Western Mount Lofty Ranges PWRA

Permian Sand aquifer

2014 Groundwater level and salinity status report

Government of South Australia
Department of Environment, Water and Natural Resources

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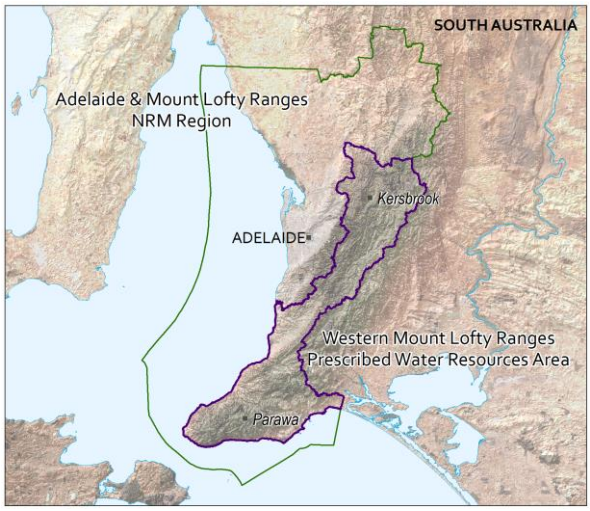
2014 Summary



The Western Mount Lofty Ranges (WMLR) Prescribed Water Resources Area (PWRA) covers an area of approximately 2750 km^2 stretching from Cape Jervis on the south coast, to Gawler in the north, within the Adelaide and Mount Lofty Ranges NRM Region. It is a regional-scale resource for which groundwater, surface water and watercourse water are prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan provides for the sustainable use of the water resources. The McLaren Vale Prescribed Wells Area (PWA) is located within the boundaries of the WMLR PWRA and a separate groundwater level and salinity status report that has been prepared for this PWA can be found on the WaterConnect website.

The WMLR PWRA is characterised by fractured rock and sedimentary aquifers that are of varying age, water quality and yield. Recharge to these aquifers occurs directly from the portion of rainfall that percolates down to the watertable through the soil profile or indirectly from throughflow from adjacent aquifers. There are three types of sedimentary aquifers in the WMLR PWRA: Permian Sand, Tertiary Limestone and Quaternary sediments. This report focuses on the Permian Sand aquifer, which are found only in the Myponga and Hindmarsh Tiers Basins, in the south of the PWRA on the Fleurieu Peninsula. It consists of unconsolidated sands, silts and clays with occasional gravel beds that are known as the Cape Jervis Formation. It is generally not highly productive, except in the northern Myponga Basin where the overlying Tertiary limestone is absent. These parts of the aquifer generally produce good yields and low salinity levels, however can have high clay content in some areas leading to lower yields and higher salinities.

Rainfall and groundwater extractions are important factors in groundwater level and salinity changes within the Permian Sand aquifer. Below-average rainfall results in a reduction in recharge to the aquifers. Below-average summer rainfall can also result in increasing irrigation extractions, and these two elements can cause the groundwater levels to fall and salinity to increase. Conversely, increases in rainfall results in increases in recharge, decreases in irrigation extractions and groundwater levels may rise and salinity stabilise or decline.

The WMLR PWRA has a Mediterranean climate, with hot, dry summers and mild, wet winters. The Hindmarsh Valley rainfall station (number 23823) was selected to represent rainfall for this aquifer due to it's central location within the Hindmarsh Tiers basin and therefore close proximity to the wells which monitor the Permian Sand aquifer. In Figure 1, the long-term average monthly rainfall is graphed in orange with the actual monthly rainfall for 2014 graphed in blue. The total annual rainfall recorded in 2014 at the Hindmarsh Valley rainfall station was 685 mm, which is 260 mm below the long-term (1889–2014) annual average of 945 mm. The monthly rainfall data shown in Figure 1 indicate that February was the only month in which the 2014 rainfall recordings greatly exceeded the long-term monthly average. August, September and October are considerably lower in comparison to their long-term averages.

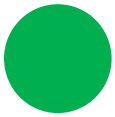
Although extensive meter data are not yet available for groundwater extractions within the PWRA, an estimated 50 250 ML/y is drawn from all aquifers for licensed purposes based on a land-use survey of irrigated properties and the theoretical irrigation requirements for various crops. It should be noted that this is an estimation and that actual current groundwater extraction may be different. The estimated demand is below the sustainable yield of 70 324 ML/y calculated for the whole of the Western Mount Lofty Ranges PWRA. However, at a local level scale within the PWRA, the estimated demand may exceed the local sustainable yield. The majority of groundwater is used for the irrigation of pasture (35%) and various fruits (33%). The remainder is used for the irrigation of wine grapes (14%), vegetables (6%), lucerne (3%) and other uses (9%).

