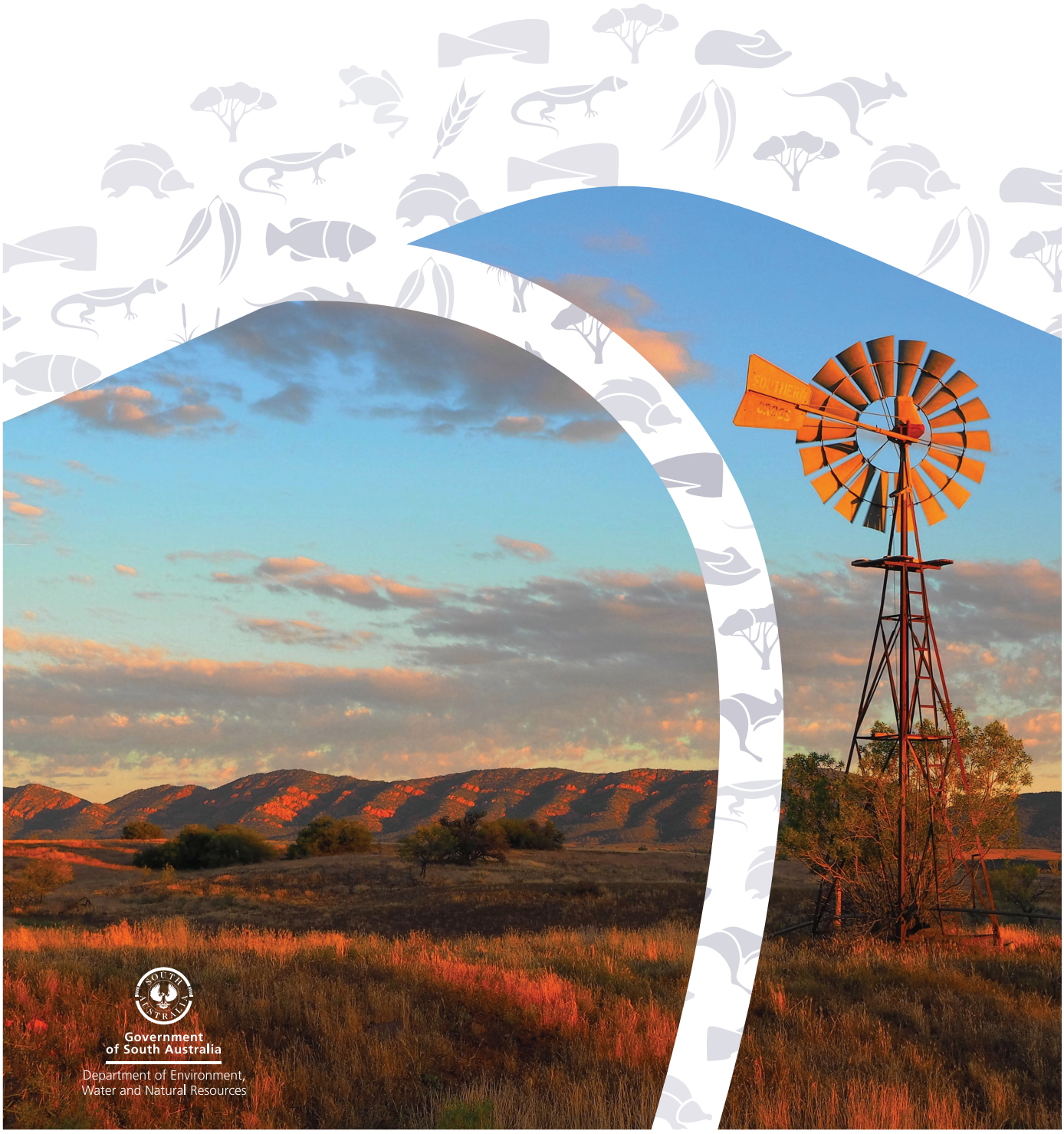
Western Mount Lofty Ranges PWRA Fractured rock aquifers

