Western Mount Lofty Ranges PWRA

Fractured rock aquifers

2015 Groundwater level and salinity status report

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

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ISBN 978-1-925369-93-9

Preferred way to cite this publication

DEWNR, 2016, *Western Mount Lofty Ranges PWRA fractured rock aquifers 2015 Groundwater level and salinity status report,* Government of South Australia, through the Department of Environment, Water and Natural Resources, Adelaide

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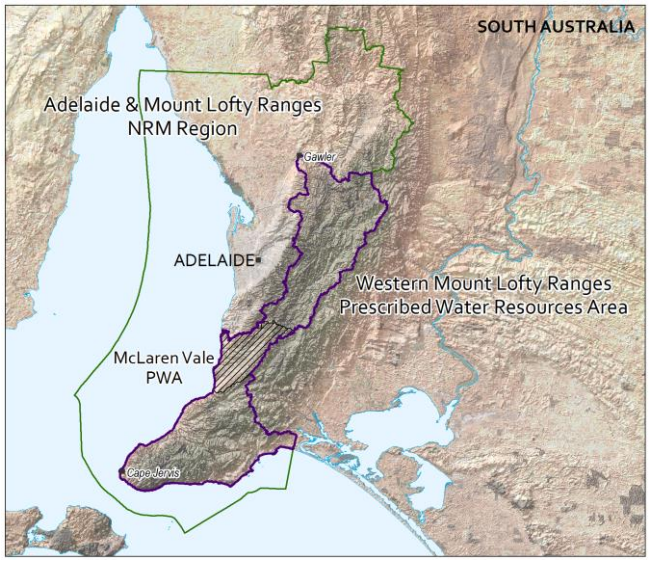
2015 Summary



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), located within the boundaries of the WMLR PWRA, is managed separately 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 aquifers (FRAs) and sedimentary aquifers that are of varying age, water quality and yield. Recharge to these aquifers occurs directly from rainfall that percolates down to the watertable through the soil profile or indirectly via throughflow from adjacent aquifers. The FRAs of the WMLR PWRA comprise three geological units: the Barossa Complex, Adelaidean sediments and the Kanmantoo Group. Generally, the Adelaidean sedimentary rocks are more favourable in terms of recharge, salinity and yields, while the Barossa Complex and Kanmantoo Group provide groundwater of poorer quality at low yields. Groundwater flow generally follows the topography, moving from higher points in the landscape towards lower areas where typically it discharges into rivers and streams.

Trends in groundwater levels and salinity in the FRAs of the WMLR are primarily climate driven: 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 can result in increases in recharge, decreases in irrigation extractions and groundwater levels may rise and salinity stabilise or decline.

The centrally-located Uraidla rainfall station (BoM Station 23750) recorded 895 mm of rainfall in the 2014–15 water-use year (Fig. 1). This is almost 170 mm less than the long-term average of 1062 mm and the five-year average of 1065 mm (Figs 1 and 2). Notable seasonal variations over the past five years include the unusually wet spring and summer of 2010–11, the drier than average spring–summer of 2012–13, and the wet summer and autumn–winter of 2013–14. The 2014–15 water-use year is particularly dry, with six months recording less than half their long-term monthly-average rainfall, although January, April and May recorded twice their average. Over the past five years, a subtle trend of declining rainfall is evident, despite the high rainfall in 2013–14 (Fig. 2).

Although groundwater extraction data are not yet available extensively within the PWRA, an estimated 50 250 ML/y is abstracted from all aquifers for licensed purposes, based on a land-use survey and the theoretical water requirements for various crop types. It should be noted that this is an estimate and actual rates of groundwater extraction may differ.

Long-term monitoring data from the FRAs across the WMLR PWRA reveal a close correlation between groundwater levels and rainfall. Following a widespread decline in groundwater levels in the Central Hills region after the 2006 drought, most monitoring wells have shown either a stabilisation, reduced rate of decline or rises in water levels for several years after 2009, in response to higher rainfall recharge. There are insufficient data across the Fleurieu Peninsula region of the WMLR PWRA to allow an assessment of water levels in this area.

In the five years to 2015, most monitoring wells (71%) show a trend of declining groundwater levels, with 19% of these showing their lowest level on record in 2015 (Fig. 3). The remaining wells show either a rising trend (26%) or stable groundwater levels (3%). Rates of groundwater decline range between 0.02 and 1.7 m/y with a median of 0.3 m/y. These wells are located throughout the Central Hills region (Fig. 3). Rises in groundwater levels ranged between 0.01 and 3.3 m/y with a median rise of 0.2 m/y. These wells are mostly located around Uraidla where rainfall is high.

