

Annual Water Outlook for Victoria

December 2016

Water and Catchment Division



Environment,
Land, Water
and Planning

Aboriginal Acknowledgement

The Victorian Government proudly acknowledges Victoria's Aboriginal community and their rich culture and pays respect to their Elders past and present.

We acknowledge Aboriginal people as Australia's first peoples and as the Traditional Owners and custodians of the land and water on which we rely. We recognise and value the ongoing contribution of Aboriginal people and communities to Victorian life and how this enriches us. We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.

Inputs

The information in this report is compiled from *Annual Water Outlooks* prepared by the urban and rural water corporations of Victoria.

DELWP acknowledges the input of the Victorian Environmental Water Holder and the provision of data by the Australian Bureau of Meteorology.

Editor

Alieta Donald, Rigby & Pyx Consulting Pty Ltd.

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Annual Water Outlook for Victoria

Victoria is well prepared to meet urban and rural water needs over the coming summer and autumn.

After a series of dry years, rainfall during winter and spring 2016 was above the 30-year average for much of Victoria. While many of our storages filled from the rain, Melbourne's are only slightly better placed than they were a year ago and the state's largest drought storages have not fully recovered. Looking ahead, rainfall conditions are predicted to be average to below average across the state and we may face a hot and dry summer.

This means we need to be prepared for all rainfall and climate scenarios. We can't change what nature has in store over the summer, but we can reduce the potential impacts to water supplies by adopting sensible policies that enable water corporations to plan for the future, encouraging people to use water wisely and supplementing our supplies through harnessing recycled water and desalinated water.

We know that over the long term climate change will mean more extreme climatic events, less rainfall, and potentially as much as a 50 per cent reduction in streamflow by 2065. Victoria's population is projected to almost double by 2051, placing further demand on scarce water resources¹.

Water for Victoria is the Victorian Government's plan to meet the challenges of climate change and population growth to support a healthy environment, a prosperous economy and thriving communities, now and into the future. It sets out a number of strategic actions to guide sustainable water management, including:

- further developing water markets and the water grid so that water can be moved around to where it is most needed
- more effectively utilising the climate-independent Victorian Desalination Project to secure water supplies across southern Victoria
- making better use of alternative, fit-for-purpose supplies, including recycled water and stormwater
- continuing to work with rural and regional communities to enable agricultural development and to support change
- investing significantly to protect the health of our waterways, through riparian works and investments in water efficiency projects that mean less water is taken from our environment

- recognising the cultural importance of water for Traditional Owners and Aboriginal people, and providing opportunities for greater participation
- delivering more timely and user-friendly information about water management so that communities can better understand what we're doing and why.

Water for Victoria also commits to keeping an eye on short-term and long-term emerging trends and risks so that we can implement the next water supply augmentations well in advance, to avoid a potential crisis.

This *Annual Water Outlook for Victoria* summarises the water corporations' outlooks for the state's water supplies over the coming year and informs Victorians about how we will ensure we can provide safe, secure water for all communities.

We have now passed the traditional winter and spring filling period and we expect storages to now fall as temperatures and demands increase and replenishing flows decrease due to drier conditions and catchments. For example, Melbourne storage volumes fell 15.8 per cent between September 2015 and May 2016. This is comparable to declines experienced during the Millennium Drought.

The Government complements the short-term planning summarised in this report with continual long-term water resource planning to ensure Victoria's water security over time. This includes commitments in *Water for Victoria* to undertake long-term water resource assessments and to review sustainable water strategies. This will make best use of the significant investment in the water grid and use of the Victorian Desalination Plant to underpin water security across the state.

Victorians can face the coming year confident that our water resources will be sufficient to cope over summer, and planning is in place to minimise the effect of water restrictions in the limited number of towns where these measures may be necessary.

Each of us can do our part by being smart about our household, business and on-farm water use. Through efficient water use and careful planning, together we can ensure we continue to provide secure water supply for all Victorians.



Lisa Neville

Minister for Water

Annual water outlook for Victoria at a glance

- Rainfall over summer is forecast to be below average in the north east and Gippsland, and average across western, central and northern Victoria
- By securing supplies, including through the use of the water grid and the desalination plant combined with targeting water efficiently with programs like Target 155 and Target your water use, Melbourne and Geelong have enough water for the coming year under average or drought conditions
- No towns are on restrictions and most will be secure, including Bendigo and Ballarat – fifteen towns are at risk of water restrictions under average or dry conditions
- Entitlement holders across the state, including farmers and the environment, will benefit from the 100 per cent allocations for high-reliability water shares in regulated systems
- Restrictions to diversions have now been lifted from almost all unregulated streams and good rainfall has helped to recharge groundwater and wetland systems⁴
- Planning for the year ahead includes continuing to use water efficiently by adopting the permanent water savings rules and by being smart about our household, business and on-farm water use

Introduction

The Annual Water Outlook for Victoria provides information about the state's water supplies, expected climatic conditions and contingency plans to cope with any supply shortages, should they arise this summer and autumn.

