Eastern 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

Department of Environment, Water and Natural Resources
GPO Box 1047, Adelaide SA 5001

Telephone	National	(08) 8463 6946
	International	+61 8 8463 6946
Fax	National	(08) 8463 6999
	International	+61 8 8463 6999
Website	www.environment.sa.gov.au	

ISBN 978-1-925510-13-3

DEWNR, 2016, *Eastern 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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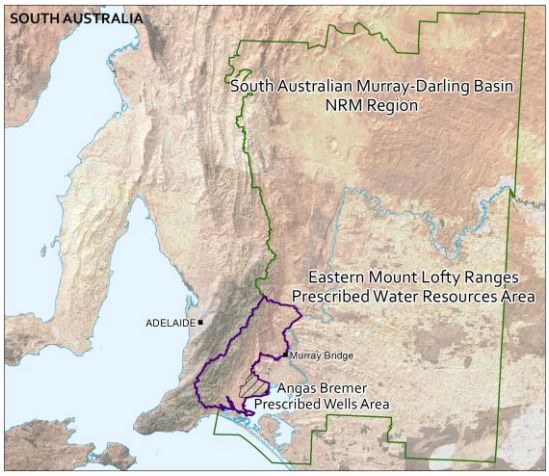
2015 Summary



The Eastern Mount Lofty Ranges (EMLR) Prescribed Water Resources Area (PWRA) is located about 50 km east of Adelaide in the South Australian Murray-Darling Basin Natural Resource Management Region (location map left). It is a regional-scale resource for which groundwater is prescribed under South Australia's *Natural Resources Management Act 2004*. The Water Allocation Plan (WAP) for the Eastern Mount Lofty Ranges provides for the sustainable use of the region's water resources. The Angas Bremer Prescribed Wells Area (PWA) is located within the boundaries of the EMLR PWRA and a stand-alone groundwater level and salinity status report has been prepared for this PWA.

The EMLR PWRA is characterised by fractured rock and sedimentary aquifers that are of varying age, water quality and yields. The fractured rock aquifers (FRAs), where groundwater is stored and moves through joints and fractures in the basement rocks, form the ranges that occur in the west of the PWRA. Sedimentary aquifers, where groundwater flows through the pore spaces within the sediments, occur in the valleys and plains to the east. Recharge to these aquifers occurs directly from rainfall that percolates down to the watertable through the soil profile and, in the case of the confined sedimentary aquifers, indirectly by throughflow from adjacent aquifers.

The FRAs in the EMLR PWRA are the focus of this report and comprise four geological units: the Barossa Complex, the Adelaidean sediments, the Normanville Group and the Kanmantoo Group. Generally, the Adelaidean sedimentary rocks show greater rates of recharge, higher yields and lower salinity relative to the Barossa Complex and Kanmantoo Group FRAs. Groundwater flow generally follows the topography, moving from higher points in the landscape towards lower areas where typically it discharges into rivers and streams or sedimentary aquifers in the valleys. The regional flow direction within the FRAs is from north-west to south-east.

Trends in groundwater levels and salinity in the FRAs of the EMLR are primarily climate driven: below-average rainfall can result 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, above-average rainfall may result in increased recharge and decreased irrigation extraction. This may cause groundwater levels to rise and salinity to stabilise or decline.

Due to the spatial extent of the region's fractured rock groundwater resource, the analysis of rainfall in 2015 was completed using data recorded from two rainfall stations: Mount Barker (BoM Station 23733) and Ashbourne (BoM Station 23701) (Fig. 1). Mount Barker rainfall station was chosen because groundwater levels in this area are strongly correlated with rainfall and are also impacted by local extraction throughout summer. Rainfall at Mount Barker totalled 594 mm in the 2014–15 water-use year, well below the long-term annual average rainfall of 757 mm (1900 to 2015) and the five-year average annual rainfall of 772 mm (Figs 1 and 2). Ashbourne rainfall station was chosen due to its central location among monitoring wells in the south of the region. The 2014–15 rainfall total of 447 mm at Ashbourne was also well below the long-term annual average rainfall of 646 mm (1900 to 2015) and the five-year average annual rainfall of 613 mm (Figs 1 and 3). Over the past five years, a trend of declining rainfall is evident at both Mount Barker and Ashbourne (Figs 2 and 3).