2016 Groundwater level and salinity status report



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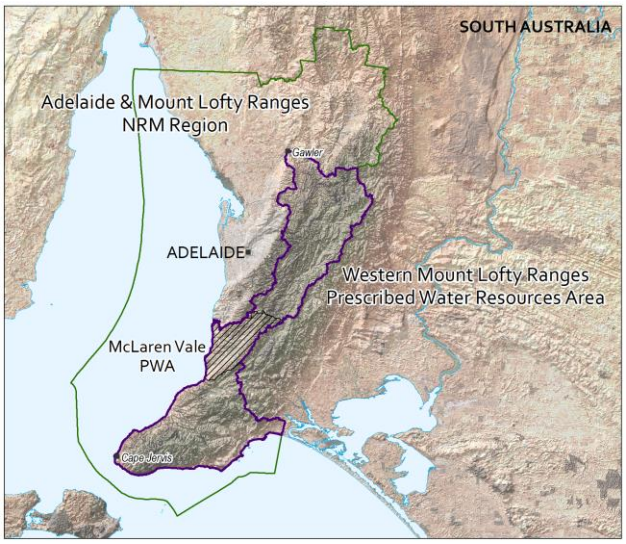
Regional setting



The Western Mount Lofty Ranges (WMLR) Prescribed Water Resources Area (PWRA) is located within the Adelaide and Mount Lofty Ranges Natural Resources Management Region and covers an area of approximately 2750 km^2, stretching from Cape Jervis on the south coast to Gawler in the north. 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 major geological provinces: 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, flowing 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.

2016 Status

The fractured rock aquifers of the Western Mount Lofty Ranges PWRA have been assigned a yellow status for 2016:

2016 Status Minor adverse trends have been observed over the past five years

The 2016 status for the fractured rock aquifers is based on:

- most monitoring wells (62%) show a five-year trend of declining groundwater levels.

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, 69% of salinity monitoring wells show a five-year trend of stable or decreasing salinity, and 70% of wells show salinities less than 1000 mg/L.

Rainfall

The centrally-located Uraidla rainfall station (BoM Station 23750) recorded 1120 mm of rainfall in the 2015–16 water-use year (Fig. 1). This is 5% greater than the long-term average of 1062 mm (1900–2016) and 8% greater than the five-year average of 1036 mm (2011–16) (Figs 1 and 2). Long-term seasonal rainfall patterns show generally higher rainfall during the winter months and lower rainfall over summer. Despite the above-average rainfall in 2013–14 and 2015–16 (Fig. 2), a subtle trend of declining rainfall is evident over the past five years and across the longer term (Fig. 1). Notable seasonal variations over the past five years include the drier than average spring–summer of 2012–13, the wet summer and autumn–winter of 2013–14 and 2015–16. In 2015-16, the months of January, May and June recorded rainfall which considerably exceeded monthly averages, but October, November, December and April recorded significantly below average monthly rainfall (Fig. 2).

Water use

The Western Mount Lofty Ranges PWRA has a total extraction limit of 69 193 ML across all aquifers of the PWRA, of which 56 045 ML has been allocated. In previous years, water usage were estimated based on land-use survey of irrigated properties and the theoretical irrigation requirements for various crops; as such, these data are not suitable to perform five-year trend analysis. More recently, changes in the way water is managed across the region have required licensed water users to measure their water use. By 2015–16, 47% of water licensees had installed water meters and submitted water usage data. Metered extractions totalled 7277 ML which represents 11% of the total extraction limit[1].

Groundwater levels

In the five years to 2016, most monitoring wells (62%) show a trend of declining groundwater levels, with 25% of these showing their lowest level on record in 2016 (Fig. 3). Furthermore, 8% of these wells also showed their lowest level on record in 2015. The remaining wells show either a rising trend (34%) or stable groundwater levels (4%). Rates of groundwater decline range between 0.01 and 2 m/y with a median of 0.3 m/y. Rises in groundwater levels ranged between 0.01 and 3.8 m/y with a median rise of 0.2 m/y.

Groundwater Salinity

Long-term monitoring data show groundwater salinities have been mostly stable within the PWRA. In 2016, most monitoring wells (70%) recorded salinities of less than 1000 mg/L, located mainly in the vicinity of Uraidla (Fig. 4). Of the remaining monitoring wells, four wells (13%) measured between 1000 and 1500 mg/L and four wells (17%) greater than 1500 mg/L. In the five years to 2016, 69% of monitoring wells show a trend of stable or declining salinity, and these are located mainly in the Central Hills region. The remaining wells (31%) recorded a rise in salinity between 6 and 60 mg/L/year with a median of 17mg/L/year (Fig. 5).

