MALLEE CATCHMENT facts

Monitoring groundwater in the Mallee 2012

Above: Groundwater monitoring bore. Photo: Mallee CMA.

This fact sheet summarises groundwater level and salinity monitoring completed within the Mallee Catchment Management Authority (CMA) region in 2012. Monitoring was undertaken to provide an update on groundwater levels and salinity across the region.

Groundwater levels change over time as a result of a combination of the weather (climate), land use patterns and management activities. Regular review and updating of trends and projected groundwater levels is undertaken to identify potential threats and assess the threat posed by shallow groundwater across the Mallee.

Salinity occurs naturally within the Mallee region; however, it has been exacerbated by human activities that accelerate the mobilisation and accumulation of salt such as the historical clearing of land for agriculture and irrigation activities. Shallow saline groundwater can directly affect the health of both native vegetation and agricultural land and also result in increased salinity within surface water bodies such as the River Murray and wetlands.

At a glance

- Groundwater levels were collected at 429 bores and salinity levels were recorded at 407 of these during the 2012 project;
- Both groundwater levels and salinity measurements have fluctuated over recent years. This may be due to localised surface water pooling in low lying areas observed across the Mallee, as well as high river levels, after a period of extremely high rainfall during the 2010/11 summer months. A total of 94 bores are suspected to have been flooded in the past 12-18 months;
- A total of 34 bores had a measured groundwater less than two metres from the surface in 2012.

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The Mallee CMA runs an annual groundwater monitoring program over a network of core bores specifically chosen to monitor both groundwater levels and salinity. During 2012, this program was delivered from February to June, monitoring 429 bores.

Method

All groundwater samples and groundwater level measurements were undertaken in accordance with the State Observation Bore Network (SOBN) groundwater bore monitoring guidelines. Groundwater bore data collected included water levels and salinity (expressed as electrical conductivity).

Electrical conductivity is used to measure salinity levels. Salty water conducts electricity more readily than purer water and as such, electrical conductivity provides an indication of the salt content of the water.

Groundwater depth was recorded by measuring the Standing Water Level (SWL), which is a measure of the depth of the groundwater from the ground surface.

Depth to groundwater was collected at 429 bores and electrical conductivity samples were recorded at 407 of these. A total of 23 bores were dry, blocked or damaged and a sample could not be collected from these bores. Due to high flows in the River Murray, or where access tracks and bridges had been closed by earlier flooding events, a total of 68 bores were inaccessible and an additional 20 could not be located.

Results

Groundwater level

Of the 429 bores monitored for groundwater depth in 2012, 20 bores were dry. Of the remaining 409 bores, the shallowest recorded depth to groundwater was 0.08m below the ground surface (Table 1) recorded on the Murray River floodplain near Merbein. The deepest recorded depth to groundwater reading was 65.82m (Table 1).

Table 1: Depth to groundwater below the surface level from the 2010, 2011 and 2012 monitoring showing minimum and maximum values in metres below ground level (mbgl).