Groundwater levels of the Permian Sand aquifer in the Myponga Basin have been relatively stable between 1975 and 1995. Since 2001, groundwater levels have declined by up to two metres, which correlates well with a dominant below-average rainfall trend recorded over this period. Within the Hindmarsh Tiers Basin, groundwater levels of the Permian Sand aquifer were relatively stable between 1999 and 2004, after which they declined by nearly one metre, with a small recovery from 2009 to 2011.

In 2014, two of the 10 observation wells with data available for both 2013 and 2014 recorded a median water level rise of 0.12 m, while five wells recorded a negligible change, where the change in maximum recovered water level was less than 0.1 m (Fig. 2). The remaining three wells with available data observed a median decline in water levels of 0.19 m. Overall, groundwater levels in 2014 were observed as stable or increasing, similar to 2013 data.

Groundwater salinity of the Permian Sand aquifers are not routinely monitored and no records are available for 2014; however, salinity is typically less than 1000 mg/L. Because of this, salinity was not considered in the assignment of the status for this region.

The Permian Sand aquifer in the WMLR PWRA have been assigned a green status for 2014:

2014 Status  "No adverse changes, indicating negligible risk to the resource."

This means groundwater status was observed to be stable (i.e. negligible change), or improving over the 12-month reporting period. If these conditions were to continue, there is a very low likelihood of negative impacts on beneficial uses such as drinking water, irrigation or stock watering.

The 2014 status for the Permian Sand aquifer is supported by:

- most wells recorded stable or increasing groundwater levels in 2014 when compared to 2013 data.

To view descriptions for all status symbols, please visit WaterConnect.

To view the *Western Mount Lofty Ranges PWRA Groundwater Level and Salinity Status Report 2011,* which includes background information on hydrogeology, location of rainfall stations and relevant groundwater-dependent ecosystems, please visit WaterConnect.

To view or download groundwater level and salinity data from observation wells within the Western Mount Lofty Ranges PWRA, please visit Groundwater Data on WaterConnect.

For further details about the Western Mount Lofty Ranges PWRA, please see the *Water Allocation Plan for the Western Mount Lofty Ranges Prescribed Water Resources Area* on the Natural Resources Adelaide and Mount Lofty Ranges website.

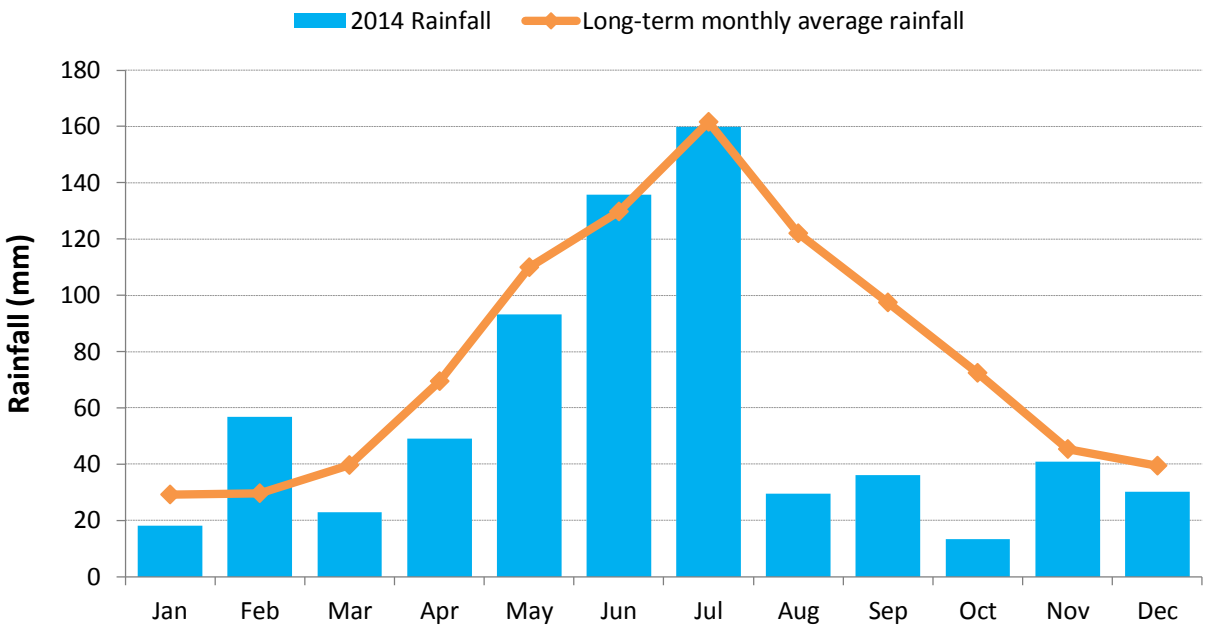


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Hindmarsh Valley rainfall station[1] (number 23823) in the Western Mount Lofty Ranges Prescribed Water Resource Area.

