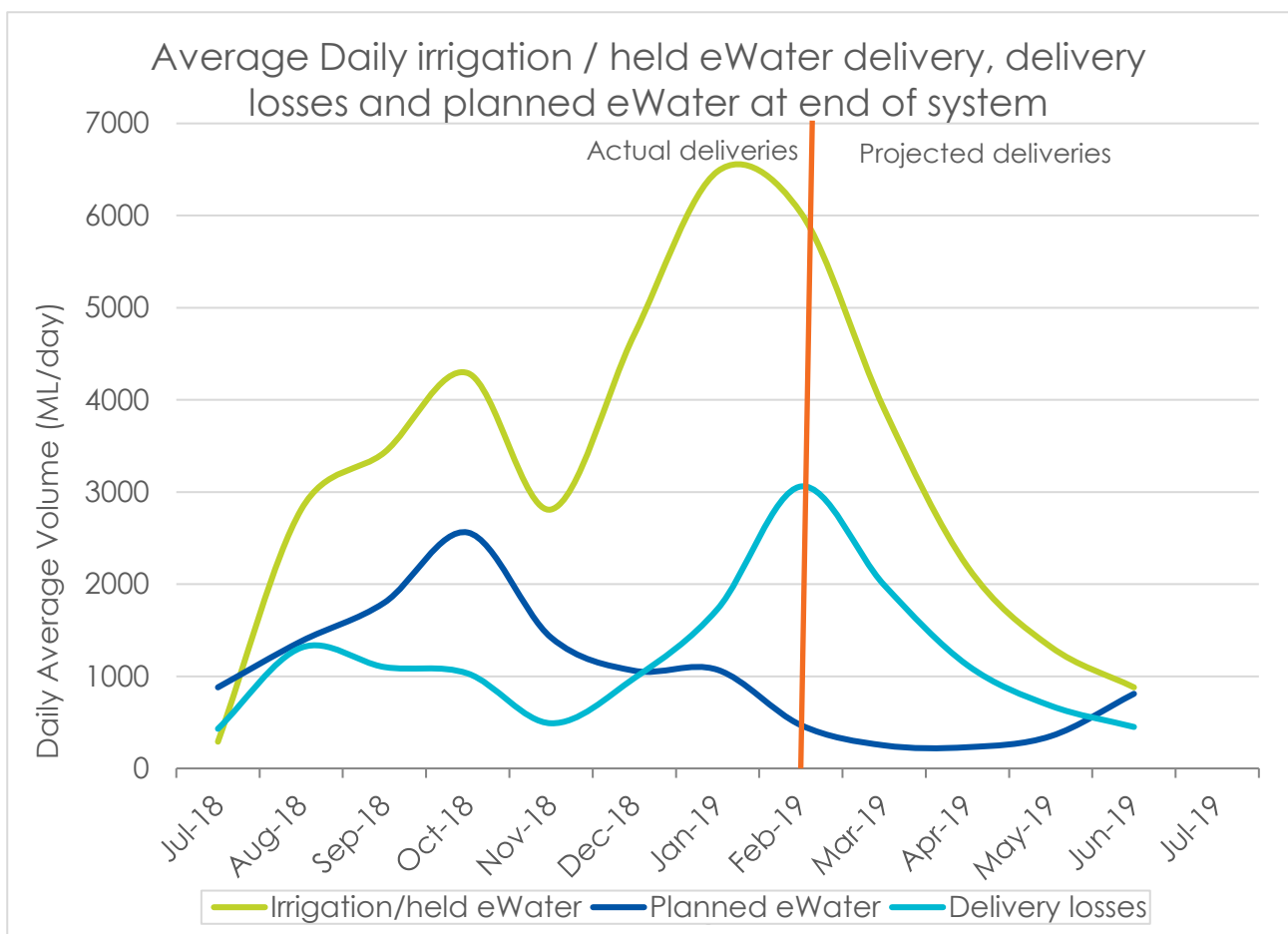
9 Storage forecast

The system demands are met from the following sources:

- Blowering Dam
- Burrinjuck Dam
- Downstream tributaries

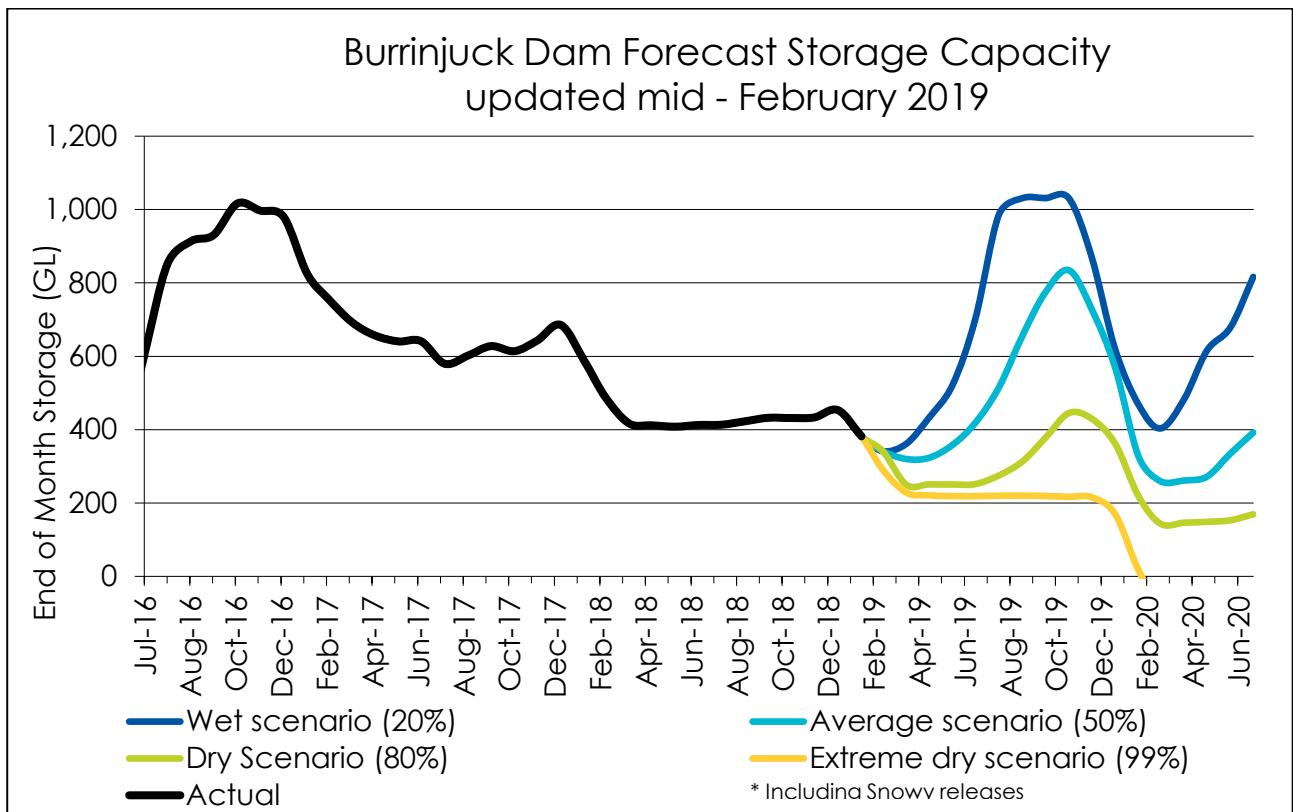
The operational procedures are intended to maximise the conservation of water resources so the demands downstream of Gundagai are firstly met from tributary flows and minimum planned environmental releases from Blowering and Burrinjuck Dams. Additional system demands are next met from Blowering and Burrinjuck Dams in proportions that balance the chances of emptying or spilling both storages in the forecast period, subject to the Tumut River channel constraints

The figure below indicates the forecast daily average delivery to licensed customers, Planned Environmental Water (including end of system flows at Balranald and Darlot) and transmission losses over 2018-19.