Due to the highly variable nature of Victoria's climate, different climate modelling scenarios are used by the water corporations to identify potential issues and vulnerabilities, and outline strategies to meet customer demand.

Given the seasonal conditions already experienced this year and the available forecasts, this report summarises the water corporations' preparedness for 'average' or 'dry' conditions. This report also summarises the state of environmental water across Victoria.

As part of this planning, water corporations consider a range of strategies, including permanent water savings rules and continued efficient water use in households, business and on-farms. The short-term planning contained in the annual outlooks is part of a suite of coordinated planning undertaken by water corporations. Long-term planning is documented in drought response plans and urban water strategies.

This is the second year an annual water outlook for Victoria has been prepared, following the release of the *Drought Preparedness Statement* in December 2015. This report covers the period of 1 December 2016 to 30 November 2017.

What factors are influencing Victoria’s water supplies?

A year ago, Australia was experiencing a significant El Niño event. During El Niño events, winter and spring rainfall is below average across much of eastern Australia. In contrast, La Nina events are associated with higher winter and spring rainfall.

Since April 2016, the El Niño–Southern Oscillation index (ENSO) has been in a neutral position and the Bureau of Meteorology (BoM) has been indicating that there is 50 per cent chance that La Nina conditions will develop (La Nina WATCH status) over the next season. However, the chance of this occurring is now declining.

The ENSO neutral position occurred at the same time as Australia was experiencing a negative Indian Ocean Dipole – together this drove higher rainfall and cooler temperatures across much of Australia including Victoria.

These climate drivers have been reflected in the rainfall across the state, which was mostly below average to very much below average in the 12 months leading up to May 2016. (see Figure 1). Over May to October 2016, most of Victoria experienced above average rainfall (see Figure 2).

The negative Indian Ocean Dipole has weakened, ending during November, which means its influence on Australian climate has reduced. This is the main

reason why rainfall predictions are now reverting to average and below average compared to the wet spring outlooks. During November rainfall across much of the state has been below average. Most of coastal Victoria received only 20-80 per cent of the November average rainfall. Northern Victoria, along the Murray River, received between 80 – 150 per cent of the November average rainfall.

The BoM *Seasonal Outlook* prepared for summer 2016-17 indicates there is a high chance that the east of the state will receive below average rainfall over summer, and a roughly equal chance of a wetter or drier than average summer across western and central Victoria (see Figure 3). Historical outlook accuracy is moderate (55–65 per cent) in north eastern Victoria and less strong in south western Victoria.

In the shorter term, a northerly shift in the average position of westerly winds and high pressure systems (also known as the "Southern Annular Mode, or SAM") is underway. When this shift (a negative SAM phase) occurs in December, this typically means southern mainland Australia becomes drier and warmer than usual.

The BoM *Seasonal Outlook* also predicts above average temperatures across most of Victoria (see Figure 4). This may increase demand for water in some areas.

