Annual Water Outlook

30 November 2018

Document Number: A3354429
Version: Approved

Document History and Distribution

Version(s)

Version	Date	Author(s)	Notes
1	2 October 2018	A. Shields	Document creation
4	24 October 2018	A. Shields, G. Ortlipp, K. Joy, S. Ridges.	Draft for comment
5	29 October 2018	M. Bailey, A. Shields	Comments incorporated
6	1 November 2018	A. Shields	Update for 1 November
7	22 November 2018	A. Shields	Incorporated DELWP comments

Distribution

Version	Recipient(s)	Date	Notes
4	M. Bailey	24 October 2018	Draft for comment
5	S. Barber	29 October 2018	Draft for comment
6	DELWP	1 November 2018	Draft for comment
8	Final	30 November 2018	Final version

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Executive Summary

Below average inflows to all Goulburn-Murray Water (GMW) major storages have continued in the first half of 2018/19. Reserves established in 2017/18 ensured opening seasonal determinations in the Murray, Goulburn, Campaspe and Loddon systems on 2 July 2018. Seasonal determinations in the Broken and Bullarook started at 0 per cent of high-reliability water shares (HRWS). The Campaspe system opened at 100 per cent HRWS.

At 15 November 2018, seasonal determinations had increased progressively with the Murray system on 90 per cent HRWS, the Goulburn and Loddon on 85 per cent HRWS and the Broken system on 20 per cent HRWS. A 100 per cent low-reliability water share (LRWS) seasonal determinations has also been made in the Bullarook system in addition to 100 per cent HRWS. A LRWS seasonal determination in the other systems in 2018/19 is highly unlikely.

The seasonal climate outlooks issued by the Bureau of Meteorology on 29 November 2018 indicate a 50 per cent to 60 per cent chance of exceeding median rainfall across the GMW region from December 2018 to February 2019. On 20 November 2018, the Bureau of Meteorology said there is a 70 per cent chance of an El Niño forming late in 2018.

Early reserves for 2019/20 have already been established in the Goulburn and Murray systems with the current water year HRWS seasonal determination exceeding 50 per cent HRWS. Some reserves for 2019/20 are stored in the Loddon and Campaspe systems in line with their respective seasonal determinations policies. The Broken, Bullarook and Ovens systems are annual systems and water availability will depend on seasonal conditions and inflows closer to the start of 2019/20.

GMW, as Resource Manager for northern Victorian systems, will issue a detailed outlook for seasonal determinations in regulated systems on Friday 15 February 2019.

With dry conditions experienced in late 2017/18 to date, numerous unregulated systems started the 2018/19 water year on restrictions, and a further number have since been implemented. Weather conditions in the coming months will determine the extent of restrictions across GMW's region, however, even with average conditions significant restrictions are likely. The seasonal rainfall and temperature outlooks suggest unregulated stream customers should anticipate some level of restriction over the summer and autumn period.

All groundwater licence holders have access to 100 per cent of their entitlement, except for those in the Newlyn zone of the Loddon Highlands Water Supply Protection Area (WSPA), who have a 75 per cent allocation for 2018/19. A final allocation announcement will be made for the Newlyn zone in mid December 2018. Groundwater levels are likely to continue to decline in 2018/19. The largest impacts are likely to be felt in the western catchments and the Katunga WSPA. As a result of this, groundwater licence holders in some zones of the Lower Campaspe Valley WSPA and Loddon Highlands WSPA are likely to have allocations below 100 per cent in 2019/20.

To the extent it can be predicted, the risk of water quality incidents occurring over the next 12 months that would impact on supply to customers/entitlement holders is considered low. The low rainfall over the winter-spring of 2018 has elevated the risk of hypoxic black-water events occurring over summer and autumn 2018/19, although such events would not prevent the supply of water. The likely need to issue warnings due to high blue green algae levels cannot be predicted, however such warnings would not prevent supply either.

Introduction

Part 4-2 of the Statement of Obligations (General) 2015 requires water corporations to prepare an Annual Water Outlook by 1 December each year. This document provides information in accordance with this obligation and will assist the development of the Water Outlook for Victoria.

The purpose of the Annual Water Outlook is to provide an outlook of water availability for the remaining months of 2018/19 and what conditions are possible at the start of the 2019/20 water year.

GMW's role is to efficiently manage, store and deliver water to more than 21,000 active customers involved in a diverse range of enterprises and interests across northern Victoria. Our customers include gravity irrigation, regulated and unregulated surface water diverters, groundwater, urban water corporations and environmental water holders. More information about GMW and its services are available on the GMW website, www.gmwater.com.au/about.

This water outlook covers the status and outlook for regulated, unregulated and groundwater sources as well as water quality.