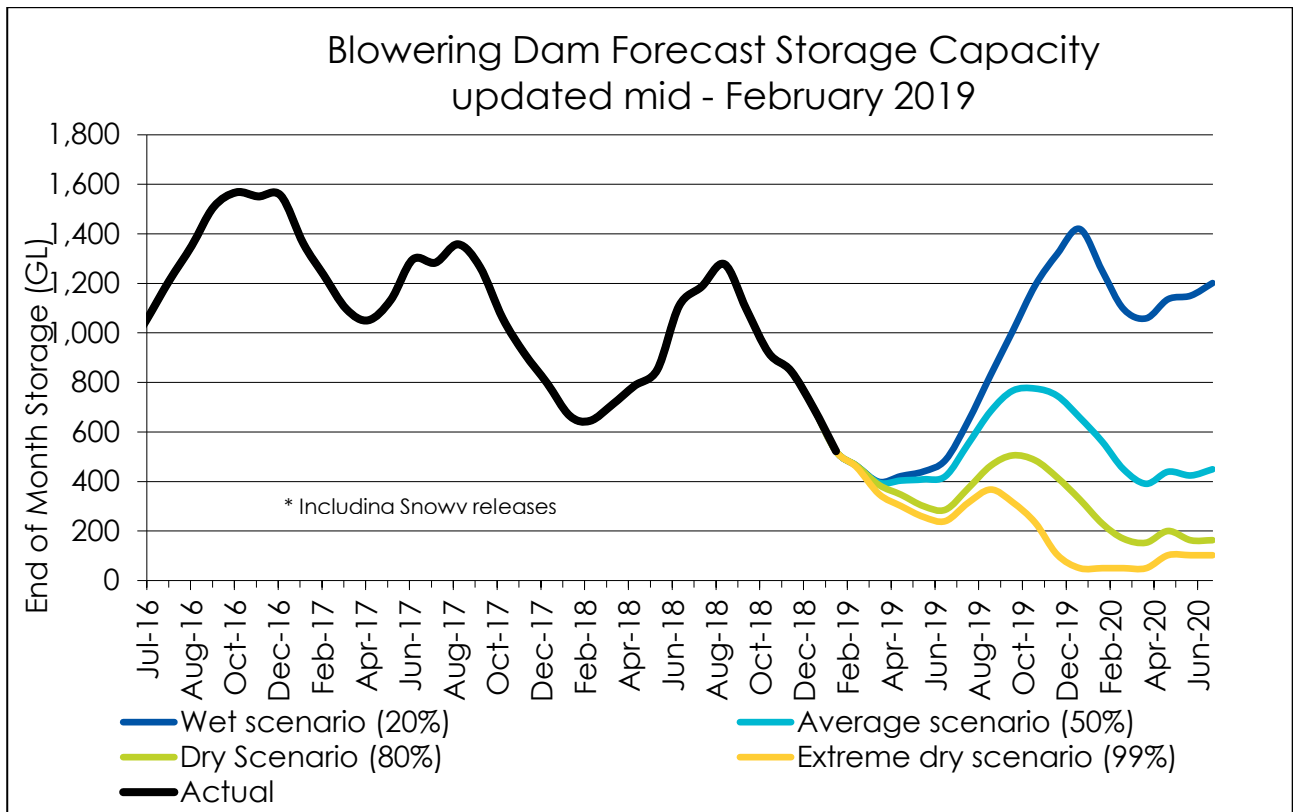


The following two figures demonstrate the behaviour of Burrinjuck and Blowering Dams under various inflow conditions until June 2020. For example, under wet inflow sequence (20th percentile) the dam may fill and spill (100%) at the end of June 2019. Chances of Exceedance (COE) in the figures indicates the possibility of that storage level being exceeded by these dates.

