

McLaren Vale PWA

Fractured rock aquifer

2014 Groundwater level and salinity status report



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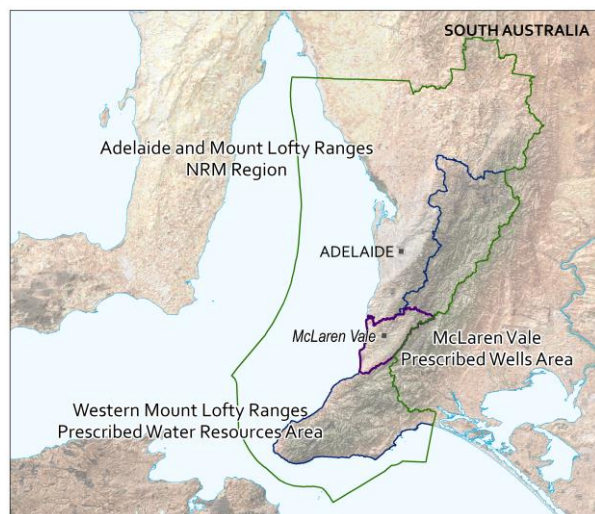
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2014 Summary



The McLaren Vale Prescribed Wells Area (PWA) is located approximately 35 km south of Adelaide, within the Adelaide and Mount Lofty Ranges NRM Region. It is a regional-scale resource for which groundwater has been prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan provides for sustainable management of the groundwater resources. The McLaren Vale PWA is located within the boundaries of the Western Mount Lofty Ranges Prescribed Water Resources Area (WMLR PWRA) and separate groundwater status reports have been prepared for this PWRA and can be found on the [WaterConnect](#) website.

The Willunga Basin, situated within the McLaren Vale PWA and the Willunga Embayment, is a structurally controlled trough, bounded in the south-east by the Willunga Fault and to the north by basement outcrop.

The basin contains sedimentary aquifers of Quaternary and Tertiary age and a fractured rock aquifer formed by basement outcrop in the north, and the hills to the east of the Willunga Fault. There are four aquifer systems recognised within the Willunga Embayment: the Quaternary aquifer, the Port Willunga Formation aquifer, the Maslin Sands aquifer and the fractured rock aquifer. This report focuses on the fractured rock aquifer (FRA), which occurs within the basement rocks. It comprises slates, quartzites, shales and limestone that form the ranges located east of the Willunga Fault as well as to the north of the PWA. Recharge to this aquifer takes place in these areas as a result of infiltration through the soil or by percolation from streamflow in drainage lines. The FRA is confined where it underlies the sedimentary aquifers of the Willunga Basin. Groundwater flow within the FRA is variable and strongly influenced by the size, density and orientation of the fractures. It generally follows the topography, flowing from elevated areas along the PWA margins towards lower elevations where discharge to the sedimentary aquifers most likely occurs. Beneath the sediments, the flow direction within the FRA turns south-west towards the coast.

Trends in groundwater levels and salinity in the fractured rock aquifer of the McLaren Vale PWA are influenced by climate in areas where the formation crops out at the ground surface: 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 climate of the McLaren Vale PWA is characterised as Mediterranean with warm to hot, dry summers and mild, wet winters. As the primary recharge area for the fractured rock aquifer is in the Mount Lofty Ranges, data from the Mount Bold Reservoir rainfall station (number 23734) were chosen for analysis of rainfall trends in the area (Fig. 1). The long-term average monthly rainfall is graphed in orange with the total monthly rainfall graphed in blue. In 2014, the total annual rainfall was 655 mm, which is just below the long-term (1889–2014) average annual rainfall of 711 mm and 157mm less than the annual rainfall recorded for 2013. The graph also shows that the months of February, June and July experienced above-average rainfall, with February recording more than double the long-term average. Rainfall occurring between August and December of 2014 was below average, with the graph showing that rainfall was observed to be well below average for four out of the five months.