Current climate and streamflow in the longer context

Victoria's climate has shown a warming and drying trend over recent decades, and this trend is expected to continue. In comparison to historical conditions Victoria is already experiencing:

- Higher temperatures;
- Reductions in rainfall in autumn and winter, and in some locations, increases in rainfall during the warmer months; and,
- In many catchments, a shift in the streamflow response to rainfall, with less streamflow generated for the same amount of rain.

The decline in rainfall during autumn and winter is associated with a southerly shift in rain-bearing weather systems. Global warming is a contributor to this southerly shift, which means that the downward trend in winter rainfall is likely to continue.

The cause of the downward shift in the streamflow response to rainfall is not yet fully known and is the subject of continuing research.

Over the longer term, we can expect:

- the rainfall reductions in winter to remain, or become drier still;
- possible increases in summer rainfall;
- possible increases in potential evapotranspiration due to higher temperature;
- reductions in streamflow across all catchments because of less rainfall and possible higher potential evapotranspiration; and
- the streamflow response to rainfall to no longer remain stationary, and generally decline.

Even if there is an increase in summer rainfall, it is unlikely to offset the streamflow impact of rainfall reductions in winter because most runoff in Victoria occurs during the cooler months of the year.

Although there will still be a lot of variability in Victoria's climate, the chances of experiencing warmer conditions and less streamflow is now higher than in past decades.

The Bureau of Meteorology seasonal climate outlooks build in the influence of changes in climate that have already occurred.

More information on the observed changes and longer-term future climate and water projections can be found at https://www.water.vic.gov.au/climate-change.

The Victorian Government is investing in further research to better understand how Victoria's climate is changing and the water resource implications, as part of implementing *Water for Victoria.*

Regulated Systems

Current seasonal conditions

The 2017/18 water year was drier than average, with storage inflows across GMW's catchments recording well below the average (from 1981 to 2015) annual volume. Inflows into the Loddon storages were only 7 per cent of the average volume. Lake Nillahcootie and Lake Eppalock both received 29 per cent of the average inflow. Dartmouth Dam and Lake Eildon received better inflows, with 65 per cent and 68 per cent of average inflows respectively.

Dry conditions continued into the 2018/19 water year. Rainfall across all of Northern Victoria from August to October 2018 was below to very much below average (Figure 1) and this has contributed to below average storage inflows (Table 1).