9.1 Burrinjuck storage forecast



9.2 Blowering storage forecast



9.3 Planned releases

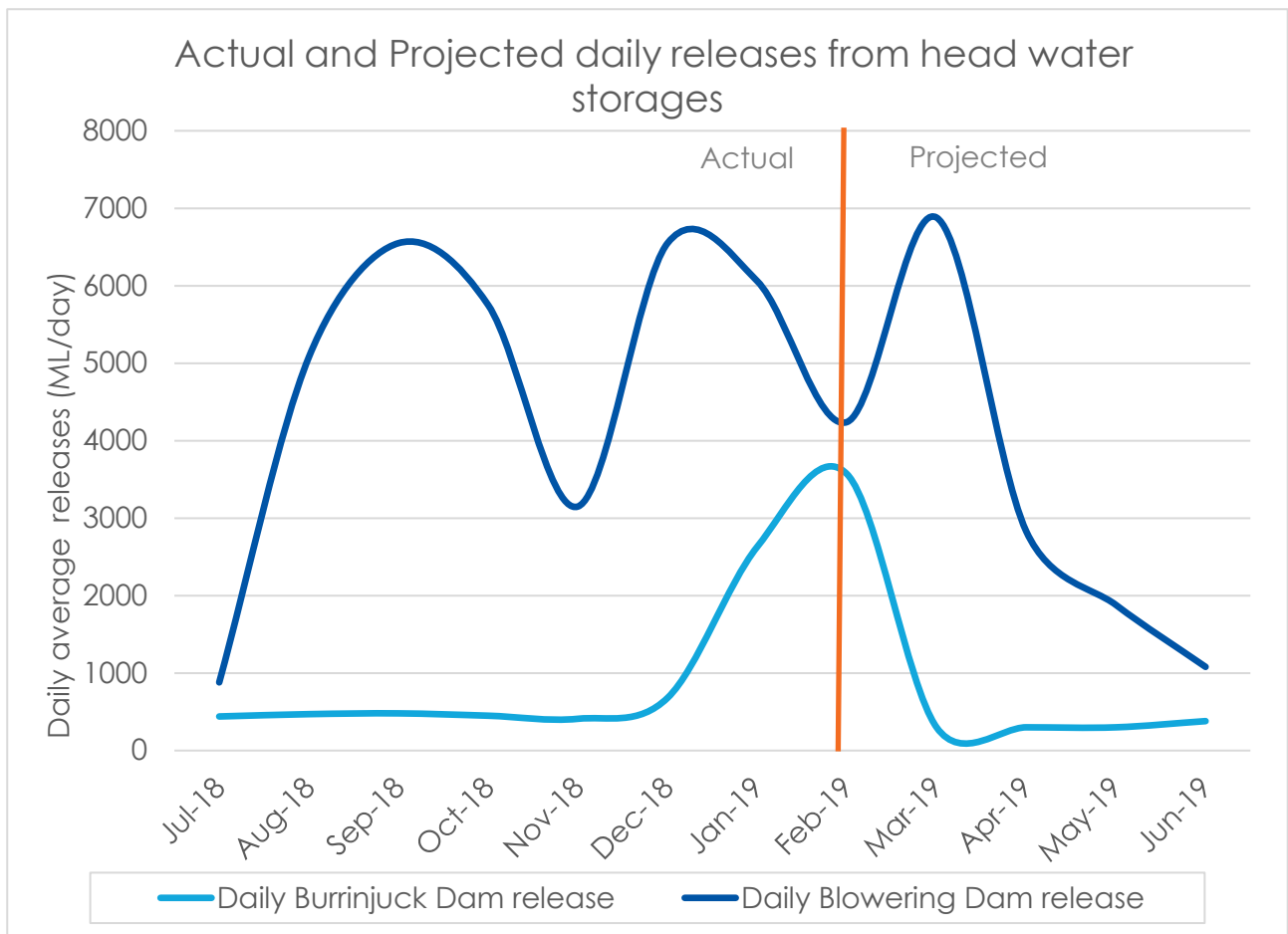


Figure above shows the expected daily average releases from Burrinjuck and Blowering dams over the next 6-month period under a continuation of dry conditions.

10 Outage planning

Most routine maintenance work on the water infrastructure in the Murrumbidgee valley is undertaken during the winter period. Maintenance work on the following structures are withheld / in progress for want of suitable flow conditions. They will be completed at the earliest opportunities.

Item	Time	Status	Description
Tarabah Weir	April 2019	In progress	Gate and walkway replacement
New gate at Spillers Regulator at the Washpen Creek	April 2019	Planning underway	Waiting for suitable low flow conditions

11 Recreational events

Several community recreational events are organised along the Murrumbidgee river system. For the safety, economic, social, and cultural benefit of the community additional service may be provided by WaterNSW by maintaining a suitable flow level, subject to prevailing irrigation / environmental demands. In other words, the supply of water and conservation of water takes priority when operational decisions are made. Where possible WaterNSW will schedule operations to assist these events when this will not compromise efficient operations.