Although groundwater extraction data are not yet available extensively within the PWRA, estimated demand from all aquifers of the PWRA (excluding the Angas Bremer PWA) is approximately 32 100 ML/y. This estimate is based on land-use surveys 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 show groundwater levels have generally been stable, athough minor declining trends in groundwater levels have been recorded in some monitoring wells. Periods of anomalously low water levels have been observed during 1997–2000 and 2006–09. In the five years to 2015, most wells show a rising trend (45%) or stable groundwater levels (16%) (Fig. 4). These wells are located mostly throughout the central and southern regions of the PWRA, and include rises of up to 1.8 m in wells south-east of Mount Observation. Over the past five years, 39% of wells show a decline in groundwater levels, including wells between Meadows and Ashbourne that recorded their lowest groundwater level on record in 2015; declines of up to 0.09 m were recorded in the north of the PWRA south-east of Mount Torrens, while in the south, declines of up to 1.3 m were recorded in Mount Compass.

Long-term monitoring data show groundwater salinities have been variable, with some increases in salinity and also periods of stable salinity. From the limited salinity data available in 2015, salinity values were typically 1000–2000 mg/L (Fig. 5). In the five years to 2015, three wells show a rising salinity trend, while one well shows stable salinity (Fig. 6).

To determine the status of the fractured rock aquifers for 2015, the trends in groundwater levels and salinities 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 Eastern Mount Lofty Ranges PWRA have been assigned a green status for 2015:

2015 Status  Positive trends have been observed over the past five years

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

- most monitoring wells (61%) show a five-year trend of rising or stable groundwater levels.

Although a green status has been assigned, the trend of increasing salinity and the decline of groundwater levels to their lowest on record that is observed between Meadows and Ashbourne is acknowledged.

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

To view the *Eastern 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 download groundwater level and salinity data from monitoring wells within the Eastern Mount Lofty Ranges PWRA, please visit the *Groundwater Data* page under the Data Systems tab on WaterConnect.

For further details about the Eastern Mount Lofty Ranges PWRA, please see the *Water Allocation Plan for the Eastern Mount Lofty Ranges* on the Natural Resources South Australian Murray-Darling Basin website.