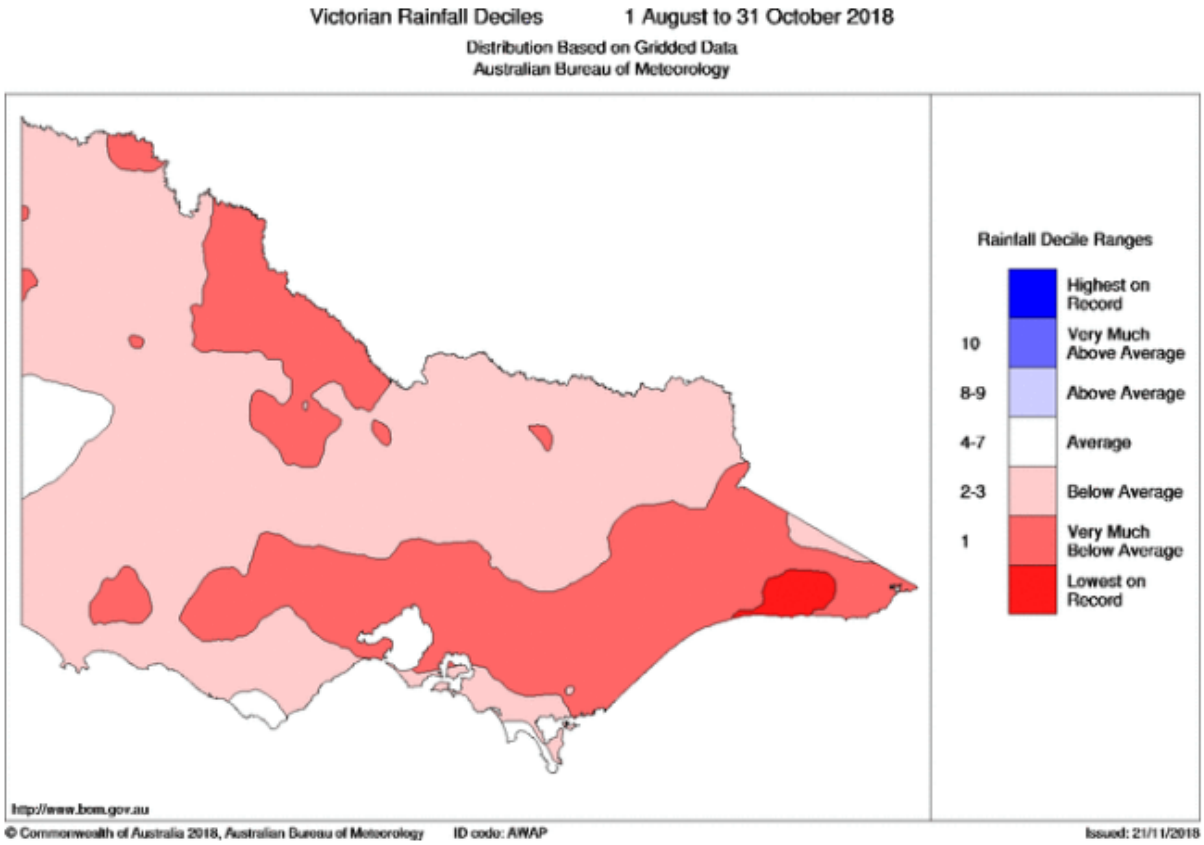

Figure 1. Rainfall deciles for 1 August to 31 October 2018

Table 1. July to October 2018 inflows to the major GMW storages

Storage	July – October inflow (GL)	Percent of average	Chance of greater inflow
Eildon	610.5	62%	78%
Goulburn Weir[1]	254.0	30%	93%
Hume[1]	400.6	26%	94%
Dartmouth	275.3	51%	86%
Buffalo	129.8	49%	81%
William Hovell	79.8	64%	76%
Nillahcootie	4.4	10%	93%
Eppalock	13.0	11%	90%
Cairn Curran	12.2	15%	90%
Tullaroop	3.6	9%	91%

[1] Natural inflows excluding releases from upstream storages

These dry conditions have limited the volume harvested into the major storages. Table 2 outlines the change in storage volumes and percentages from July to mid-November. Demand for water has commenced early this water year, meaning storage levels have already started to fall, such as Dartmouth Dam, Lake Eppalock and Cairn Curran Reservoir.

Lake William Hovell and Lake Buffalo are the only major storages to fill so far in 2018/19.

Table 2. Storage volume changes from July to mid-November

Storage	1 July 2018 Volume (GL)	1 July 2018 Percentage full	15 November 2018 Volume (GL)	15 November 2018 Percentage full	Volume change (GL)	Percentage full change
Eildon	1,823	54.7%	1,975	59.2%	152	4.6%
Hume	1,304	43.4%	1,352	45.0%	48.5	1.6%
Dartmouth	3,428	88.9%	2,995	77.7%	-433	-11.2%
Buffalo	13.8	58.6%	23.5	99.9%	9.7	41.3%
William Hovell	13.5	98.4%	13.7	100.1%	0.2	1.6%
Nillahcootie	22.2	55.0%	23.3	57.7%	1.1	2.6%
Eppalock	185.5	60.9%	158.5	52.0%	-27.0	-8.9%
Cairn Curran	77.7	52.8%	67.1	45.6%	-10.7	-7.3%
Tullaroop	41.0	56.2%	38.0	52.1%	-3.0	-4.2%

Water availability in Northern Victoria early in 2018/19 was assisted by the reserves established in 2017/18. This allowed an opening seasonal determination to be made on 2 July 2018 in all systems except the Bullarook and Broken systems, which both have smaller, annual storages (i.e. typically fill each year) compared to the other systems.

Seasonal determinations as at 15 November are shown in Table 3. Only the Campaspe and the Bullarook systems have reached 100 per cent HRWS so far this water year. The Goulburn and Murray systems' early season reserves for 2019/20 have both been established. The reserve volumes contribute to operating commitments for the following water year, aiming to ensure that any water carried over by entitlement holders from the current water year can be delivered at the start of the irrigation season.

Table 3. Seasonal determinations as at 15 November 2018

Water System	High-Reliability Water Share	Low-Reliability Water Share
Murray	90%	0%
Broken	20%	0%
Goulburn	85%	0%
Campaspe	100%	0%
Loddon	85%	0%
Bullarook	100%	100%

Resource Availability

Murray System

The Murray system started 2018/19 with a seasonal determination of 41 per cent HRWS. This reasonably high opening was due to reserves established in 2017/18. Low but steady inflow conditions early in 2018/19 enabled seasonal determinations to increase in small consistent increments. The seasonal determination has reached 90 per cent as of 15 November 2018.

There have been no spills from Victoria's share of Lake Hume during the water year so far in 2018/19. A low risk of spill was declared on 10 October 2018 and approximately 100 GL was returned from spillable water accounts to allocation accounts.

As specified in clause 10.5 of GMW's Murray bulk entitlement, water was borrowed from the Barmah-Millewa Forest Environmental Water Allocation at the start of the 2018/19 water year to support early seasonal determinations for high-reliability water shares. The water borrowed from the Barmah-Millewa Forest Environmental Water Allocation will start to be paid back once seasonal determination are 100 per cent HRWS, before further resource improvements are set aside for 2019/20.