Figure 1. Rainfall deciles for Victoria from May 2015 to April 2016

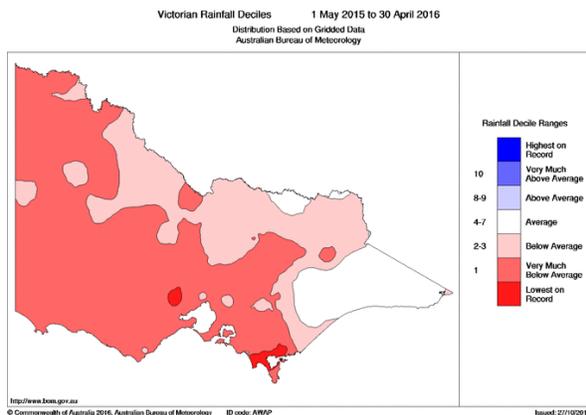


Figure 2. Rainfall deciles for Victoria from May 2016 to October 2016

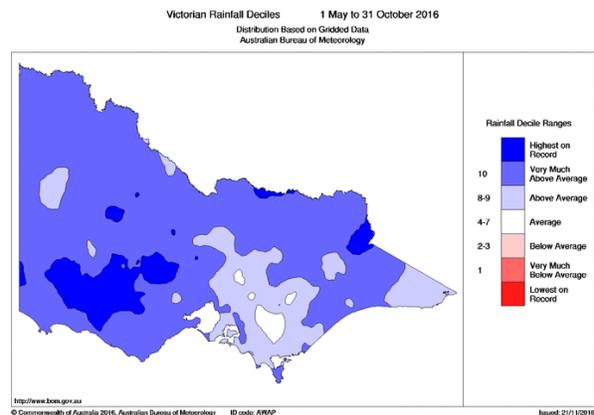


Figure 3. Chance of above median rainfall for December to February 2017

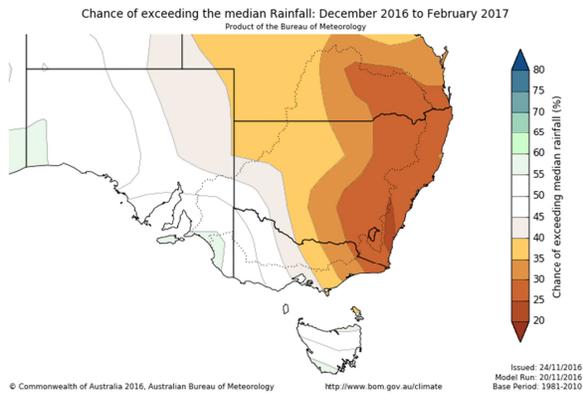
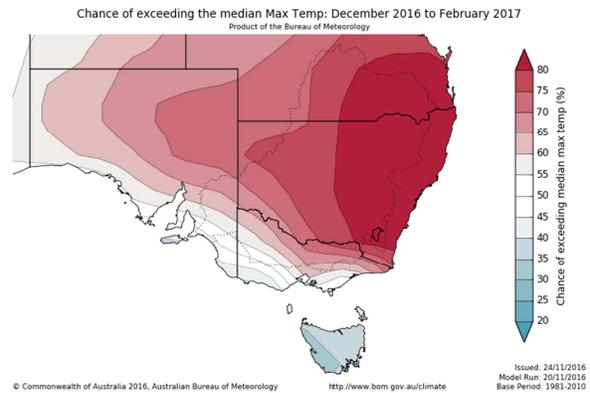


Figure 4. Chance of above median maximum temperatures for December to February 2017



All maps © Commonwealth of Australia 2016, Australian Bureau of Meteorology

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

What was the effect of the winter and spring rainfall?

During winter 2016, rainfall was above average across Victoria as a whole, particularly across the west and north east. State-wide rainfall was 23 per cent above the winter average. A few sites in the north and east recorded their highest total winter rainfall on record².

In September 2016, most of Victoria received further above average rainfall, with areas in the north and west receiving highest rainfall on record. Victoria, as a whole, experienced the second wettest September on record; the rainfall total was 94 per cent above the September average. Only parts of West Gippsland received average or below average rainfall².



In far south-western Victoria the Glenelg River reached major flood levels in both Casterton and Coleraine, flooding and isolating some homes and businesses. In the eastern Wimmera, the Avoca

River reached major flood levels at Charlton, with several houses experiencing flood damage and one person losing their life in flood waters².

The State Emergency Service received 1500 calls for assistance over a 10-day period in mid-September and performed more than 20 flood rescues. During this time, 13 schools and more than 190 roads were closed temporarily, with 25 local government areas affected and parts of some towns subject to evacuations. There was minor flooding around Ballarat and the Grampians as well as in Albury. The frequent heavy rain also resulted in landslides along stretches of the Great Ocean Road, leading to a four-day road closure between Eastern View and Lorne².

During October rainfall across Victoria continued to be significant. State-wide, it was 26.5 per cent above average, the highest October rainfall since 2010². Conditions for November have been drier with areas of below average rainfall.

The wet conditions over winter and early-mid spring have helped to increase flow in rivers, recharge groundwater, boost water storages and provided shared benefits for recreational users of water across the state so that communities can enjoy the benefits of water.

Most of our reservoirs filled to capacity from July to November, including Hume Reservoir, Lake Eppalock and Cairn Curran Reservoir in northern Victoria, Lake Glenmaggie and Blue Rock Lake in eastern Victoria, and Pykes Creek Reservoir and Lake Wartook in the state's west. However, a number of the large storages across the state have not filled to capacity – Dartmouth Dam and Lake

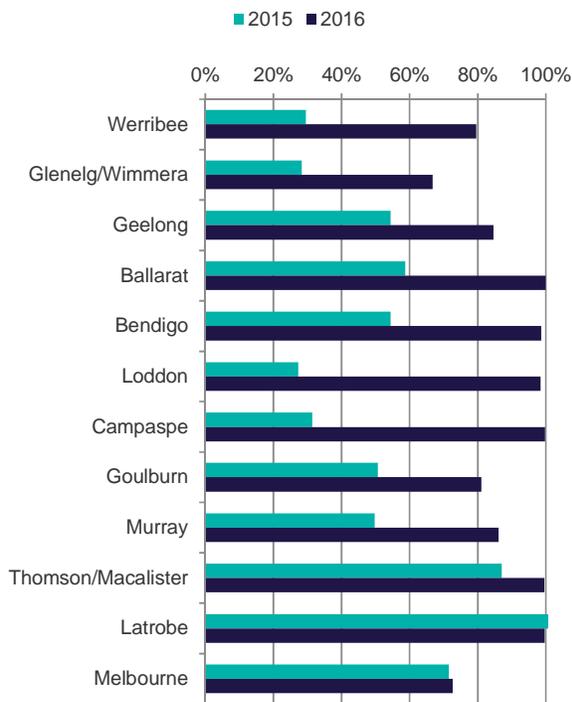
Eildon in the north, Thomson Reservoir in Gippsland and Rocklands Reservoir in the Grampians. This is due to the size of these storages relative to their catchment sizes, which means they take longer to fill.