Licensed groundwater extraction (excluding stock and domestic use) from the FRA in the McLaren Vale PWA totalled 767 ML¹ for the 2013–14 water-use year (Fig. 2). This accounts for 17% of the total groundwater use within the McLaren Vale PWA and is an increase of 2.3% on the previous water-use year. Groundwater in the region is primarily used for viticulture and is supplemented with treated effluent from the Christies Beach Wastewater Treatment Plant via the Willunga Basin Water Company reticulation scheme. This additional water is used primarily in the west of the PWA, including the Sellicks Beach, Aldinga, Maslin Beach, Willunga and McLaren Vale areas.

¹ The licensed groundwater use for the 2013–14 water-use year is based on the best data available as of April 2015 and may be subject to change, as some extraction volumes are in the process of being verified.

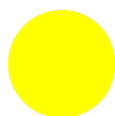
Groundwater levels in the FRA tend to follow rainfall patterns and show an overall declining trend for the majority of monitoring wells over the past 40 years. Recently, monitored water levels have generally stabilised or risen due to a reduction in the extraction volumes since 2009–10, and to above-average rainfall for several years.

In 2014 however 79% of the 28 observation wells, with available data to assess the annual trend in maximum recovered groundwater levels from 2013 to 2014, recorded a median decline in the maximum recovered water levels of 0.49 m, with levels ranging from 0.06 m to 2.55 m, with one well recording a 9.95 m decline (Fig. 3). Rises in maximum recovered water level were recorded in 11% of wells with available data. These rises ranged between 0.28 and 0.98 m, with a median rise of 0.51 m. Negligible change in the recovered groundwater level was recorded in the remaining 11% of observation wells, where the change in maximum recovered water level between 2013 and 2014 was less than 0.05 m. Rainfall in 2014 was nearly 160 mm less than that of 2013 and is likely to have contributed to a decline in recharge to the aquifer. Large groundwater declines in some areas may also be a result of intensive, localised pumping, exacerbated by below-average rainfall in the latter part of 2014. These factors combined likely caused the declines in groundwater levels.

During the past 10 years, several observation wells have experienced an increase in salinity. Groundwater salinities observed in 2014 range between 895 mg/L and 2800 mg/L, with 38% of the 25 wells used for the assessment recording a salinity of less than 1500 mg/L (Fig. 4). Most of the wells that exceed 1500 mg/L are located within the western half of the PWA and long-term monitoring records show that salinity concentrations exceeding 1500 mg/L are typical of the area, such that irrigators in the area primarily use treated water from the Christies Beach Wastewater Treatment Plant via the Willunga Basin Water Company reticulation scheme. Of the wells with salinity data from both 2013 and 2014, 76% recorded a change in salinity of 5% or less, indicating stable salinity overall.

The fractured rock aquifer in the McLaren Vale PWA has been assigned a yellow status for 2014:

2014 Status



“Gradual adverse changes, indicating a low risk to the resource in the medium term.”

This means that minor adverse changes in the resource status have been observed over the 12-month reporting period. If these conditions were to continue, it is unlikely to negatively impact the beneficial uses of the resource (e.g. drinking water, irrigation or stock watering) for at least 15 years.

The 2014 status for the fractured rock aquifer is supported by:

- an overall decline in water levels in 2014 when compared with 2013 water levels.

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on [WaterConnect](#).

To view the *McLaren Vale Prescribed Wells Area Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, location of rainfall stations and relevant groundwater-dependent ecosystems, please visit the *Water Resource Assessments* page on [WaterConnect](#).

To view or download groundwater level and salinity data from observation wells within the McLaren Vale PWA, please visit [Groundwater Data](#) on WaterConnect.

For further details about the McLaren Vale PWA, please see the *Water Allocation Plan for the McLaren Vale Prescribed Wells Area* on the Natural Resources Adelaide and Mount Lofty Ranges [website](#).