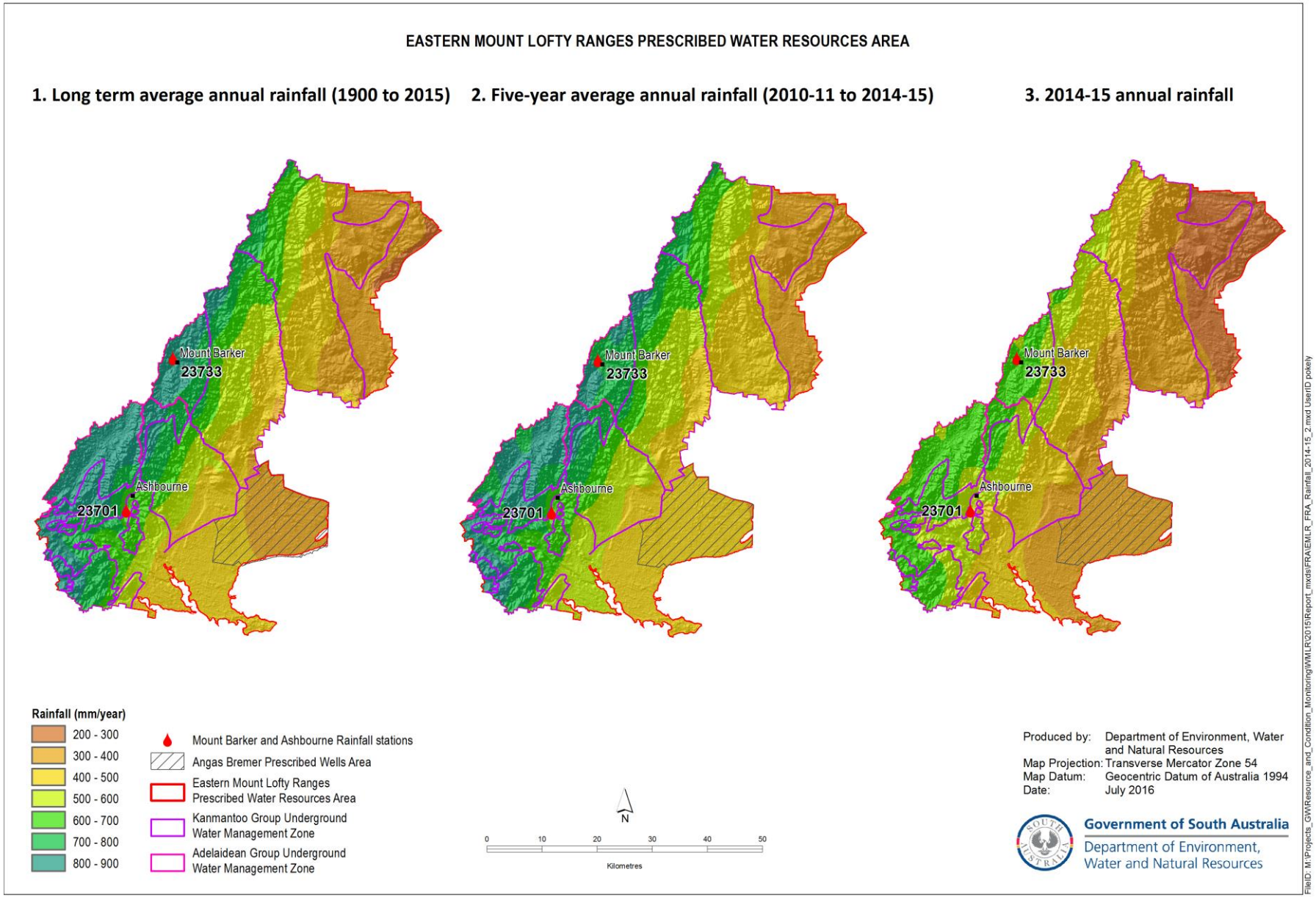


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year in the Eastern Mount Lofty Ranges Prescribed Water Resources Area[1]

[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.