Generally, water storages in Victoria are 29.5 per cent fuller than the same time last year (as at 30 November) (see Figure 5). Regional storages are holding significantly more water, 84.8 per cent compared to 61.3 per cent in 2015 and 74.3 per cent in 2014.

Melbourne storages are marginally better placed compared to the same time last year, at 72.6 per cent compared to 71.5 per cent in 2015 and 78.5 per cent in 2014.

In summary, storage levels to the end of November are similar to this time last year for Melbourne and Gippsland but significantly improved for most other areas of the state. This has boosted water supplies and also provided a number of shared benefits including opportunities for recreation and environmental watering.

Figure 5. Victorian storages percentage full as at 30 November 2015 and 30 November 2016



What is the current state of Victoria’s rural water supplies?

In **Northern Victoria**, the 2015-16 season was one of the driest on record. Seasonal determinations in all Goulburn Murray Water systems, except for the Murray system, did not reach 100 per cent for high-reliability water shares. As a result, water reserves for the 2016-17 season to operate the regulated systems and to make opening seasonal determinations available were very limited.

The 2016-17 water year began with seasonal determinations for high-reliability water shares available in only the Murray (one per cent) and Goulburn systems (eight per cent). The Campaspe, Loddon, Broken and Bullarook systems all started on zero per cent for high-reliability water shares.

By 17 October 2016 all regulated systems had 100 per cent high-reliability water shares available for the 2016-17 season. As at 15 November 2016, Campaspe, Broken and Bullarook entitlement holders have the maximum volume available in 2016-17 as there is now 100 per cent allocation for low-reliability water shares in these systems.

Consistent with the seasonal determination policy in northern Victoria, Goulburn Murray Water are now putting aside water for reserves in the Goulburn and Murray systems for next year, increasing the chance of the 2017-18 irrigation season opening with seasonal determinations against high-reliability water shares in 2017.

Further inflows are needed before low-reliability water shares seasonal determinations can be announced in the Murray and Goulburn systems in 2016-17.

Entitlement holders in the Ovens system are unlikely to go onto restrictions in 2016-17 as the storages are expected to remain full into early 2017.

Most groundwater used in the northern region comes from deeper aquifers such as those in lower Ovens and Murray valleys, and further west in the Lower Campaspe and Mid Loddon valleys. These aquifers have large storage capacities and so are better able to buffer the effects of annual dry conditions. Recharge would be boosted across most aquifers with the change to wet conditions mid-year.

In **Western Victoria**, there has been a significant break to the dry conditions seen throughout the 2015-16 season and the preceding year. In the Werribee system, which supplies irrigators in the Werribee and Bacchus Marsh districts, seasonal determinations against high-reliability water shares reached 15 per cent and storage levels dropped to 12 per cent.

During August and September 2016, Pykes Creek and Melton reservoirs filled and Lake Merrimu rose to about 60 per cent with further inflows likely to continue over the next few months.

This has enabled the seasonal determinations for the Werribee and Bacchus Marsh Irrigations Districts to increase from zero per cent at the start of July 2016 to 100 per cent of high-reliability water shares and 45 per cent low-reliability water shares by November 2016.

Most groundwater levels are normal for this time of year, except for the Deutgam aquifer in Werribee South. The shallow Deutgam aquifer remains lower than the full allocation level following the extended dry period. Licence holders to this aquifer have been restricted to 50 per cent of licence volume to protect the aquifer.

Southern Rural Water has removed the restrictions or bans for licence holders on unregulated rivers. At the same time last year, 28 of the 37 rivers Southern Rural Water manage were placed on restrictions or bans.



Conditions have dramatically improved across the **Wimmera-Mallee**, with supplies for rural water customers from the Wimmera-Mallee Pipeline and Northern-Mallee Pipeline secure this season. Groundwater supplies remain relatively unaffected and sufficient volumes of water are also available to meet demands. Grampians Wimmera Mallee Water has lifted the bans on unregulated irrigation water extraction from the Wimmera River and Avoca River due to the favourable climatic conditions.

In **Gippsland**, seasonal determinations are 100 per cent for high-reliability water shares in the Thomson-Macalister system and there is access to supplementary spill entitlement.

Restrictions on diversions have been removed from almost all unregulated surface water systems, except four in the Greater Melbourne catchments which are on bans as at 25 November 2016⁴. Most groundwater systems are behaving as expected at this time of year, with water availability sufficient to meet unrestricted demand.

What is the state of Victoria's environmental water?

Environmental water is water allocated to protect and maintain rivers, wetlands and lakes and the native species that rely on them. The Victorian Environmental Water Holder (VEWH) holds water entitlements and received annual allocations, like all entitlement holders, that can be used for environmental purposes.