Month	Location	Recreation event	Specific requirement
Jan	General	Australia Day	High weir pool levels
Feb	Hay	Fishing Classic	High weir pool
Feb	Wagga	Gumi race	Lower river levels
Feb	Darlington Point	Fishing Classic	Steady, higher flow levels at Darlington Point
Mar	Leeton	Bidgee Classic	Steady, higher levels at Gogeldrie Weir
Mar	Balranald	Fishing classic	Higher flows at Balranald
Apr	General	Easter Weekend	High weir pool levels
May	Tumut	Fly fishing	Low river levels
Oct	Tumut	Trout fishing	Moderate river levels

12 Flow targets

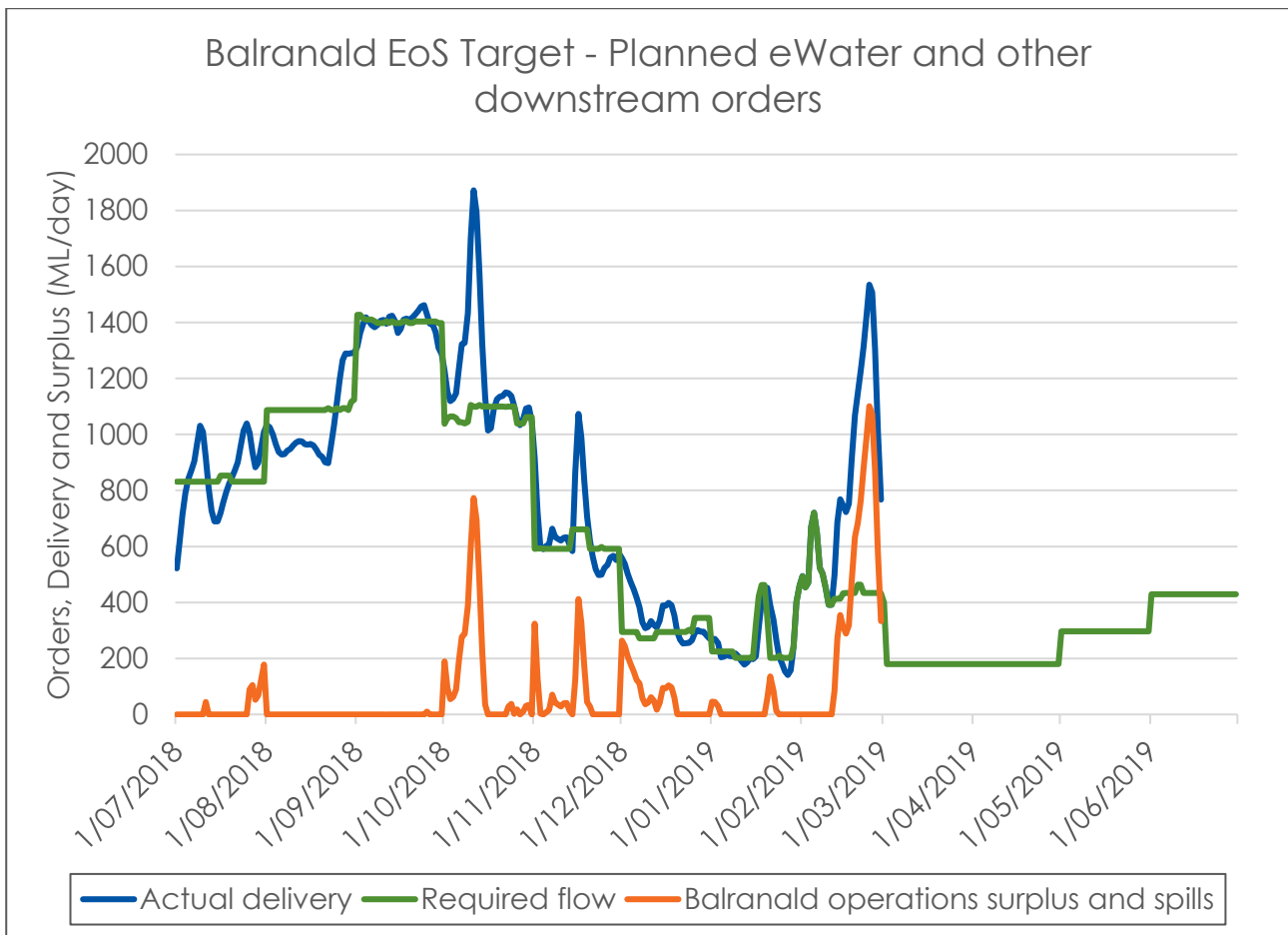
12.1 Minimum flow at Balranald

WaterNSW targets minimum daily flows in the Murrumbidgee River at D/S Balranald gauging site throughout a water year. The minimum daily flow cannot be used to meet access licence water requirements or bulk water transfer requirements (Inter-valley Transfers to the Murray Regulated River system etc.) below Balranald.