Long-term monitoring data show groundwater salinities have been mostly stable within the PWRA. In 2015, most monitoring wells (75%) recorded salinities of less than 1000 mg/L, and these are located mainly between Uraidla and Lobethal (Fig. 4).

In the five years to 2015, just over half of the available monitoring wells (58%), spread throughout the Central Hills region, recorded a trend of rising salinity (Fig. 5), most likely as a result of reduced recharge. The largest increases in salinity have been recorded east of Gumeracha and north-east of Uraidla.

To determine the status of the FRAs of the WMLR PWRA for 2015, the trends in groundwater level and salinity over the past five years (2011 to 2015, inclusive) were analysed. This is a new approach, in contrast to the year-to-year assessments that have been used in past *Groundwater level and salinity status reports*. Please visit the Frequently Asked Questions on the *Water Resource Assessments* page on WaterConnect for more detail on the current method of evaluating the status of groundwater resources.

The fractured rock aquifers of the WMLR PWRA have been assigned a yellow status for 2015:

2015 Status Minor adverse trends have been observed over the past five years

The 2015 status of the fractured rock aquifers is based on:

- most monitoring wells (71%) show a five-year trend of declining groundwater levels
- most monitoring wells (58%) show a five-year trend of rising salinity.

Although the majority of wells show a five-year trend of declining groundwater levels, it should be noted that the median rate of decline across the whole PWA is low (0.30 m/y). In addition, although just over half of salinity monitoring wells show some increase in salinity, around three quarters of these wells show salinities of less than 1000 mg/L.

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on WaterConnect.

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

To view or download groundwater level and salinity data from monitoring 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* on the Natural Resources Adelaide and Mount Lofty Ranges website.