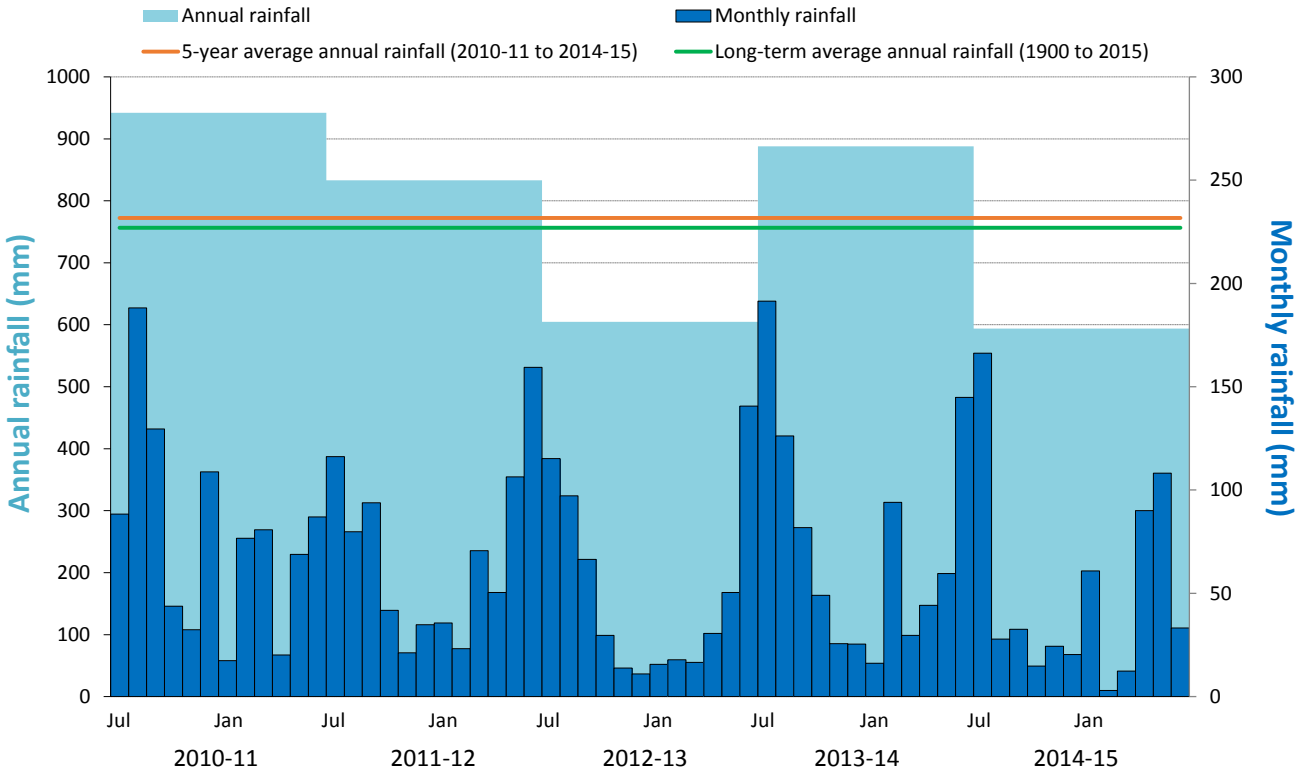


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Mount Barker (BoM Station 23733)[2]

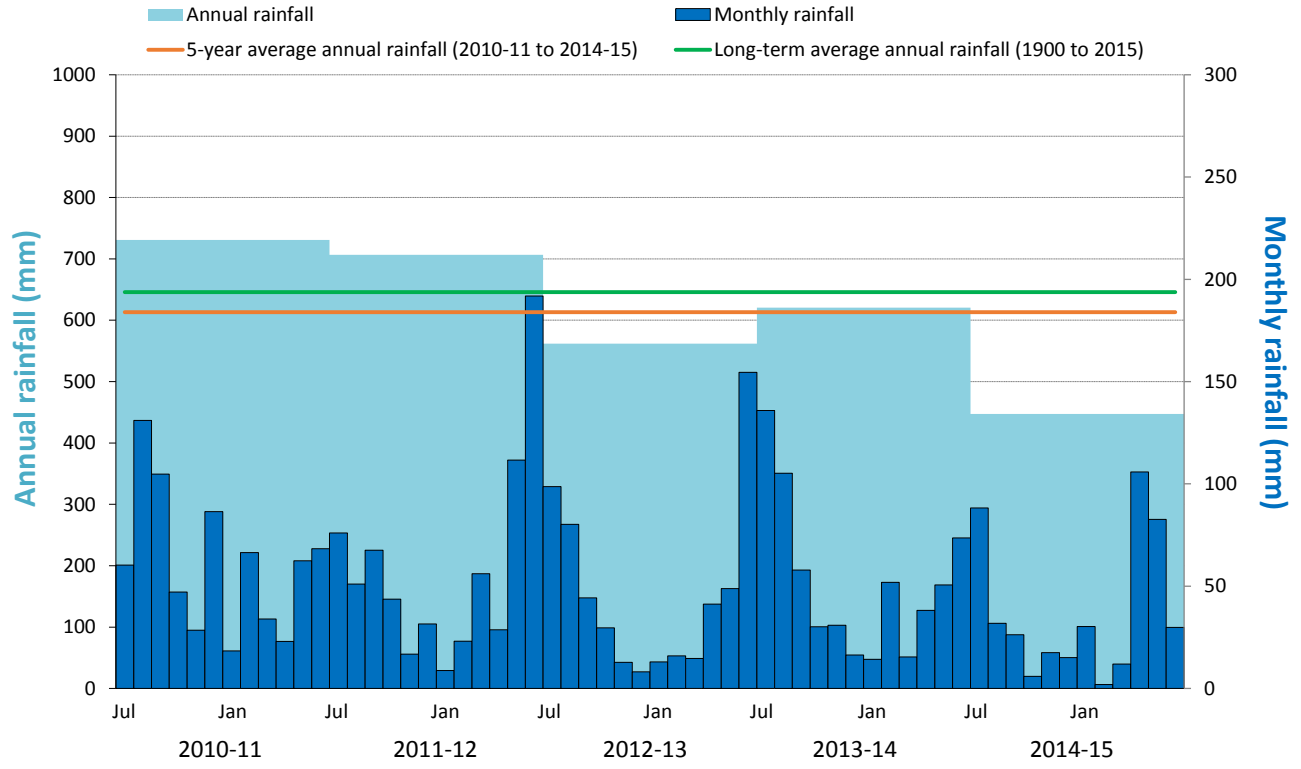


Figure 3. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Asbourne (BoM Station 23701)[2]

[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.