Month	Minimum daily flows at Balranald (ML/day)
January	186
February	180
March	180
April	180
May	297
June	429
July	829
August	1,087
September	1,330
October	1,030
November	568
December	254

The supply of the above minimum flows is subject to the following conditions

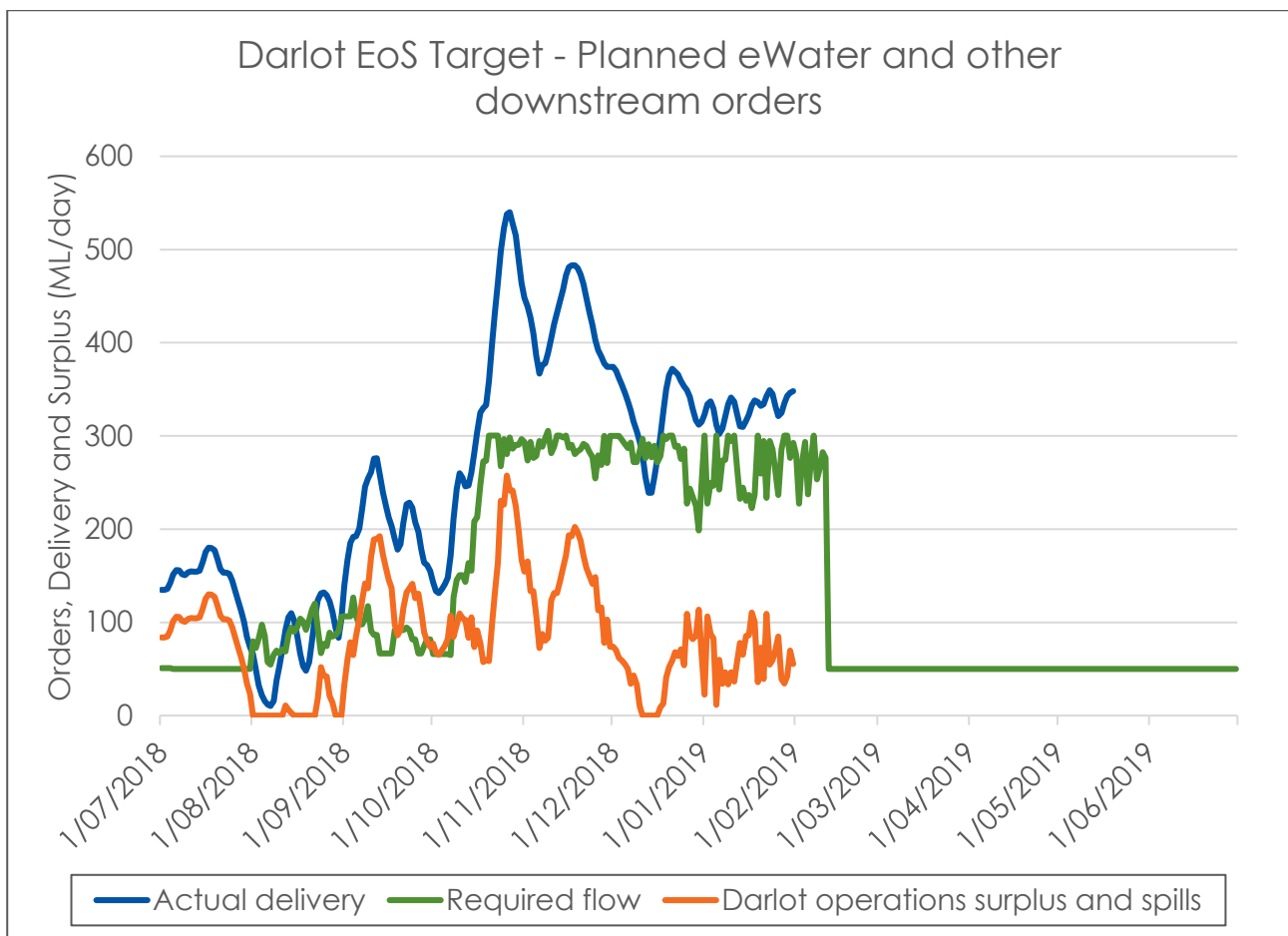
- a) The average daily flow for each month, measured at Balranald, is maintained at the target minimum environmental flow;
- b) A variability of 25% below the target is not exceeded for a period greater than seven (7) consecutive days and/or ten (10) days per month;
- c) Exceedance of the target by up to 25% is used to offset existing shortfalls; and
- d) The cumulative shortfall in daily target flows for any month is distributed evenly to the daily target for the next month's minimum flow.
- e) Exceedance of environmental water releases cannot be used as a credit against future shortfalls.