Goulburn System

Compared with the Murray system, the reserves established in the Goulburn system during 2017/18 were not as large. Nevertheless, the system commenced the 2018/19 water year with a seasonal determination of 32 per cent HRWS.

Inflows during spring 2018 have been more favourable in the catchment above Lake Eildon compared to the mid-Goulburn catchment. The Lake Eildon volume started to increase in July 2018 with improved inflows. The storage volume increased to 65 per cent of capacity in late September before releases started to exceed inflows to meet early season demand. Waranga Basin reached 64 per cent of capacity before system demands began to draw the storage down in late August 2018.

Like the Murray system, the seasonal determination in the Goulburn system has gradually increased from the start of the water year to reach 85 per cent on 15 November 2018.

Broken System

The Broken system opened the 2018/19 water year with a seasonal determination of 0 per cent HRWS. Despite this, entitlement holders were advised that allocation carried over was available for use throughout the water year. On 1 August 2018, a seasonal determination of 1 per cent HRWS was announced.

Continuing dry conditions in the Broken system have seen the seasonal determination increase to only 20 per cent HRWS by 15 November 2018. The average carryover in the Broken system was equivalent to 28 per cent HRWS and this contributed to the overall volume available for use early in the water year.

Campaspe System

Seasonal determinations in the Campaspe system were 100 per cent HRWS and 59 per cent LRWS in 2017/18. Reserves established last water year allowed an opening seasonal determination of 100 per cent HRWS on 2 July 2018.

Sufficient reserves for the 2019/20 water year have not yet been established to allow for a seasonal determination to LRWS in 2018/19.

Loddon and Bullarook Systems

In accordance with the rules in the bulk entitlement, the Loddon system 2018/19 seasonal determination has increased in line with the Goulburn system from an opening seasonal determination of 32 per cent to 85 per cent at 15 November 2018. The system has enough water in storage to meet 100 per cent of HRWS commitments in 2018/19 and reserves are being established for 2019/20 water requirements.

The Bullarook system is the smallest of the GMW systems with two relatively small annual storages. Along with the Broken system, the Bullarook system opened with a 0 per cent HRWS seasonal determination on 2 July. Rainfall and inflow improvement in August 2018 enabled a seasonal

determination of 19 per cent HRWS made on 15 August. Ongoing resource improvements through September and October provided enough resource to give a seasonal determination of 100 per cent HRWS and 100 per cent LRWS by 15 October 2018.

Ovens System

Despite entitlement holders having water shares, the Ovens system does not receive seasonal determinations like the six other regulated systems operated by GMW. The system is managed similarly to an unregulated stream because of the high volume of inflows relative to storage size. Entitlement holders are restricted if the inflows into the system and the volumes held in Lake Buffalo and Lake William Hovell are insufficient to meet all the demand in the system.

With storages effectively full and reasonable inflows into the system, entitlement holders are not restricted. Entitlement holders in the King system had access to their spill-reliability entitlements until 20 November. Access to spill-reliability entitlements will continue into December for those who access water from the Ovens and Buffalo rivers, but will cease when inflows reduce below in valley water requirements.

Outlook comparison

The outlook for seasonal determinations published on 2 July 2018 (Table 4) indicated that even with average inflows, 100 per cent HRWS was not expected to be reached in the Murray, Goulburn and Loddon systems by mid-October. Based on the storage inflows outlined in Table 1, the increases in seasonal determinations to 15 November have followed the patterns suggested by the outlook. The Goulburn and Loddon systems have tracked better than the dry inflow scenario, as the inflows into the Goulburn system have been between the average and dry scenarios. Seasonal determinations in the Murray system have also tracked between the average and dry inflow scenarios due to the inflows into Hume and Dartmouth as well as contributions from the Ovens River.

Table 4. Outlook for seasonal determinations for 15 October 2018 as published on 2 July 2018

Water System	Inflow Scenario[1]		
	Wet	Average	Dry
Murray	100%	90%	73%
Broken	100%	100%	25%
Goulburn	100%	96%	58%
Campaspe	100%	100%	100%
Loddon	100%	96%	58%
Bullarook	100%	100%	15%

[1] Note dry conditions are defined as inflow volumes to major storages that are greater in 90 years out of 100, average conditions are inflow volumes to major storages that are greater in 50 years out of 100 and wet conditions are inflow volumes to major storages that are greater in 10 years out of 100

Outlook for remainder of 2018/19

The Bureau of Meteorology's three month outlook for December 2018 to February 2019, issued on 29 November 2018, indicated the chances of exceeding the median rainfall over most of GMW's region range from 50 to 60 per cent (Figure 2).

Figure 2. Chance of exceeding median rainfall for the period November 2018 to January 2019 (Source Bureau of Meteorology).