	2010	2011	2012
Minimum mbgl	0.75	0.45	0.08
Maximum mbgl	66.2	66.1	65.82

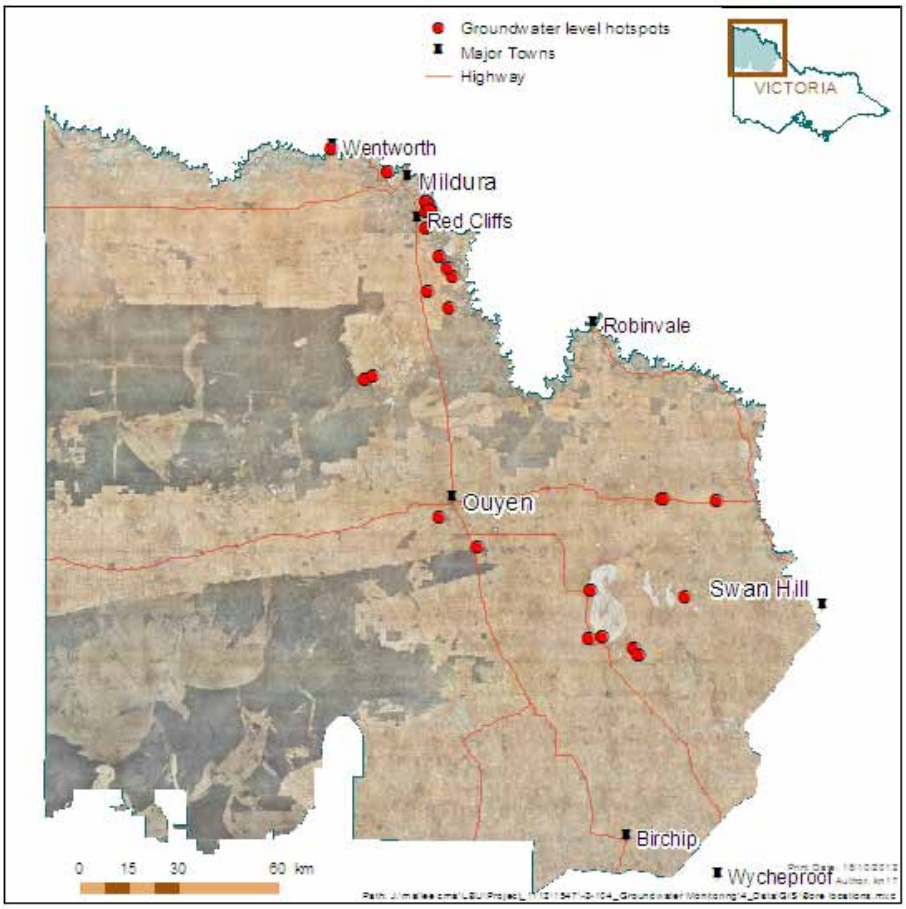

Figure 1. Bores identified to have groundwater levels within two metres of the ground surface (groundwater level hot spots).

When compared to 2011 results, 56% of bores sampled in both 2011 and 2012 showed an overall increase in depth to groundwater, meaning groundwater is now further from the surface. However, 87% of bores sampled in both 2010 and 2011 showed an overall reduction in depth to groundwater, meaning the groundwater was closer to the surface. Prior to the 2011 monitoring round, the average monthly rainfall from October 2010 to March 2011 was more than four times greater than average records (Commonwealth of Australia 2011, Australian Bureau of Meteorology, March 2011).

Groundwater level 'hotspots'

Hotspots is a term used to describe areas of the region where the groundwater is within two metres of the surface, as this water can affect the health of vegetation and surface water bodies, particularly if it is saline. During the 2012 sampling, 34 bores had a measured groundwater less than two metres from the surface (Figure 1), compared to 46 bores in 2011 and only nine bores in 2010. These hotspots will be monitored again in the 2013 period to assess any trends and/or movements in water level depth. The hotspots are generally located on the Murray River floodplain, in the Tyrrell Basin and on the Raak Plains (Figure 1).

Electrical conductivity (salinity)

Of the 407 samples monitored for electrical conductivity, the lowest reading was 145µS/cm, which would be considered as fresh water (Table 2). The upper limit for human drinking water is 2500µS/cm, and most fresh drinking water will have a salinity level of about 100µS/cm.

The highest recorded electrical conductivity reading was recorded in the Tyrrell Basin at 209,880µS/cm (Table 2). As a comparison, this is four times saltier than sea water, which is usually around 56,000µS/cm. Saline groundwater is a natural feature of the Mallee landscape; for example, within the Tyrrell Basin. However, the area impacted by saline groundwater has expanded due to land use change following clearing of native vegetation.

Although the maximum value recorded for salinity in 2012 was higher than the 2011 results, it is similar to the maximum value recorded in 2010. Approximately half (53%) of the bores monitored in both 2011 and 2012 recorded an increase in salinity, compared with 69% of bores that recorded an increase in salinity readings from 2010 to 2011.

Key findings

While no detailed analysis has been undertaken at this point, results showed there was a high variability in comparing the data collected in 2010, 2011 and 2012.

Table 2: Electrical Conductivity results from the 2010, 2011, and 2012 monitoring, minimum and maximum values in microSiemens per centimetre (µS/cm).

	2010	2011	2012
Minimum µS/cm	192	218	145
Maximum µS/cm	208,400	169,200	209,880

It is possible this high variability may be the result of localised surface water pooling in low lying areas observed across the Mallee, as well as high river levels, after a period of extremely high rainfall during the 2010/11 summer months. A total of 94 bores are suspected to have been flooded in the past 12-18 months. Due to the widespread surface water pooling and high river levels in 2011, it is possible that water may have entered the bore from the surface rather than representing the aquifer, which may have influenced both groundwater levels and salinity. This influence may continue for some time as the water from these events filters through the soil profile, dissolving salts that have accumulated during the extended dry period. It is expected that groundwater levels will stabilise over time, however, this would need to be confirmed with continued monitoring. Monitoring will be undertaken again for depth to groundwater and salinity levels in the region in 2013.

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Information included in this article is from reports submitted to the Mallee CMA by Thiess Services Pty Ltd (2012), Water Data Services (2011) and RPS Aquaterra (2010).

More information

For further information on the groundwater monitoring program, please contact the Mallee CMA on 5051 4377.

Project Partners

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