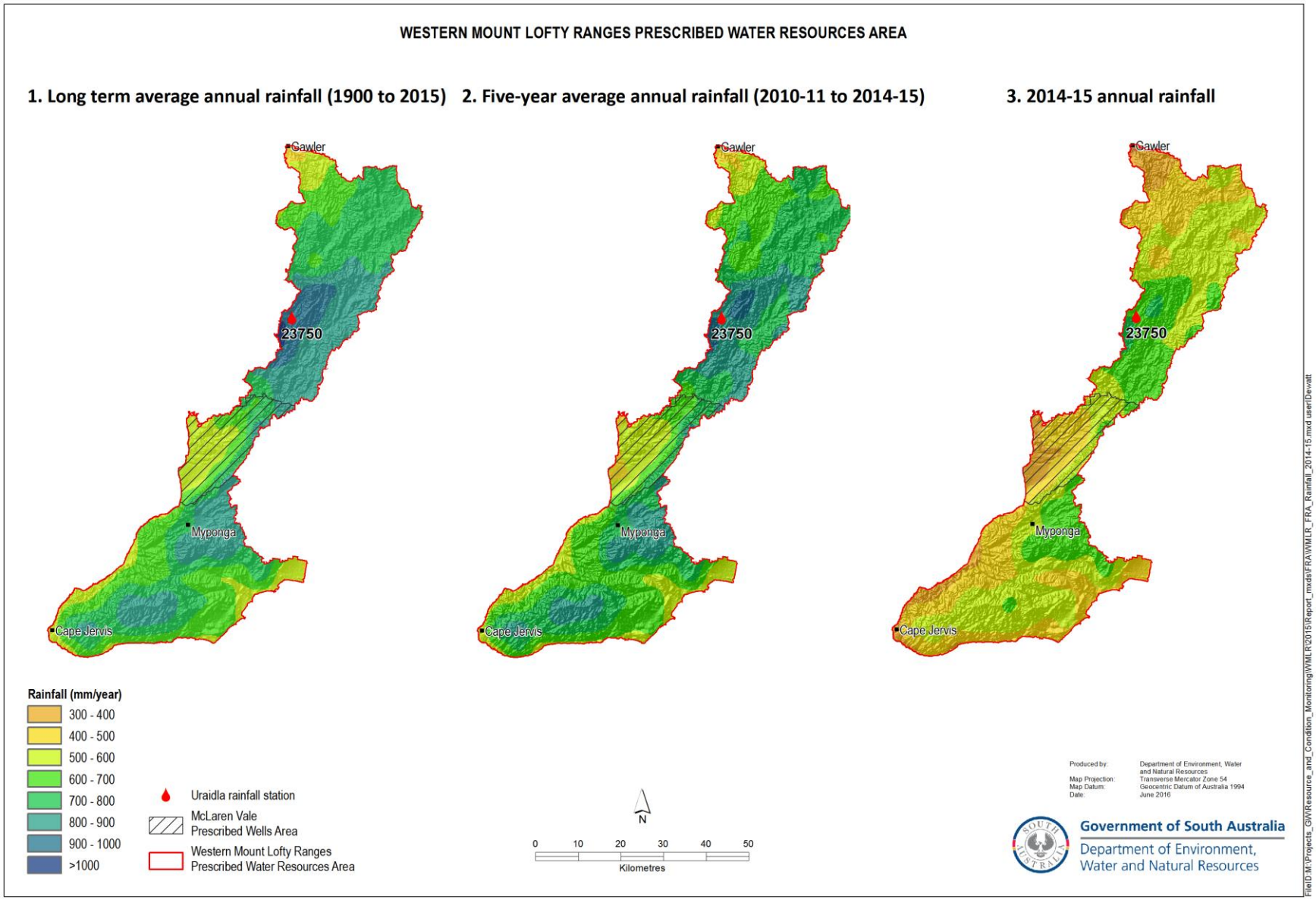


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year in the Western Mount Lofty Ranges Prescribed Water Resources Area [1]

[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.