In northern Victoria, high flows inundated areas of river red gums forests along the Murray, and river and wetlands across the landscape also received natural inflows. In the Barmah-Millewa forest, deeper water in some wetlands has promoted the growth of ecologically important species including swamp wallaby grass, Moira grass and water ribbons. Once natural flows begin to recede, environmental water will be used at a number of sites, such as Barmah Forest, to extend the benefits the high flows have provided.

The River Murray and other waterways in the Murray-Darling Basin have seen extensive *blackwater* events – a result of microbes using all the oxygen in the water to breakdown the leaves and wood being washed in with the returning floodwaters. Oxygen is not replenished quickly enough during blackwater events to support plants and animals. Environmental watering at sites such as Hattah Lakes, Campaspe River, Goulburn River and lower Broken Creek has provided important refuge sites for fish and other aquatic animals seeking more oxygenated water.

In the Werribee River, to extend the period of high flow, 224 ML of environmental water was released from Melton Reservoir and passed through the weir pool at Werribee, the Werribee township and out to Port Phillip bay through the Werribee River estuary. This release supports a diverse range of native fish species, water bugs and platypus.

In the east of the state, the high natural flows have been able to meet ecological objectives of the planned spring freshes in the Thomson, Macalister and Latrobe rivers and only small volumes of environmental water have been used. Natural flows have mostly met environmental needs, therefore more water is available to achieve objectives later in the year, or will be carried over into 2017-18.

Like other water users, the VEWB considers all potential conditions when developing its Seasonal Watering Plan and adjusts water management depending on the conditions as the season progresses. When there is more water available in the system, stored environmental water may be used to supplement natural flooding and flows.

This gives environmental water managers the opportunity to extend unregulated high flow events to encourage the movement and spawning of native fish, enhance the condition and extent of bank vegetation and provide opportunities for the exchange of nutrients and carbon between the river and the floodplain.

Which urban water systems and towns are facing potential water restrictions and why?

Individual water corporations are assessing water supplies on a system by system basis, and planning how best to manage supplies and avoid the need for water restrictions.

There are 106 systems³ that supply urban reticulated water to Victorian towns. Over the coming year, water corporations have identified via the *annual water outlooks* that under dry or drought conditions, restrictions may be required in six supply systems. The other 100 water supply systems are not predicted to need water restrictions.

Restrictions would be used to manage demand under certain local conditions. In addition to water availability issues, some towns may need to be placed on restrictions due to water quality issues, infrastructure failures or capacity constraints. These risks are not easy to predict and can cause a water corporation to place towns on water restrictions with little or no warning. Systems which are vulnerable to these issues are systems with only one source of water, limited water treatment capacity or systems where water has to be moved a long way to reach the town. The risk of blue-green algae blooms may be present this year as recent rains have washed nutrients into reservoirs and warm weather over summer may trigger blooms.

Under moderate or average conditions, water restrictions may not be necessary in any of the six water supply systems identified as being at risk — with the exception of the Coalition Creek System servicing Korumburra. This system is vulnerable to restrictions even in average climate conditions.



Under dry or drought scenario climate modelling, restrictions in the six systems could affect 15 towns across the state this summer. Table 1 contains detailed information for each system on current water levels, outlook for the summer and autumn, how water restrictions will be triggered, the short-term measures available to assist affected communities, and some long-term infrastructure improvements currently being considered to improve their water supplies.

Is Melbourne facing restrictions this summer?

With the current storage levels and smart water use underpinned by the security of the water grid and the Victorian Desalination Project, it is not expected that water restrictions will be necessary in Melbourne or any other major urban centre over summer. Given the current outlook, urban water supplies in larger systems or those connected to the grid have sufficient water resources this year to meet demand over summer without the need for restrictions.

Why are some water supply systems and towns more vulnerable to drought than others?

Many factors influence a water system's vulnerability to drought and the potential need for water restrictions including:

- climatic conditions
- the physical characteristics of the water system itself, including reservoir capacity
- the existence of a drought reserve
- the flexibility of local demand

- whether the system has options for additional supplies, for example provided by access to the water grid.

How well did we manage water supplies last summer?

Understanding how to deal with the impact of lower than expected inflows and drought was firmly in the thoughts of most Victorians this time last year. Rainfall during 2015 was below to very much below average across most of the state. The state-wide average rainfall was 505.2 mm, 23 per cent below the long-term annual average of 660.2 mm. This was coupled with maximum temperatures that were above the long-term average across the State².

The *Drought Preparedness Statement* released in December 2015, highlighted that 23 systems out of a total of 107³ systems faced the risk of insufficient water supplies. The report showed that under dry, drought and worst case scenario climate modelling, 50 towns in South Gippsland, the Colac region, north east Victoria and north central Victoria were facing the risk of water restrictions over the 2015-16 summer and autumn period.