[1] The licensed groundwater extraction volume for the 2015–16 water-use year is based on the best data available as of March 2017 and may be subject to change, as some extraction volumes are in the process of being verified; installation of water meters by licensed users is still in progress across the WMLR PWRA.

More information

To determine the status of the fractured rock aquifers of the Western Mount Lofty Ranges PWRA for 2016, the trend in groundwater levels and salinities over the past five years (2012 to 2016, inclusive) were analysed, 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.

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

To view the W*estern 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 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* on the Natural Resources SA Murray-Darling Basin website.

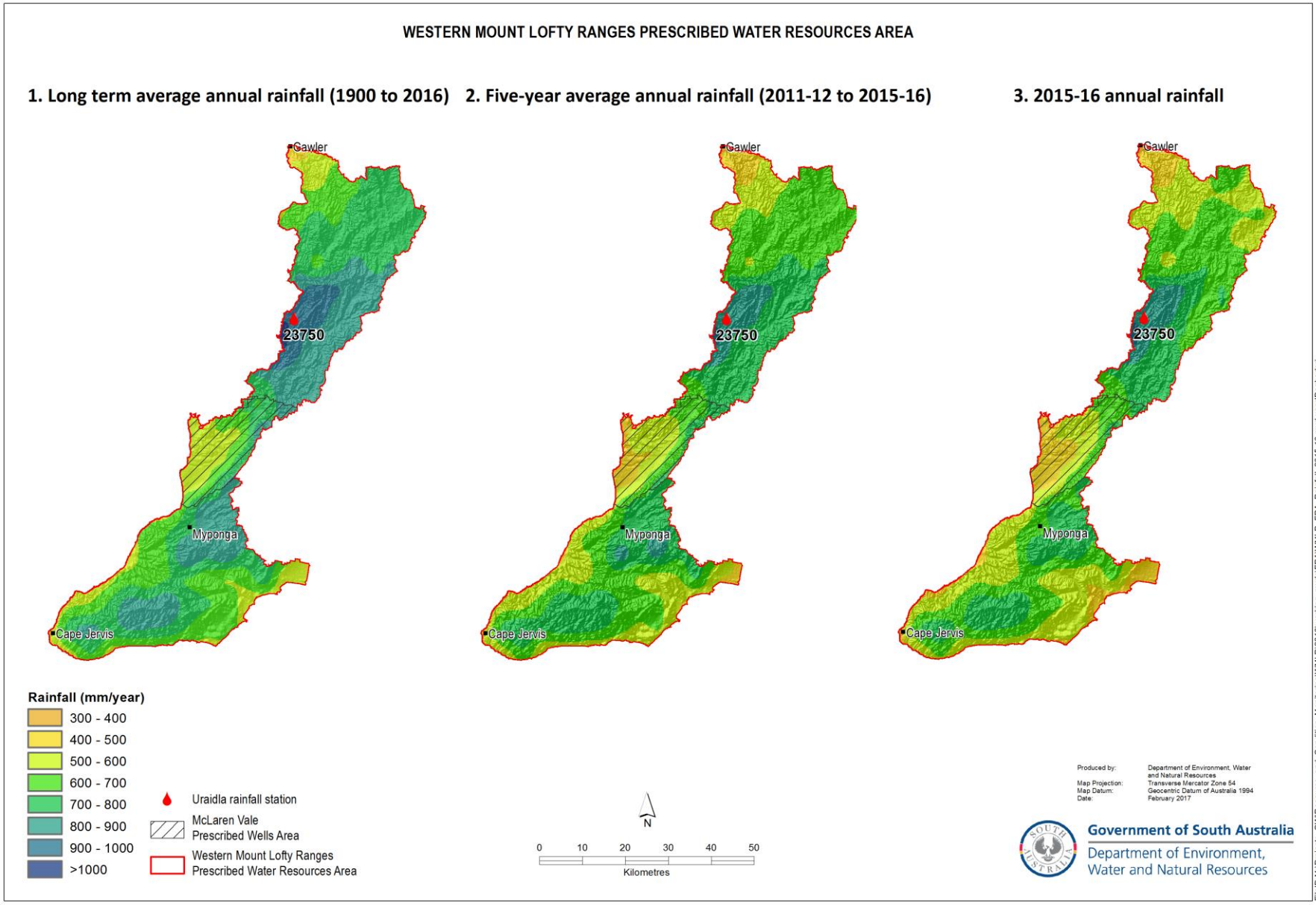


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2015–16 water-use year in the Western Mount Lofty Ranges PWRA[2]

[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.