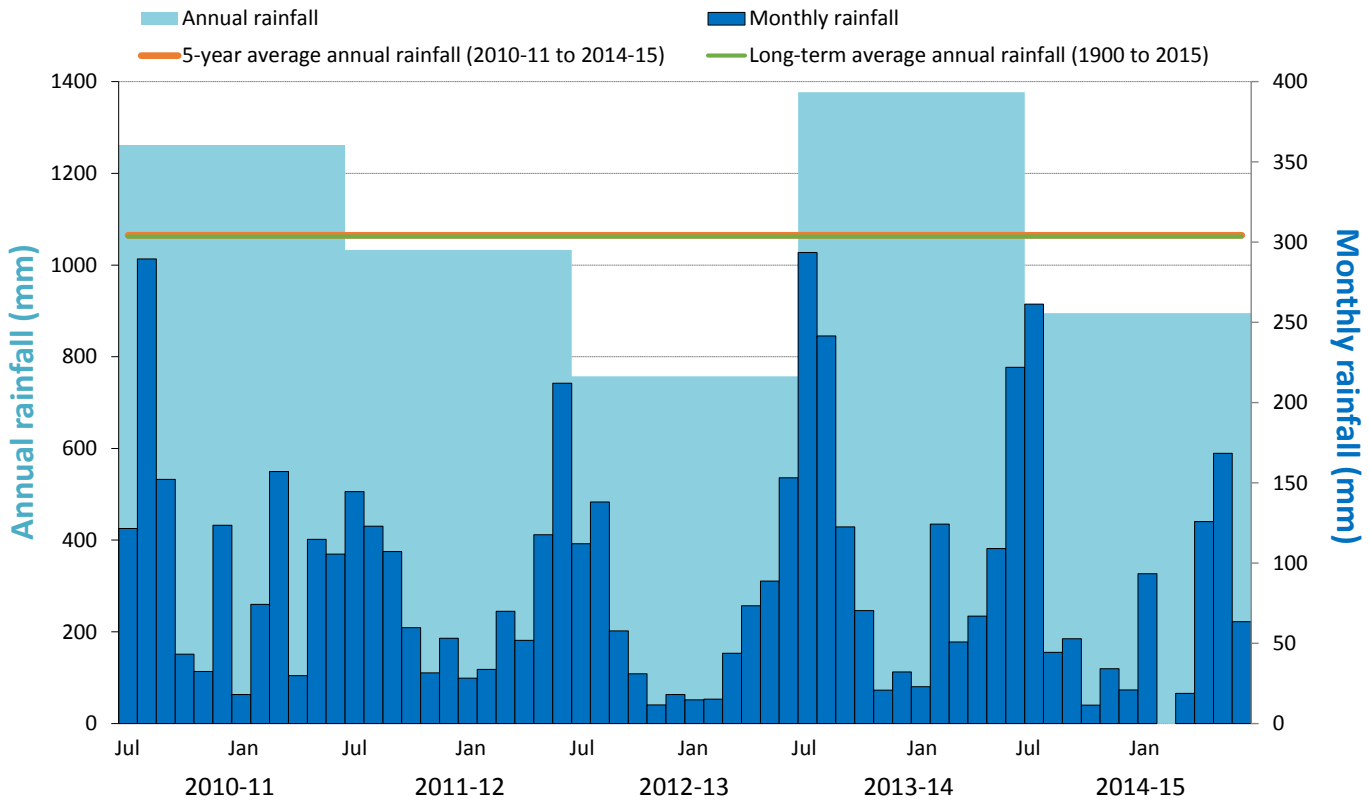


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Uraidla (BoM Station 23750)[2]

[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.

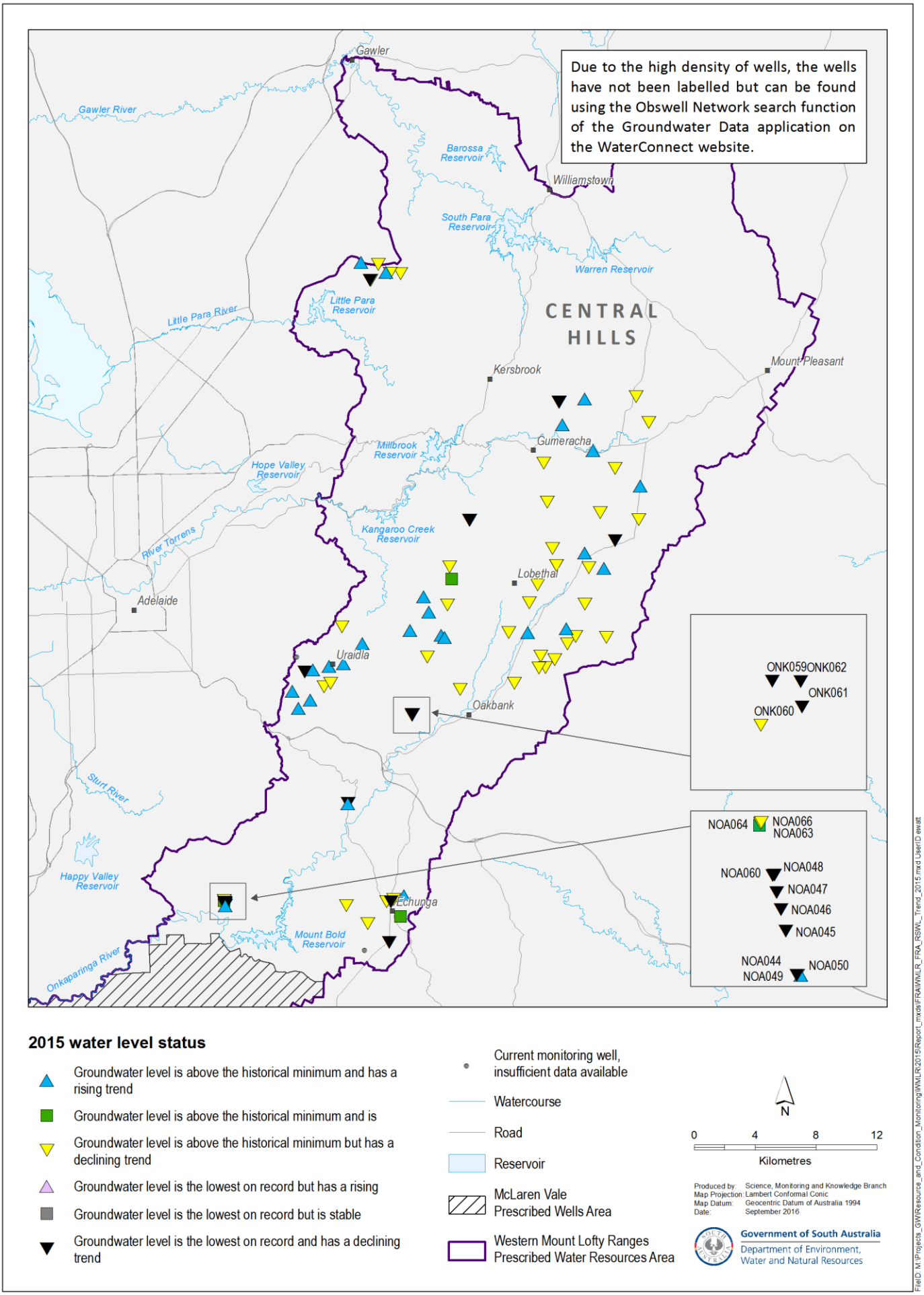


Figure 3. 2015 status of groundwater levels in the fractured rock aquifers of the Western Mount Lofty Ranges Prescribed Water Resources Area, based on the five-year trends from 2011 to 2015