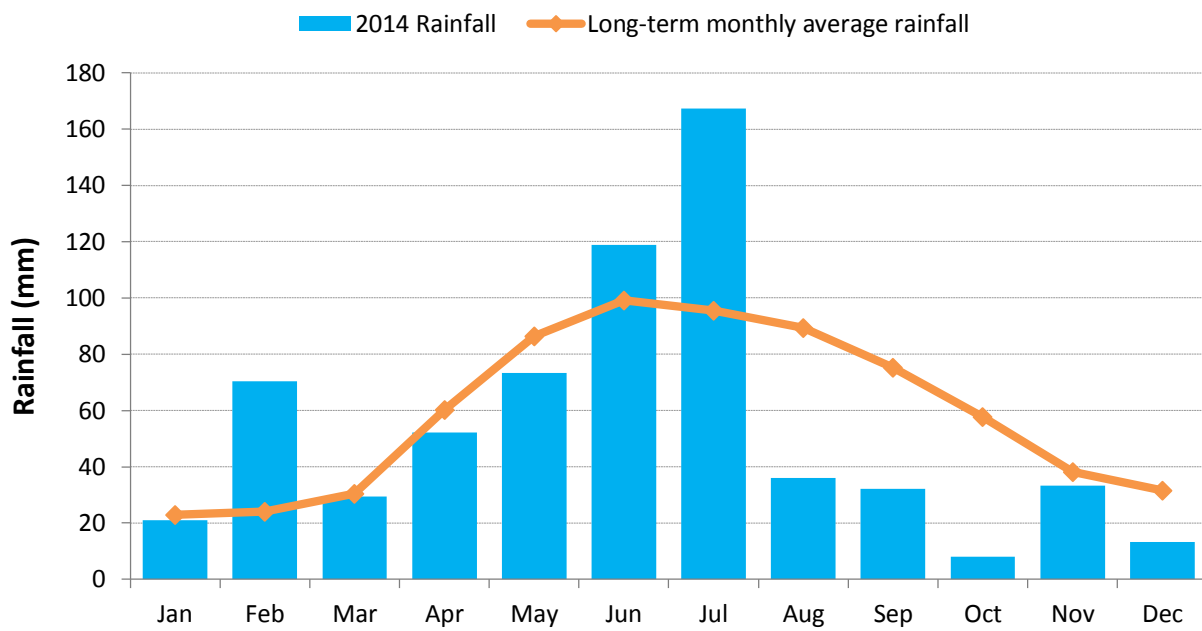


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Mount Bold Reservoir rainfall station² (number 23734) in the McLaren Vale Prescribed Wells Area

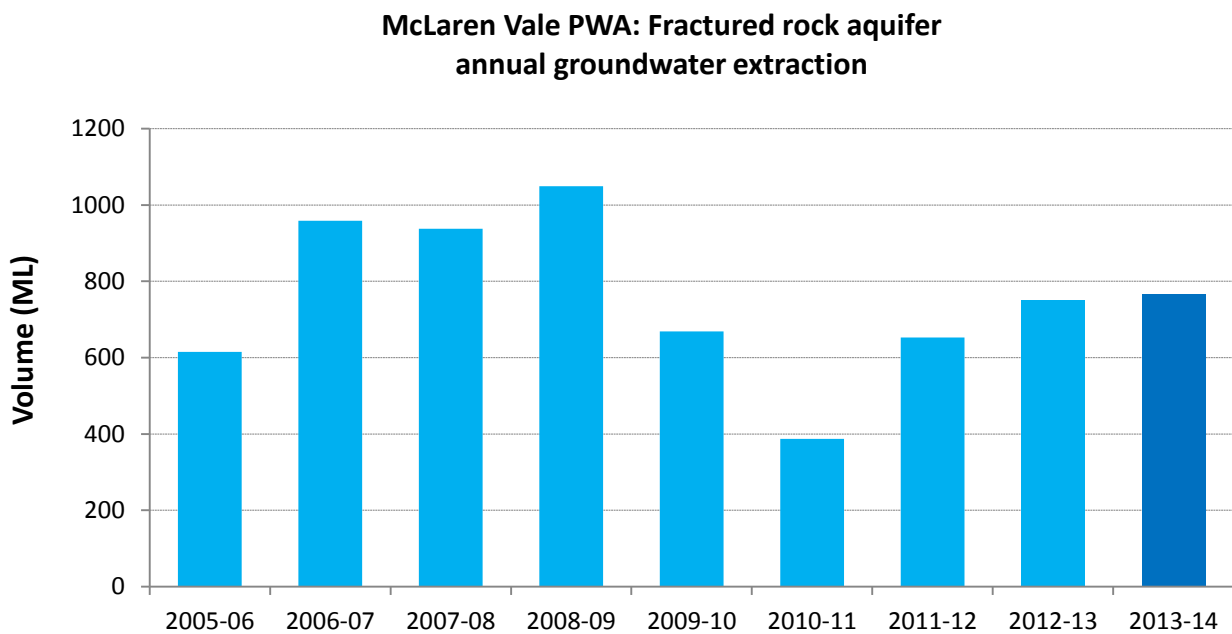


Figure 2. Historical licensed groundwater use from the fractured rock aquifer in the McLaren Vale Prescribed Wells Area

² 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.