The above Figure shows the Balranald end of system (EoS) actual delivery, required flow and operational surplus. The end of system target includes planned environmental water, irrigation orders below Balranald and any IVT or other operational orders by MDBA. For details on total operational loss refer section 8.1.

12.2 Minimum flow at Darlot

WaterNSW has a minimum daily flow target of 50ML/day in the Billabong Creek at Darlot gauging site throughout a water year. The minimum daily flow cannot be used to meet bulk water transfer requirements (Inter-valley Transfers to the Murray Regulated River system etc.) below Darlot. The supply of the above minimum flows at Darlot is subject to similar conditions as at Balranald (Section 12.1)



The above figure shows the Darlot end of system (EoS) actual delivery, required flow and operational surplus. The end of system target includes planned environmental water, irrigation orders below Darlot and any IVT or other operational orders by MDBA. In the above chart, the required flows are higher from early October as MDBA is calling water through the Finley Escape to partly address the Barmah Choke constraint in the Murray River. The MDBA operational orders are expected to continue to end of February 2019. For details on total operational loss refer section 8.1.

12.3 Seasonally varied flow targets in the Old Man Creek

After meeting all consumptive demands during non-supplementary periods, the following end of system flow targets are maintained at Kywong (Old Man Creek):

- a) The average September flow – at least 600ML/day
- b) The average October flow – at least 400ML/day
- c) The average November flow – at least 100ML/day
- d) From December to April a minimum flow of 60ML/day

- e) Between May and August, the Beavers Creek Offtake regulator gates remain fully open.

The above flow conditions are to be met only when possible with existing river levels in the Murrumbidgee River, without additional releases from the head water storages.

12.4 In-stream operational targets

- Minimum instream flows at the following locations are targeted for operational purposes, when possible:
 - Yanco Creek @ Downstream Tarabah Weir – 25ML/day
 - Yanco Creek @ Morundah – 65ML/day (to be revised based on maintenance work)
 - Yanco Creek @ Wiraki – Up to 70ML/day
 - Billabong Creek @ Downstream Hartwood Weir – 25ML/day
 - Tumut River @ Oddy's bridge 100ML/day
 - Tumut River @ Tumut 500ML/day
 - Murrumbidgee River @ D/S Gogeldrie Weir 200 ML/day
 - Murrumbidgee River @ D/S Maude Weir 100 ML/day
- An operational stream flow target of 800ML/day (=1.0m) at Murrumbidgee R @ Darlington Point to supply customers in the Uri Creek when there are no third-party impacts.
- Maximum flow targets at the following locations to minimise transmission losses:
 - Colombo Creek @ Morundah - 600ML/day

More information

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