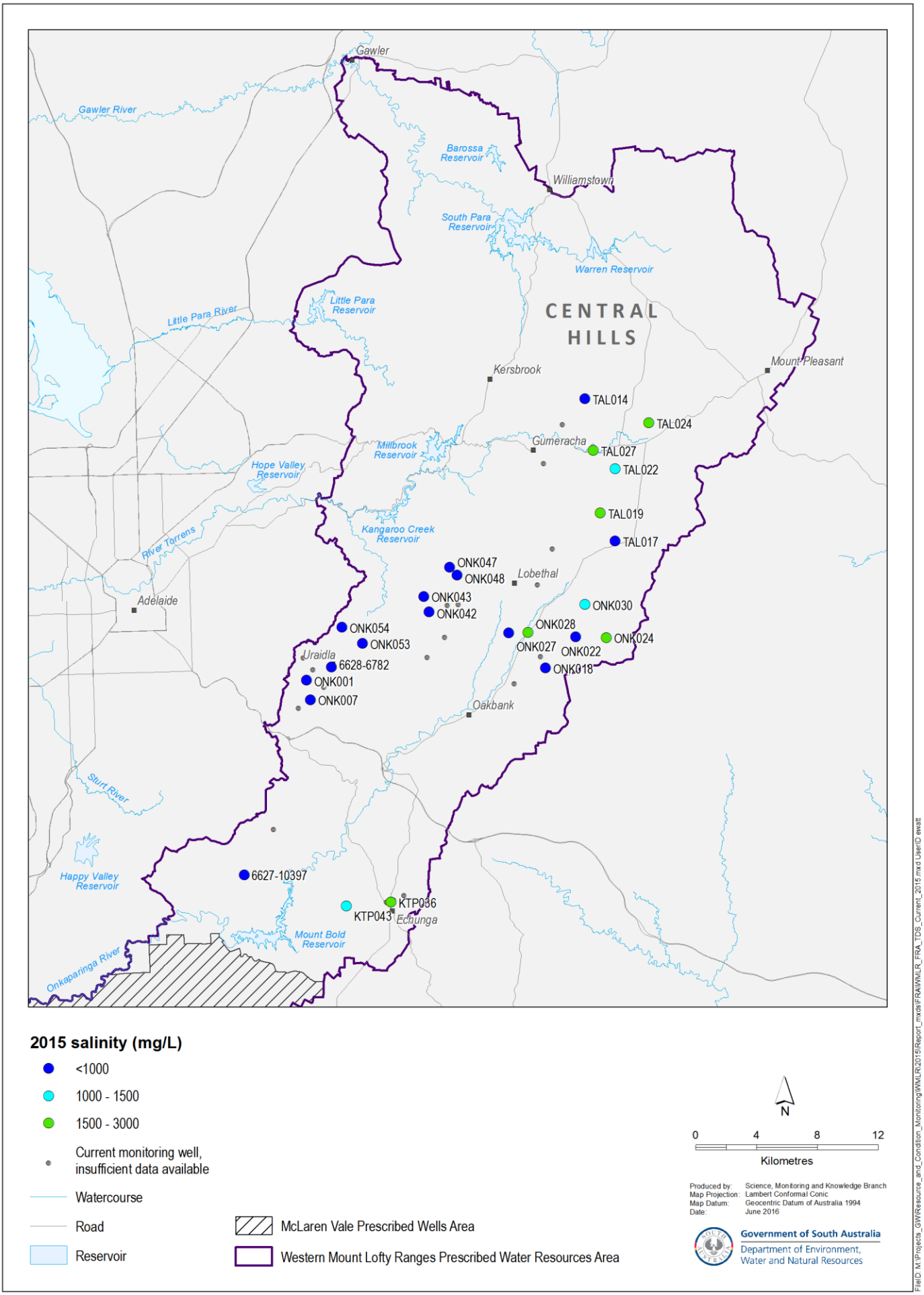


Figure 4. 2015 groundwater salinity of the fractured rock aquifers in the Western Mount Lofty Ranges Prescribed Water Resources Area