The conditions that eventuated over the 2015-16 summer and autumn period resulted in three water corporations placing water restrictions on nine supply systems, which applied to 36 towns. The timing and severity of restrictions ranged from two weeks to over five months, and stage 1 through to stage 4. Water restrictions were introduced for a number of different reasons – drought and lack of rainfall and streamflow, low water availability, blue-green algae risks and infrastructure constraints due to high demand on the system.



Some systems experienced conditions which were the worst on record – for example Lorne’s Allen Reservoir dropped to 33 per cent and stage 3 restrictions were introduced, yet this is a reservoir which historically has rarely dropped below 75 per

cent capacity. Grampians Wimmera Mallee Water needed to place ten towns on stage 4

restrictions for five days as it managed supplies that were impacted by blue-green algae, which affected the quality of the water.

In March 2016, storage levels for Melbourne were at 63 per cent. At that time, Melbourne’s water storages had been declining steadily for the previous two years and had dropped by 152 gegalitres in the last year alone.

Based on advice from the four metropolitan water corporations, the Government placed an order for 50 gegalitres of desalinated water to increase the amount of water available for Melbourne and to provide a buffer under the different climate modelling scenarios. This 50 gegalitres equates to 2.8 per cent of the total storage capacity for the Melbourne supply system. This water also benefits systems connected to Melbourne, including Geelong (storage levels below 40 per cent in March 2016) and Sunbury (storage levels of about 20 per cent in March).

This report and the metropolitan water corporations’ annual water outlooks, drought response plans and urban water strategies (currently in preparation) include the added security provided by the water grid and the Victorian Desalination Project.

How can you help to secure our urban water supplies?

Water for Victoria is the Victorian Government’s plan to meet the challenges of climate change and population growth to support a healthy environment, a prosperous economy and thriving communities, now and into the future.

The community and industry have an essential role in smart and efficient use of our water supplies. This was demonstrated during the Millennium Drought. The contribution made by communities and businesses in reducing water use during this time has been widely attributed as the reason Melbourne did not run out of water. This included the ‘Target 155’ program, a voluntary water efficiency program that encouraged Melbourne households to limit their water use to 155 litres per person per day.

The Melbourne metropolitan water corporations are delivering the next generation of the Target 155 program, providing advice and education to help the community understand efficient water use and how to aim for the target of 155 litres per person per day.

To complement Melbourne's Target 155 program, the regional urban water corporations are launching a regional water efficiency program called 'Target Your Water Use'.

Water use across Victoria varies a lot due to the different urban environments, diverse landscapes and climate variation. Water use per person for regional urban water corporations ranges from 120 litres per day to almost 500 litres per day. The Target Your Water Use program recognises this and focuses on efficient water use for each region.



How can you help to secure our rural water supplies?

Rural water infrastructure is vital to support agriculture and its future growth. Successive governments have invested in irrigation districts; the focus has been on reducing the amount of water required to operate the irrigation systems and enabling increased value of agricultural production. Governments, in partnership with communities, have also built modern stock and domestic supply systems in drier parts of the state. The Wimmera Mallee system is the largest of these systems.

Climate change will increase the need for existing infrastructure to be more efficient and for new infrastructure that enables access to the water grid. For these reasons, the Victorian Government is investing \$81.19 million with the community, together with a further \$45.6 million from the Federal Government, in areas such as Mitiamo, South West Loddon, and Werribee Irrigation District¹.

It is important that rural water corporations and farmers operate irrigation distribution systems to maximise water efficiency. Investment in irrigation modernisation has demonstrated how irrigation delivery systems can run more efficiently. Innovation in spatial technologies will enable benchmarking, monitoring and reporting of on-farm water use to drive future improvements in water efficiency.

In summary, Victoria is well prepared to meet urban and rural water needs over the coming summer and autumn.

After a series of dry years, Victoria had higher than average rainfall during winter and spring 2016. However, rainfall conditions are predicted to be average to below average across the state and we may face a hot and dry summer.

This report demonstrates that the state's urban and rural water corporations are tracking the condition of water supply systems and have strategies in place to meet local customer demand and address potential vulnerabilities based on different climate modelling scenarios.

Each of us can do our part by being smart about our household, business and on-farm water use. Through efficient water use and careful planning, together we can ensure all Victorians have secure water supplies.

Table 1. Victorian towns facing potential water restrictions in summer and autumn 2016–17