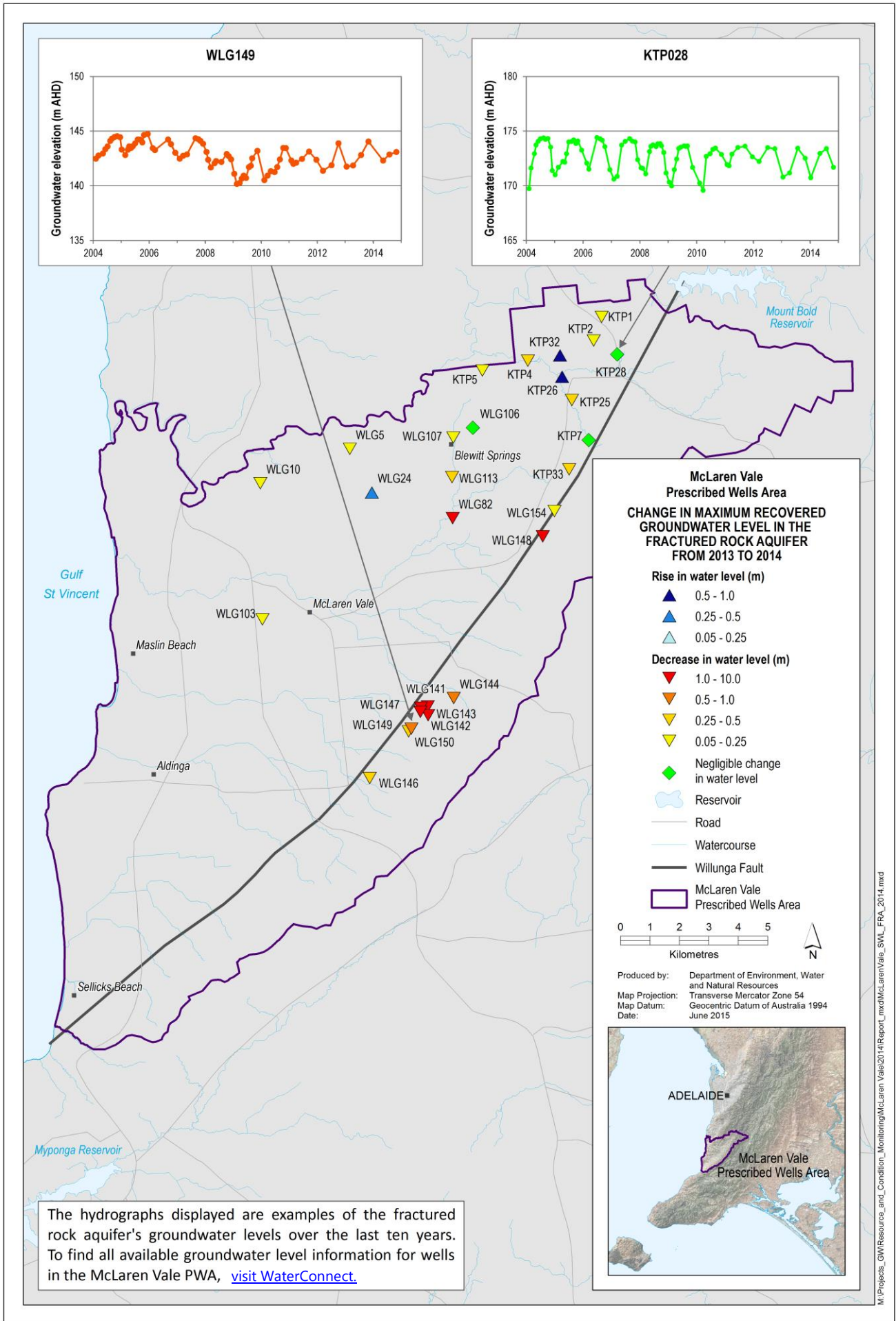


Figure 3. Overall changes in maximum groundwater levels of the fractured rock aquifer in the McLaren Vale Prescribed Wells Area from 2013 to 2014