[1] Rainfall data used in this report is sourced from the SILO Patched Point Dataset, which uses original Bureau of Meteorology daily rainfall measurements and is available online at www.longpaddock.qld.gov.au/silo.

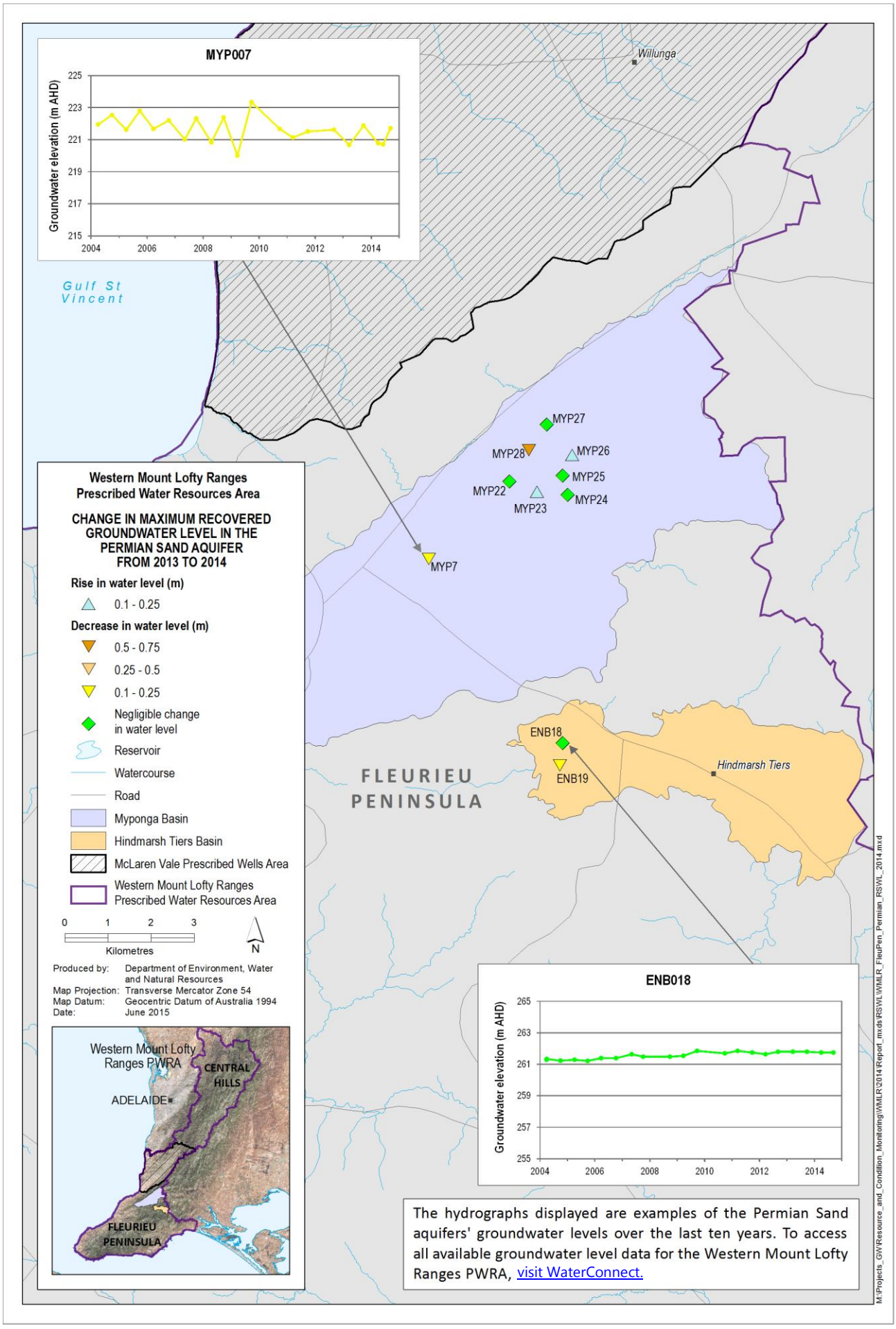


Figure 2. Overall changes in maximum groundwater levels of the Permian Sand aquifer in the Western Mount Lofty Ranges Prescribed Water Resource Area from 2013 to 2014