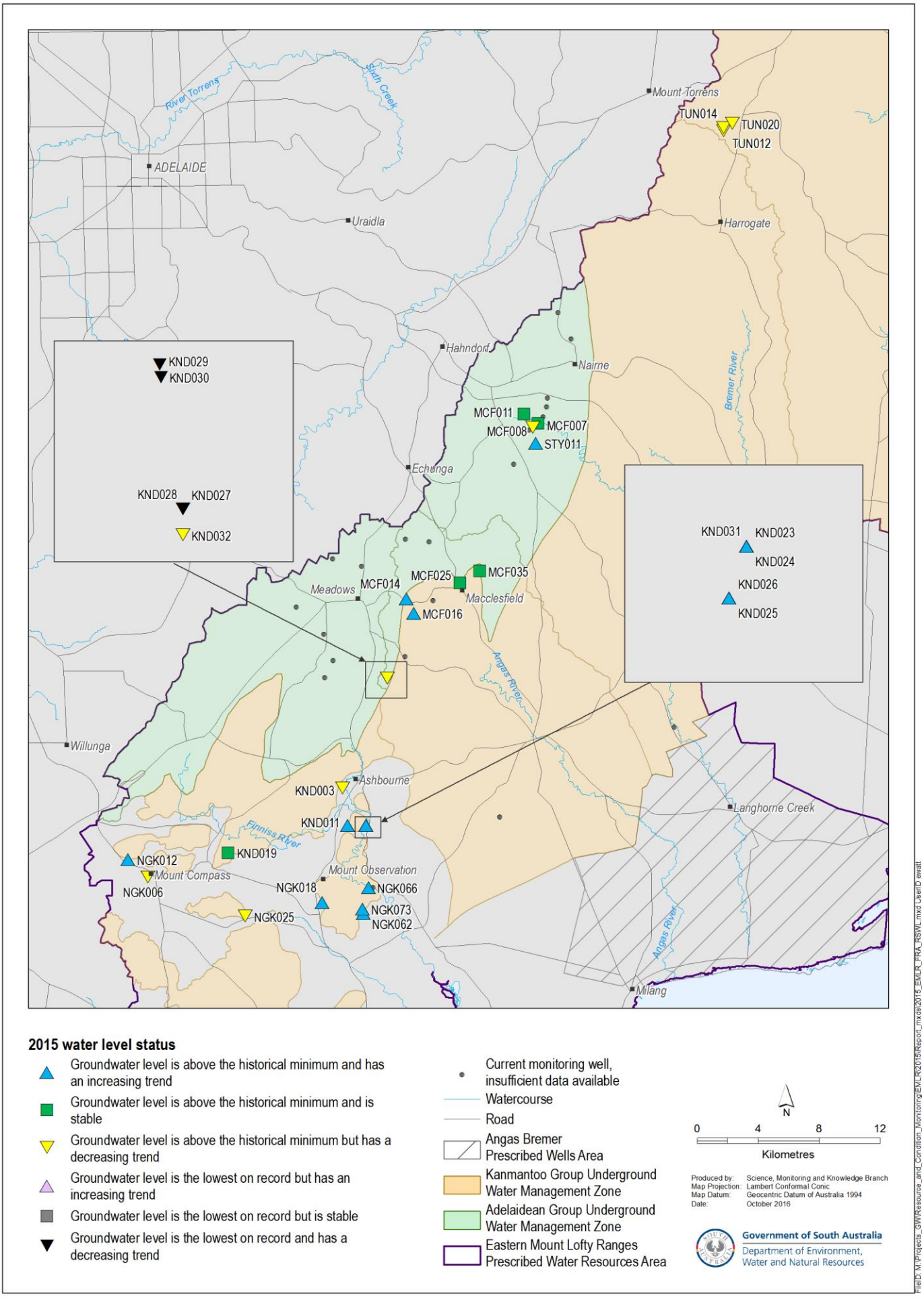


Figure 4. 2015 status of groundwater levels in the fractured rock aquifers of the Eastern Mount Lofty Ranges Prescribed Water Resources Area, based on the five-year trends from 2011 to 2015