The Bureau of Meteorology's ENSO Wrap-Up issued on 20 November said that there is approximately a 70 per cent chance of El Niño occurring in 2018. In the Indian Ocean a positive Indian Ocean Dipole (IOD) has developed. An El Niño and a positive IOD increase the likelihood of a dry and warm end to the year across most of Australia. Temperature and rainfall outlook updates are available from the Bureau of Meteorology website (www.bom.gov.au/climate/ahead/).

As the historical peak inflow period has passed and catchments have dried during spring, inflows are not expected to increase significantly unless passing severe weather systems bring heavy rain to the catchments.

As detailed in Table 3, only the Campaspe and Bullarook systems have reached 100 per cent HRWS availability so far in the 2018/19 water year. Resource improvements in the Goulburn and Loddon systems will contribute to seasonal determination increases until seasonal determinations reach 100 per cent HRWS. If inflows follow the dry inflow scenario, seasonal determinations in both systems are expected to be about 93 per cent HRWS by mid-February 2019. In the Murray system, the dry inflow scenario would allow seasonal determinations to reach 100% HRWS by mid-February 2019. For the Broken system, inflows greater than the long term average are required to reach 100% HRWS by mid-February 2019.

Bullarook entitlement holders have their maximum seasonal determination and will not see any changes for the remaining months of 2018/19.

GMW's seasonal determination policy describes how available water is distributed to entitlement holders. In the Murray, Goulburn, Campaspe and Loddon systems, available water is allocated progressively to HRWS once all system operating requirements can be met. Once HRWS are fully available, reserves (in addition to the early reserve in the Murray and Goulburn systems) to support HRWS in the following water year start to be established. After HRWS in the following water year are secured, assumed inflows with a probability of exceedance of 99 per cent are received, any available water is allocated to low-reliability entitlements.

In the Broken and Bullarook systems, available water is allocated progressively to HRWS once all system operating requirements can be met. Once seasonal determinations reach 100 per cent HRWS, any available water is allocated to low-reliability entitlements.

In the Goulburn and Murray systems, where both HRWS seasonal determinations are still below 100 per cent, the necessary operating reserves for 2019/20 are yet to be established. It is highly unlikely that a LRWS seasonal determination will be announced in the Murray system or the Goulburn system in 2018/19.

Entitlement holders in the Ovens system may experience restricted diversion access this water year if storage inflows reduce and water from the storages is needed to meet demand before the end of December. History indicates that restrictions are not needed to manage demand when the storages are still at capacity in January.

Irrigation demand in the first two months of the 2018/19 irrigation season were the highest since 2002/03. Weather conditions in the remaining months of the season, as well as any further increases in the seasonal determinations and trade opportunities will dictate how much water is used in 2018/19 and how much is carried over into 2019/20.

Outlook for 2019/20

Reliable long-term weather outlooks for the start of 2019/20 are not available as the Bureau of Meteorology rainfall outlooks only extend for three months. GMW, as Northern Victoria Resource Manager, will release a detailed first outlook for the 2019/20 water year on 15 February 2019 based on historical inflows and follow up with another detailed outlook on 15 May 2019.

It is not expected that dry inflow contingency measures will be required for the 2019/20 in the Murray, Goulburn, Campaspe and Loddon systems and carryover should be able to be delivered at the start of the season. If conditions are extremely dry, opening seasonal determinations are likely to be zero or very low. Recent carryover trends indicate that the equivalent of 30 per cent HRWS on average across all systems will be available for use in 2019/20.

If conditions are dry in 2019/20, dry inflow contingency measures may be required in the Murray, Goulburn, Campaspe and Loddon systems in preparation for 2020/21.

Murray System

With this season's seasonal determination greater than 50 per cent HRWS, the early season reserve volume has been set aside for 2019/20. This volume contributes to system operating requirements in 2019/20 to enable delivery of carryover from the start of the season. If extreme dry conditions are experienced, water availability and seasonal determinations are likely to be very low. Seasonal determinations will be available under dry inflow conditions, but are unlikely to reach 100 per cent HRWS. Average inflow conditions should allow seasonal determinations to reach 100 per cent HRWS during spring 2019.

Goulburn System

The seasonal determination in the Goulburn system is greater than 50 per cent HRWS and only the 2019/20 early reserve has been secured. Average inflow conditions should allow seasonal determinations to reach 100 per cent HRWS during spring 2019. Seasonal determinations will be available under dry inflow conditions, but are unlikely to reach 100 per cent HRWS. Similar to the Murray system, seasonal determinations could be very low if inflows are extremely low.

Campaspe System

About 24 GL has been set aside for operating commitments in the Campaspe system. This will enable the water that has been carried over to be delivered. Seasonal determination increases will depend on inflows during the 2019 winter and spring.

Loddon System

About 31 GL has been set aside for operating commitments 2019/20. If conditions allow, seasonal determinations in the Loddon system will be the same as the Goulburn system in 2019/20. If inflows are insufficient in the Loddon system to maintain the same seasonal determination as the Goulburn system, the Loddon system seasonal determination will be lower than the Goulburn system.