Water corporation	Water supply system (towns supplied)	Current condition, outlook and risks	Drought preparedness Options and actions
Barwon Water	Colac (Colac, Irrewarra, Beeac, Cressy, Coragulac, Alvie, Pirron Yallock)	As of 27 November, Colac's overall storage level is 98.5 per cent. At the same time last year, storages were at 93 per cent. If storage inflows over the summer are significantly below the long-term average, restrictions may need to be applied in the late summer or early autumn 2016-17.	If climate conditions over the summer are significantly drier than the average, Barwon Water may need to introduce Stage 2 restrictions in late summer or early autumn. The length and severity of restrictions would depend on seasonal conditions. Barwon Water is in the process of connecting the Colac system to the Geelong system. This will be completed by mid-2017.
Barwon Water	Lorne (Lorne)	As of 27 November, Lorne's reservoir is at 99.5 per cent. If storage inflows over the summer are significantly below the average, restrictions may need to be applied in the late summer or early autumn.	If climate conditions over the summer are significantly drier than the average, Barwon Water may need to introduce Stage 2 restrictions in late summer or early autumn. The length and severity of restrictions would depend on seasonal conditions.
North East Water	Corryong (Corryong, Cudgewa)	Supplied from Nariel Creek via pumping to Hamilton Hill Reservoir, which is 98 per cent full. This storage is small and relies on run of river to maintain water supply. The system is vulnerable to dry conditions.	Under dry conditions North East Water may need to implement low level restrictions in autumn.
North East Water	Goorambat (Goorambat)	Supplied from groundwater. While groundwater levels have recently experienced recharge, the aquifer has not recovered from last drought. This aquifer can fail at short notice.	If the aquifer fails, water would be carted from Benalla or Devenish and low level restrictions may be imposed at short notice. North East Water is in the process of constructing a pipeline from Goorambat to Yarrawonga, which will be completed in 2017.
South Gippsland Water	Coalition Creek (Korumburra)	Supplied via the Coalition Creek system (comprising Coalition Creek reservoir, Ness Gulls reservoir and Bellview Creek reservoir). This system is unreliable, even in average conditions. There is a temporary supplementary water supply from the Tarwin River West Branch and groundwater (which also supplies Leongatha).	Under average conditions South Gippsland Water will be required to use the temporary supplementary supply to avoid water restrictions. Under dry conditions, South Gippsland Water will be required to place customers on Stage 1 restrictions for a period of time between April 2017 and July 2017, even with the supplementary water. The length and severity of restrictions would depend on seasonal conditions. South Gippsland Water has previously identified Korumburra's water supply as marginal. Therefore, it will be connected, via the Lance Creek system, to the Melbourne supply system by mid-2019.
South Gippsland Water	Little Bass (Poowong, Loch, Nyora)	Supplied by the Little Bass Reservoir, which is 100 per cent full. Under dry conditions the system is vulnerable to water supply concerns.	Under dry conditions South Gippsland Water will be required to place customers on restrictions for a period of time from March 2017. The length and severity of restrictions would depend on seasonal conditions. South Gippsland Water has previously identified the Little Bass's water supply as marginal. Therefore, it will be connected, via the Lance Creek system, to the Melbourne supply system by mid-2019.

Further information

Where can I get more information?

More information about **sustainable water management** and how we manage in dry conditions across Victoria can be found at:

- Department of Environment, Land, Water and Planning – www.delwp.vic.gov.au/water

More information about water supply and demand, your **local water corporations** have released an Annual Water Outlook that can be found at:

- Barwon Water – www.barwonwater.vic.gov.au/
- Central Highlands Water – www.chw.net.au/
- City West Water – www.citywestwater.com.au/
- Coliban Water – www.coliban.com.au/site/root/index.html
- East Gippsland Water – www.egwater.vic.gov.au/
- Gippsland Water – www.gippswater.com.au
- Goulburn-Murray Water – www.g-mwater.com.au/
- Goulburn Valley Water – www.gvwater.vic.gov.au/
- Grampian Wimmera Mallee Water – www.gwmwater.org.au/
- Lower Murray Water – www.lmw.vic.gov.au/
- Melbourne Water – www.melbournewater.com.au/Pages/home.aspx
- North East Water – www.newater.com.au/
- South East Water – www.southeastwater.com.au/Pages/Home.aspx
- South Gippsland Water – www.sgwater.com.au/
- Southern Rural Water – www.srw.com.au/
- Wannon Water – www.wannonwater.com.au/index.php
- Western Water – www.westernwater.com.au/Home
- Westernport Water – www.westernportwater.com.au/
- Yarra Valley Water – www.yvw.com.au/home

More information about the **environmental water** can be found at:

- Victorian Environmental Water Holder – www.delwp.vic.gov.au/water

More information about **forecast rainfall and temperatures** can be found at:

- Australian Bureau of Meteorology – www.bom.gov.au/climate/ahead

End Notes

1 – State of Victoria (2016). *Water for Victoria*, Melbourne.

2 – Sourced from www.bom.gov.au

3 – There are now 106 water supply systems compared to 107 systems referenced in the 2015 Drought Preparedness Statement. The Aireys Inlet system has now become part of the Geelong system and is no longer a separate water supply system.

4 – There was a correction made on 13 December 2016 to amend an error in relation to the number of unregulated waterways on bans. The number of waterways on bans has increased from zero to four.