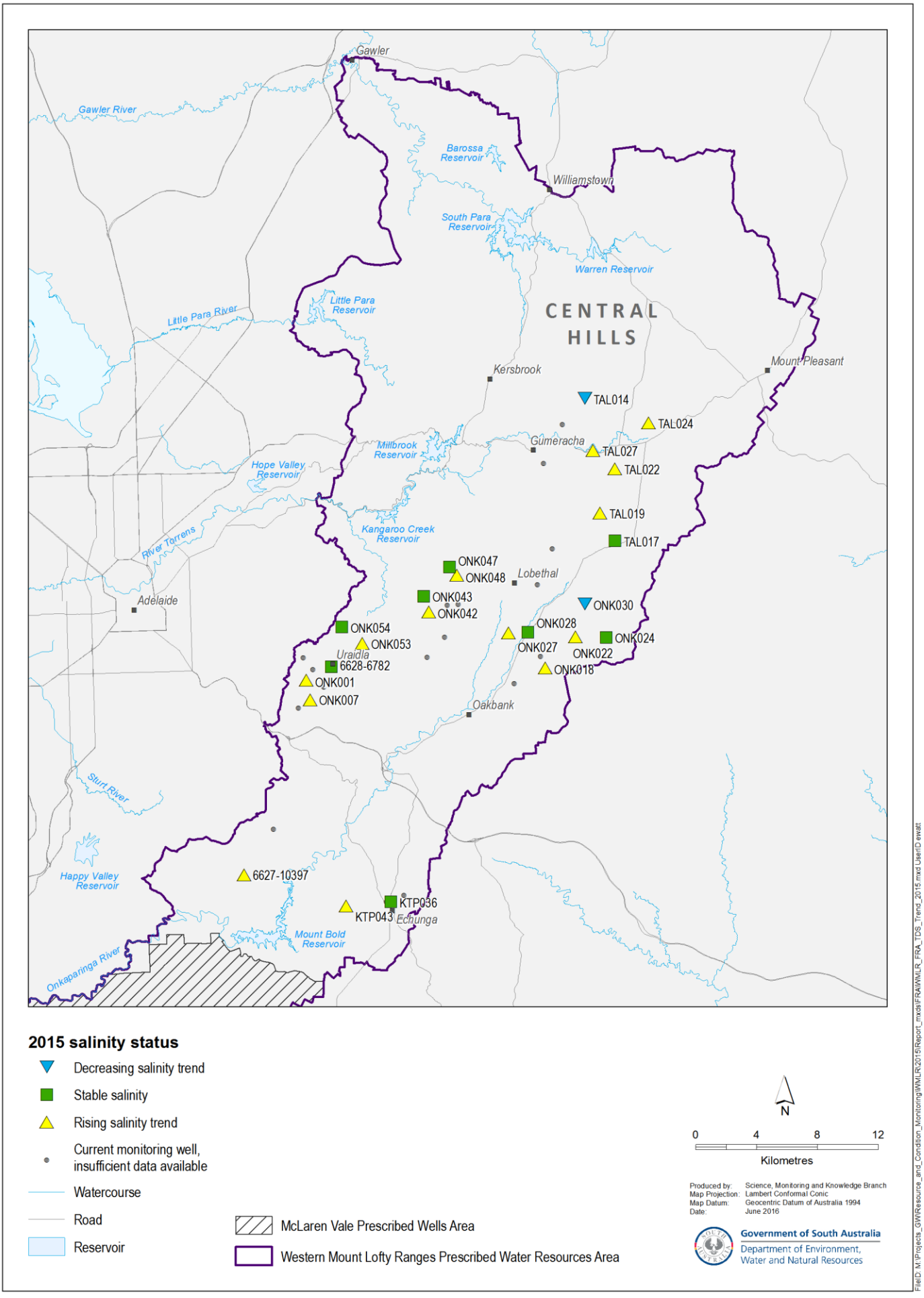


Figure 5. 2015 status of groundwater salinity in the fractured rock aquifers of the Western Mount Lofty Ranges Prescribed Water Resources Area based on the five-year trends from 2011 to 2015

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