Broken System

The Broken system is an annual system, so 2019/20 reserves will depend on the final seasonal determination for 2018/19, how much water is utilised this water year and the inflows during the traditional inflow months in winter and spring 2019. As all resource improvements are contributing to seasonal determination improvement, operating reserves for 2019/20 will not commence until the seasonal determinations reach 100 per cent LRWS. Based on current inflow trends, reserves for 2019/20 will be similar to those at the end of 2015/16 when planning for a low inflow year in 2016/17 commenced.

Bullarook System

Like the Broken, the Bullarook system is an annual system, so 2019/20 reserves will depend on how much water is used this water year and the inflows during the traditional inflow months in 2019. There is currently about 200 ML available to support system operations in 2019/20.

Ovens System

Water availability in the Ovens system depends on weather and streamflows, so it is difficult to determine what water availability will be in 2019/20. Restrictions are unlikely under wet and average inflow conditions, but remain possible under drier scenarios.

Unregulated Systems

Current seasonal conditions

Unregulated streams are monitored in accordance with relevant Local Management Rules (LMRs). Minimum streamflow requirements are outlined in LMRs. A minimum flow requirement of 3 ML/day is applied to streams that do not have a LMR.

If minimum flow requirements are not met, restrictions are put in place (Table 5). Restrictions range from Stage 1 Roster (access to 10 per cent of entitlement every 10 days) to Stage 5 suspension (only diversion for domestic and stock use is permitted). LMRs and the details of rosters and restrictions are available online at https://www.gmwater.com.au/water-resources/diversions.

Table 5. Current Stage 5 Suspensions on unregulated streams (as at 28 November 2018)

Catchment	Stream	Suspension start date
Broken	Boosey Creek	13 January 2017
	Hollands Creek and Ryans Creek	19 January 2018
Kiewa	Middle Creek	9 October 2018
	Basin Creek	9 October 2018
	Bight Creek	9 October 2018
	Sheep Creek	7 November 2018
	Nine Mile Creek (Yackandandah trib)	7 November 2018
	Hellhole Creek	7 November 2018
	Kinchington Creek	7 November 2018
	Glen Creek	9 November 2018
	Bay Creek	23 November 2018
	Plain Creek	23 November 2018
	Back Creek (Nine Mile Creek)	23 November 2018
	Cherry Tree Creek	23 November 2018
	Deep Creek	23 November 2018
Murray Tributaries	Black Dog Creek (Upper)	17 November 2017
	Indigo Creek	9 October 2018
Mitta Mitta	Lockharts Creek	2 November 2018
	Sandy Creek	2 November 2018
Ovens	Reedy Creek (above Yellow Creek confluence)	31 October 2018
	Roberts Creek	23 November 2018
King	Boggy Creek	31 October 2018
Goulburn	Sunday Creek (Kurakurac & Kilmore)	21 December 2016
Campaspe	Wanalta Creek	08 November 2016
	Cornella Creek	21 September 2017
	Axe Creek	6 October 2017
	Sweenies Creek	6 October 2017
	Emu Creek	6 October 2017
	Sheep Wash Creek	6 October 2017
	Mount Ida Creek	5 October 2018
	McIvor Creek	5 October 2018
	Wild Duck Creek	5 October 2018
	Stony Creek	5 October 2018
	Smiths Creek	21 November 2018
	Campaspe River U/S Eppalock	26 November 2018
	Falls Creek	26 November 2018
	Five Mile Creek	26 November 2018
	Smokers Creek	26 November 2018
Loddon	Muckleford Creek	07 December 2016
	Bullock Creek	12 December 2016
	Bet Bet Creek	14 December 2016
	Barkers Creek	24 October 2017
	Back Creek	24 October 2017
	Coghills Creek	24 October 2017
	Joyces Creek	19 October 2018
	Langdons Creek	19 October 2018
	McCallums Creek	19 October 2018
	Slaty Creek	19 October 2018
	Adekate Creek	19 October 2018
	Bullarook Creek	1 November 2018
	Creswick Creek	1 November 2018
	Kangaroo Creek	1 November 2018
	Leitches Creek	1 November 2018
	Pinchgut Creek	1 November 2018
	Rocky Lead Creek	1 November 2018
	Sailors Creek	1 November 2018
	Slattery Creek	1 November 2018

Outlook for remainder of 2018/19

The Bureau of Meteorology current seasonal streamflow forecast predicts well below median streamflows for November to January across the GMW region (http://www.bom.gov.au/water/ssf/).

The most likely scenario is that more streams will not meet the minimum flow requirements and be put onto restrictions.