Glossary

Allocation	Water that is actually available to use or trade in any given year, including new allocations and carryover. The water that is actually in the dam in any given year is allocated against water shares. The seasonal allocation is the percentage of water share volume available under current resource conditions, as determined by the resource manager.
Aboriginal Victorians	An Aboriginal Victorian is a person of Aboriginal descent who identifies as an Aboriginal and is accepted as such by the Victorian Aboriginal community in which he or she lives.
Aquifer	An underground layer of rock or sediment that holds water and allows water to flow through it.
Augmentation	Increase in size and/or number, for example of assets in a water supply system.
Climate change	A change in global or regional climate patterns.
Climate models	Mathematical representations of the earth's climate system based on the laws of physics. They are used to understand our future climate.
Community	Includes individuals, public and private landholders, community groups and business owners.
Desalination	Removing salt from water sources, often for drinking purposes.
Diversions	The removal of water from a waterway, for example via a pump.
Environmental water	Water to support environmental values and ecological processes.
Environmental water holder	A body established to hold and manage environmental entitlements.
Floodplain	Low-lying land adjacent to a river or stream with unique ecosystems dependent on inundation from flood events.
Freshes	Small and short peaks in flows; a 'flush' of water through a waterway, which occurs generally in the summer and spring months.
Gigalitre (GL)	One billion (1,000,000,000) litres.
Groundwater	All subsurface water, generally occupying the pores and crevices of rock and soil.
High-reliability water share	Legally recognised, secure entitlement to a defined share of water. Water shares are classed by their reliability, which is defined by how often full seasonal allocations are expected to be available. Allocations are made to high-reliability water shares before low-reliability shares.
Inflows	Water flowing into a storage or waterway.
Low-reliability water share	Legally recognised, secure entitlement to a defined share of water. Water shares are classed by their reliability, which is defined by how often full seasonal allocations are expected to be available. Allocations are made to high-reliability water shares before low-reliability shares.
Megalitre (ML)	One million (1,000,000) litres.
Millennium Drought	The drought in Victoria spanning from 1997 to 2009.
Recreational users	Victorians and other visitors that use Victorian waters for fishing, water skiing, rowing, camping, walking, bird watching, sporting events, social gatherings and other activities on or near waterways.
Recycled water	Water derived from sewerage systems or industry processes that is treated to a standard appropriate for its intended use.
Regulated systems	Systems where the flow of the river is regulated through the operation of large dams or weirs.
Reliability of supply	Represents the frequency with which water that has been allocated under a water entitlement is expected to be supplied in full.
Reservoir	Natural or artificial dam or lake used for the storage and regulation of water.
Seasonal determination	The percentage of water share volume available under current resource conditions determined by the resource manager for unbundling systems. Since 1 July 2012 the resource manager has used seasonal determination instead of the previously used term, seasonal allocation. This is to distinguish between water available under current resource conditions and the water customers have available because of carryover.

Stormwater	Runoff from urban areas. The net increase in runoff from urban development due to water not being able to seep into the ground because of impervious surfaces, such as roofs and roads.
Sustainable water strategies	Regional long-term planning documents legislated under the <i>Water Act 1989</i> , to address threats to, and identify opportunities to improve water security and river health outcomes.
Traditional Owners	People who, through membership of a descent group or clan, are responsible for caring for Country. Aboriginal people with knowledge about traditions, observances, customs or beliefs associated with a particular area. A Traditional Owner is authorised to speak for Country and its heritage.
Unregulated systems	River systems with no large dams or weirs to regulate flow.
Urban water strategies	All urban water corporations in Victoria are required to develop these strategies, which detail how water supplies and water demands will be balanced over the long-term. These are the next iteration of Water Supply Demand Strategies first prepared in 2007.
Victorian Desalination Project	The formal name of the Wonthaggi desalination plant and associated infrastructure – made up of the plant, underground pipeline and dedicated power supply.
Victorian Environmental Water Holder	An independent statutory body responsible for holding and managing Victoria's environmental water entitlements.
Water corporations	Government owned organisations that provide a range of water services to customers within their service areas including water supply, sewage and trade waste disposal and treatment, water delivery for irrigation and domestic and stock purposes, drainage, and salinity mitigation services. Some water corporations have a regulatory function for the diversion of water from waterways and the extraction of groundwater. Formerly known as water authorities.
Water entitlement	A right to receive water allocations, depending on resource availability. An unbundled water entitlement is a water share. A bundled water entitlement may be one of several types; most commonly take and use licences, water allowances, and supply by agreements.
Water market	Market in which the trade of permanent and temporary water is allowed under certain conditions.
Water quality	Refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose.
Water security	The capacity of a population to access adequate quantities of acceptable quality water to sustain life, socio-economic development and human wellbeing.
Water storages	A hydrological feature in which water is stored. Surface water storages include natural and artificial ponds, lakes, reservoirs and lagoons, also the bodies of water held behind weirs and dams.
Water systems	All sources of water supply including centralised and decentralised sources and structural or non-structural options, including planning, regulatory or pricing measures.
Waterways	Rivers and streams, their associated estuaries and floodplains (including floodplain wetlands) and non-riverine wetlands.
Weirs	A barrier across a river designed to alter flow characteristics.