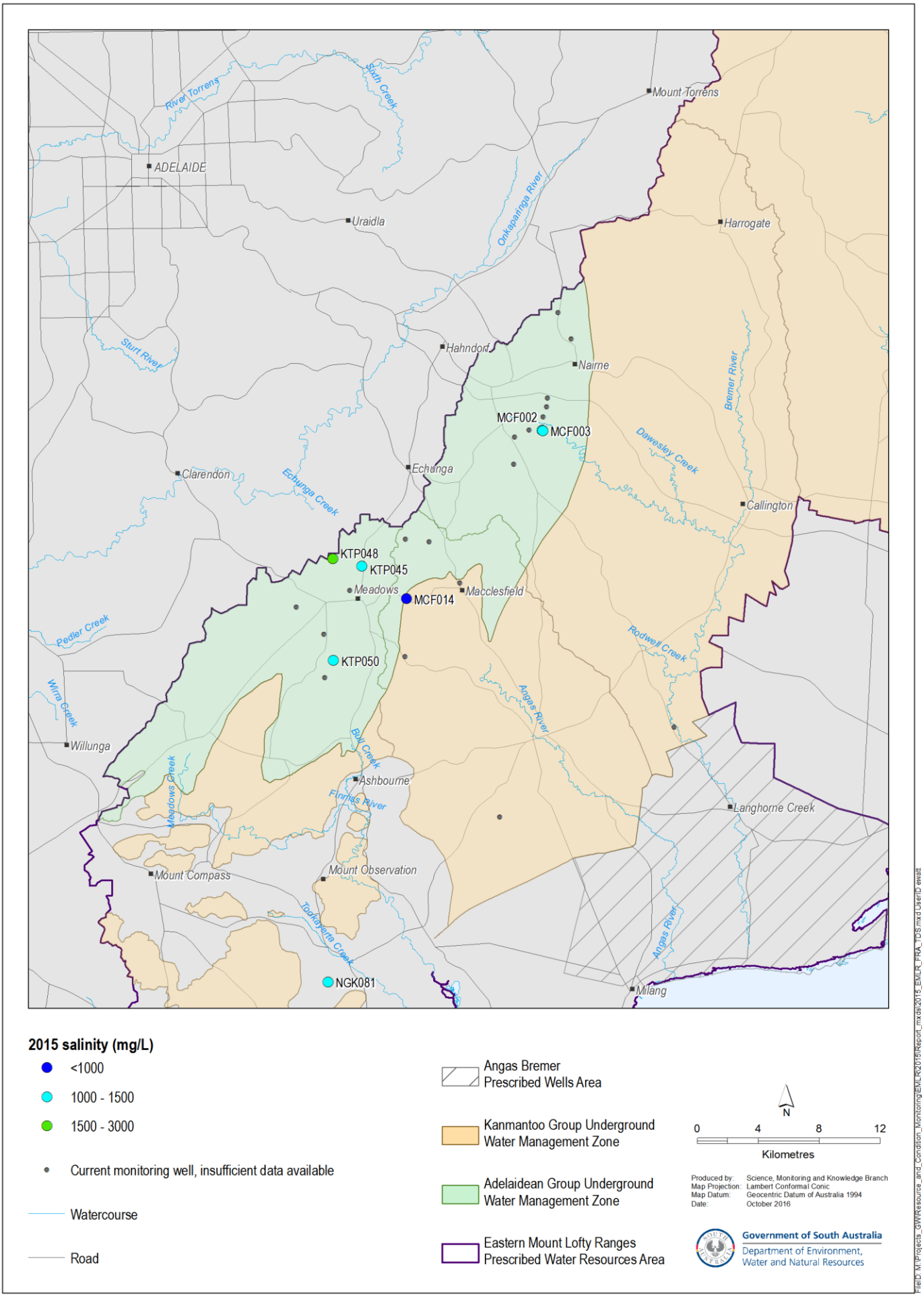


Figure 5. 2015 groundwater salinity in the fractured rock aquifers of the Eastern Mount Lofty Ranges Prescribed Water Resources Area