Upper Murray Catchment

- The Bureau of Meteorology predicts that flows are likely to be well below median and a 50 per cent chance of exceeding median rainfall in the Upper Murray catchment.
- No restrictions are forecast for the main stem of the unregulated Murray River and the Mitta Mitta River above Lake Hume.
- Tributaries may experience restrictions or suspension.

Kiewa Catchment

- The Bureau of Meteorology predicts lower than median flow and around a 50 per cent chance of exceeding median rainfall in the Kiewa catchment.
- Although no restrictions are forecast for the Kiewa main stem, a number of smaller tributaries already have prolonged restrictions applying and it is likely that additional streams will have suspension applied to irrigation.

Ovens Catchment

- The Bureau of Meteorology predicts lower than median flow and around a 50 per cent chance of exceeding median rainfall in the Ovens catchment.
- Flows on the Upper Ovens main stem are lower than at periods since the introduction of the Upper Ovens River Management Plan since 2012.
- Restrictions are likely for the main stem of the Ovens River upstream of Myrtleford and larger tributaries in accordance with the Plan.
- Suspension of irrigation is likely for smaller tributaries.

Goulburn Catchment

- The Bureau of Meteorology predicts significantly lower than median flow and around a 50 per cent chance of exceeding median rainfall in the Goulburn catchment.
- Most tributaries are likely to be placed on restriction or suspension.

Broken Catchment

- The Bureau of Meteorology predicts significantly lower than median flow and around 50 per cent chance of exceeding median rainfall in the upper parts of the Broken catchment.
- The Upper Broken River and all tributaries may experience restrictions and suspensions.

Campaspe Catchment

- The Bureau of Meteorology does not provide a prediction on streamflow, but estimates a 50 per cent chance of exceeding median rainfall in the Campaspe catchment.
- The Upper Campaspe, Coliban and all tributaries are likely to experience restrictions and/or suspension.

Loddon Catchment

- The Bureau of Meteorology predicts lower than median flow and a 50 per cent chance of exceeding median rainfall in the Loddon catchment.
- The Loddon River upstream of Cairn Curran Reservoir and most tributaries are expected to experience restrictions or suspension.

Outlook for 2019/20

Access to unregulated systems in 2019/20 will depend on weather conditions (Table 6).

Table 6. Unregulated systems outlook for 2019/20

Catchment	Worst on record weather conditions (greater for 95 of 100 years)	Dry weather conditions (greater for 75 out of 100 years)	Average weather conditions (greater for 50 out of 100 years)
Loddon	All streams on suspension	All streams on suspension	All tributaries and the Upper Loddon on restriction or suspension.
Campaspe	All streams on suspension	All streams on suspension	All tributaries and the Upper Campaspe on restriction or suspension.
Goulburn	All minor and major tributaries on restriction or suspension.	All minor tributaries on suspension. All major Goulburn tributaries on restriction	Most minor tributaries on restriction or suspension.
Broken	All minor tributaries on suspension.	All minor tributaries on suspension.	All minor tributaries on restriction or suspension.
Ovens	All minor tributaries on suspension. Upper Ovens River and larger tributaries on restriction	All minor tributaries on suspension. Upper Ovens River and major tributaries on restriction	All minor tributaries on restrictions. Tributaries of the Upper Ovens to be on the same level of restriction as the Ovens main stem above Myrtleford. Several smaller tributaries on suspension.
Kiewa	All minor tributaries on suspension. Kiewa River on restriction	All minor tributaries on suspension. Kiewa River on restriction	All minor tributaries on restrictions.
Upper Murray	All minor tributaries on suspension. Upper Murray River on restriction	All minor tributaries on suspension. Upper Murray River on restriction	All minor tributaries on restrictions.

Note: worst conditions on record are defined as instream flows that are in 95 years out of 100, dry conditions are greater 75 out of 100 years, average conditions are inflow volumes to major storages that are greater in 50 years out of 100 and wet conditions are inflow volumes to major storages that are greater in 10 years out of 100).

Groundwater

Current seasonal conditions

Currently, all groundwater licence holders have access to 100 per cent of their entitlement, except for those in the Newlyn zone of the Loddon Highlands Water Supply Protection Area (WSPA) who have a 75 per cent allocation for 2018/19 (Table 7).

Table 7. Groundwater allocation for 2018/19

Groundwater Management Unit (GMU)	2018/19 Allocations (% Licensed Volume)
Barnawartha GMA	100%
Broken GMA	100%
Central Victorian Mineral Springs GMA	100%
Eildon GMA	100%
Katunga WSPA	100%
Kiewa GMA	100%
Loddon Highlands WSPA	100% (75% in Newlyn zone)
Lower Campaspe Valley WSPA	100%
Lower Ovens GMA	100%
Mid Goulburn GMA	100%
Mid Loddon GMA	100%
Shepparton Irrigation GMA	100%
Strathbogie GMA	100%
Unincorporated GMU	100%
Upper Goulburn GMA	100%
Upper Murray GMA	100%
Upper Ovens WSPA	100%
West Goulburn GMA	100%

*WSPA = Water Supply Protection Area; GMA = Groundwater Management Area

Outlook for remainder of 2018/19

Allocations for the Newlyn zone of the Loddon Highlands WSPA will be reviewed in mid December 2018, but it is unlikely that the allocations will increase.