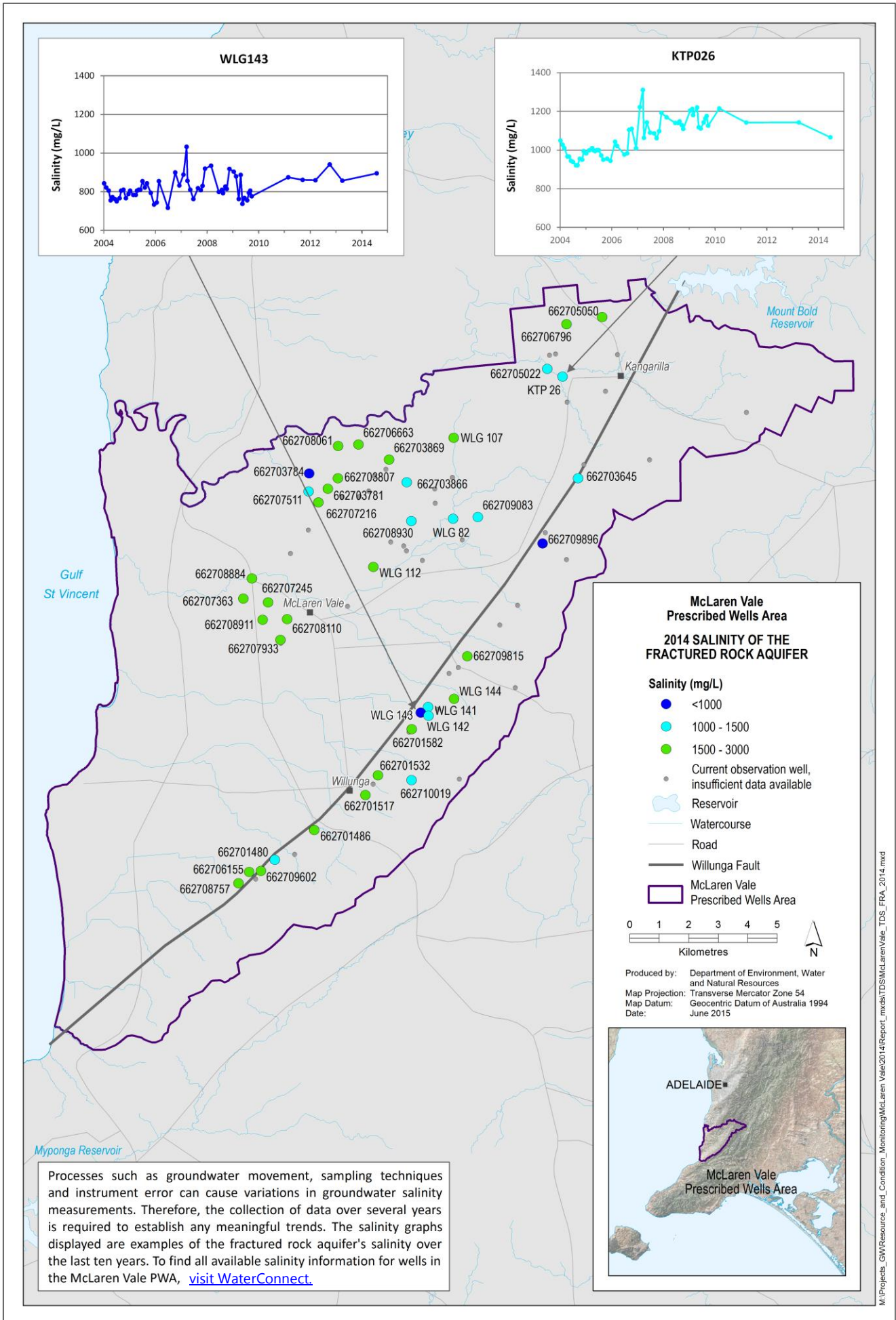


Figure 4. Groundwater salinity of the fractured rock aquifer in the McLaren Vale Prescribed Wells Area for 2014