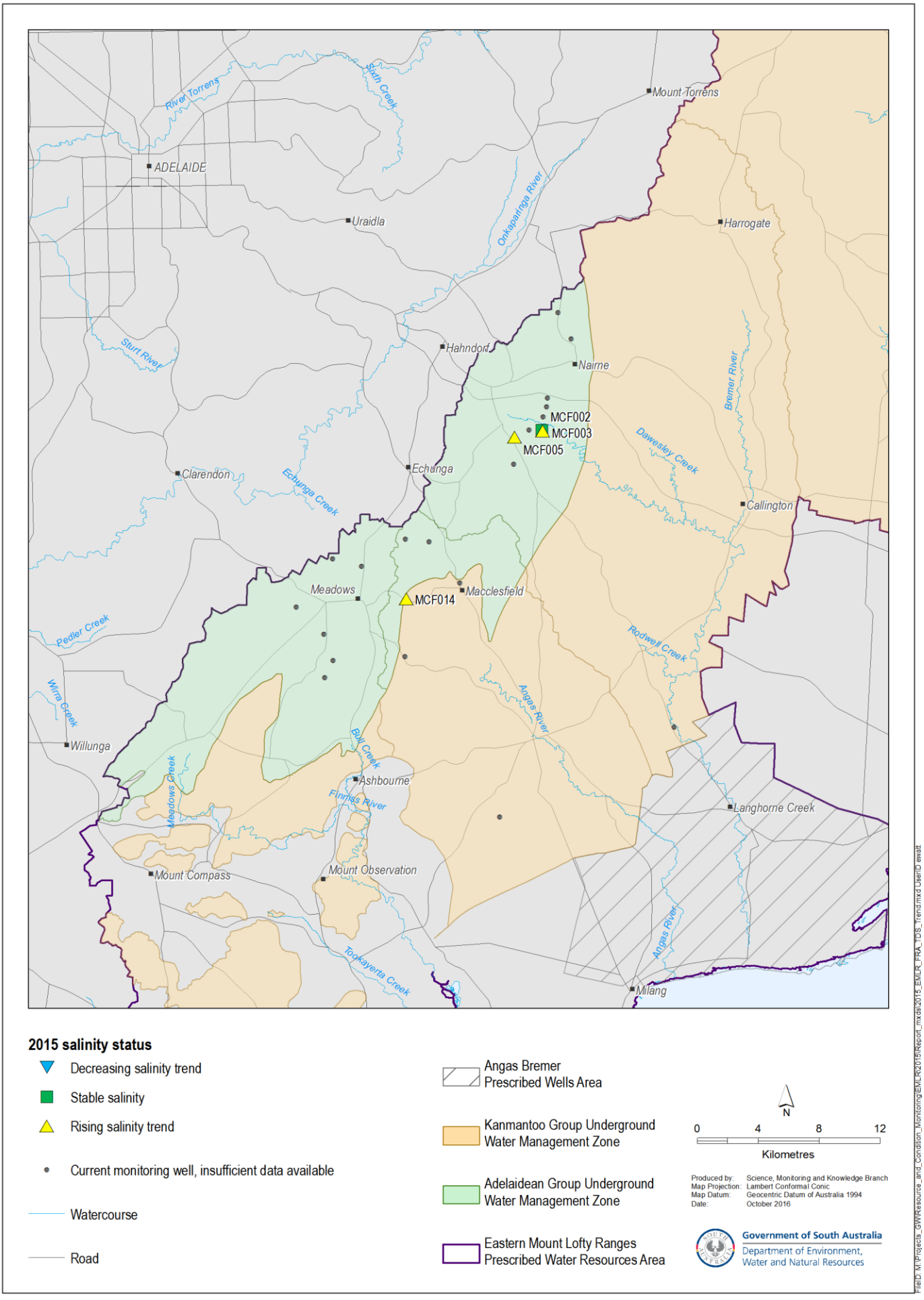


Figure 6. 2015 status of the groundwater salinities in the fractured rock aquifers of the Eastern Mount Lofty Ranges Prescribed Water Resources Area, based on the five-year trends from 2011 to 2015

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