Groundwater use and trading activity is likely to be above average in 2018/19 if dry conditions continue.

Outlook for 2019/20

Groundwater recovery and drawdown levels in northern Victoria are dependent on rainfall recharge and groundwater extraction. Above-average groundwater use in 2017/18, coupled with continued dry conditions in 2018/19, have resulted in declining groundwater levels in the Loddon and Campaspe catchments, as well as the Katunga WSPA and the Kiewa GMA. Groundwater levels in other areas in northern Victoria remain stable.

Groundwater levels are likely to continue to decline in 2018/19. The largest impacts are likely to be felt in the western catchments and the Katunga WSPA. As a result of this, groundwater licence holders in some zones of the Lower Campaspe Valley WSPA and Loddon Highlands WSPA are likely to have allocations below 100 per cent in 2019/20 (Table 8).

Table 8. Groundwater outlook for 2019/20

Catchments	Groundwater Management Unit	Groundwater level outlook	Allocations outlook
Loddon/ Campaspe	Central Victorian Mineral Springs GMA	Seasonal drawdown and recovery likely to continue to decline	Remain at 100%
	Mid Loddon GMA	Seasonal drawdown and recovery likely to continue to decline	Remain at 100%
	Loddon Highlands WSPA	Seasonal drawdown and recovery likely to remain stable except in Newlyn Zone where both are likely to continue to decline.	Remain at 100% except in Newlyn & Blampied zones – 75%;
	Lower Campaspe Valley WSPA	Seasonal drawdown and recovery likely to continue to decline	Remain at 100% except in the Barnadown Zone, which is likely to be 75%
Goulburn/ Broken/ Mid Murray	Broken GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Eildon GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Katunga WSPA	Seasonal drawdown and recovery likely to continue to decline	Remain at 100%
	Mid Goulburn GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Shepparton Irrigation GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Strathbogie GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Upper Goulburn GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	West Goulburn GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
Kiewa/ Ovens/ Upper Murray	Barnawartha GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Kiewa GMA	Seasonal drawdown and recovery likely to continue to decline	Remain at 100%
	Lower Ovens GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Upper Murray GMA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%
	Upper Ovens WSPA	Seasonal drawdown and recovery likely to remain stable	Remain at 100%

Surface Water Quality

Current seasonal conditions

The winter-spring period of 2018 has not caused any surface water quality problems in the GMW region. Blue green algae levels in storages are very low at the moment, but have the ability to increase quickly.

Outlook for 2018/19

To the extent that it can be predicted, the risk of water quality incidents occurring over the next 12 months that would impact supply to entitlement holders is considered low. Water storage levels are currently moderate (most are at least half full) and are not forecast to fall to very low levels prior to winter 2019, thus minimising some water quality risks.

The likely need to issue warnings due to high blue green algae levels cannot be predicted. Elevated blue green algae levels can occur under a range of weather, storage level and stream flow scenarios. For example, Lake Eppalock has experienced algae warnings in summer, autumn and winter, and also over a wide range of storage levels.

The low rainfall over the winter-spring period of 2018 and the forecast for continuing dry conditions elevates the risk of hypoxic black-water events occurring over summer and autumn 2018/19 due to the build-up of organic matter on the floodplains. However, black-water will generally only occur if rain falls with sufficient intensity to cause overland flow that can carry organic matter into a stream, combined with temperatures high enough to cause rapid bacterial activity in the receiving stream.

The occurrence of elevated blue green algae or hypoxic black-water events is unlikely to affect GMW's supply to rural customers, as the phenomena are not considered harmful to irrigated agriculture (although the impact on stock is unknown). However, both events can impact aquatic life and recreational use of water bodies.

Urban water corporations are generally able to treat blue green algae affected water to provide safe drinking water. Similarly, the urban water corporations are generally able to manage the taste and odour issues typically associated with black-water water, although it does present some challenges.

High salinity in water systems is unlikely to occur under the current and expected water resource position. However, in the Campaspe and Loddon catchments salinity does tend to rise significantly as storage levels decline.

Information Updates

GMW will update seasonal determinations on the 1st and 15th of each month, or next business day, until all seasonal determination are 100 per cent HRWS. Seasonal determinations will then be updated on the 15th of each month, or next business day.

The first outlook for 2019/20 seasonal determinations will be issued on 15 February 2019. All resource management updates can be located on the Northern Victoria Resource Manager website at http://nvrm.net.au/.