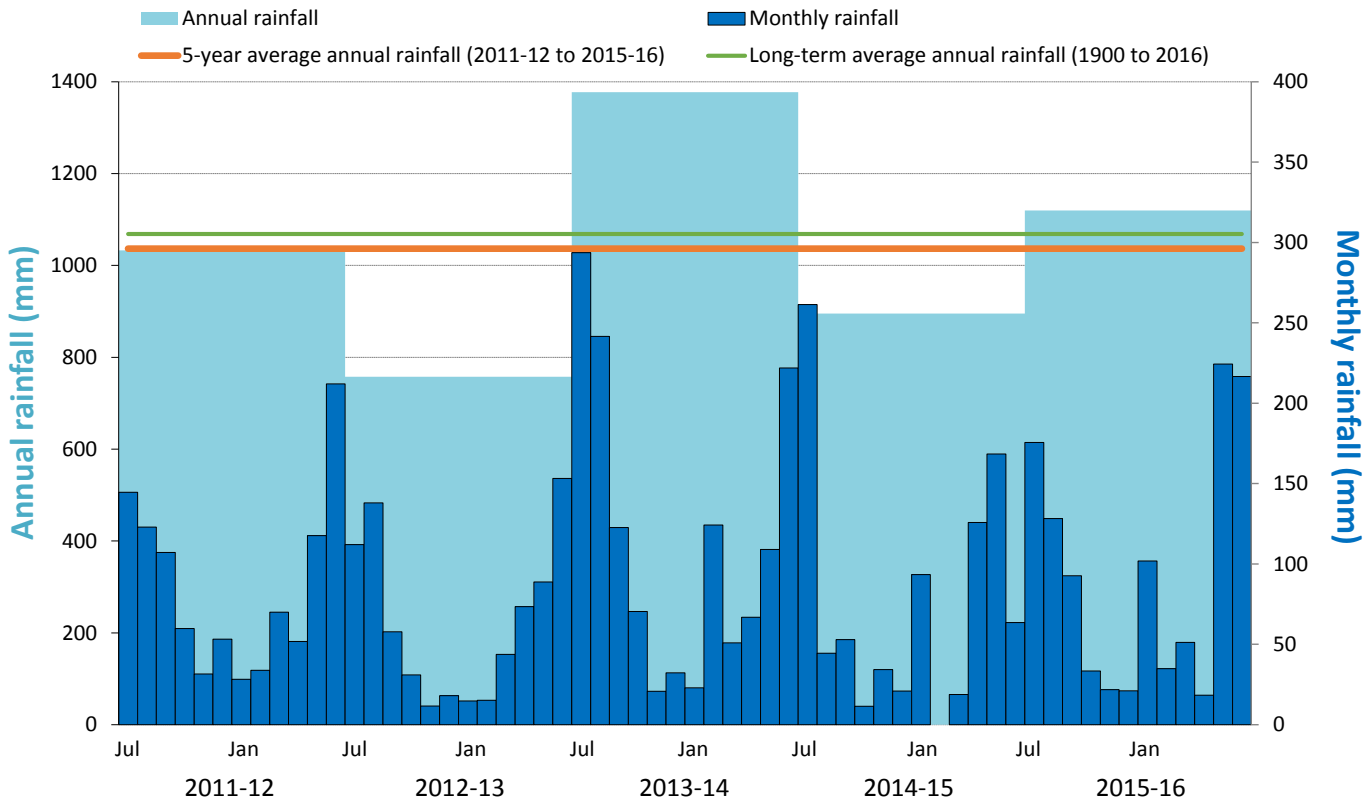


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Uraidla (BoM Station 23750)[3]

[3] 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.

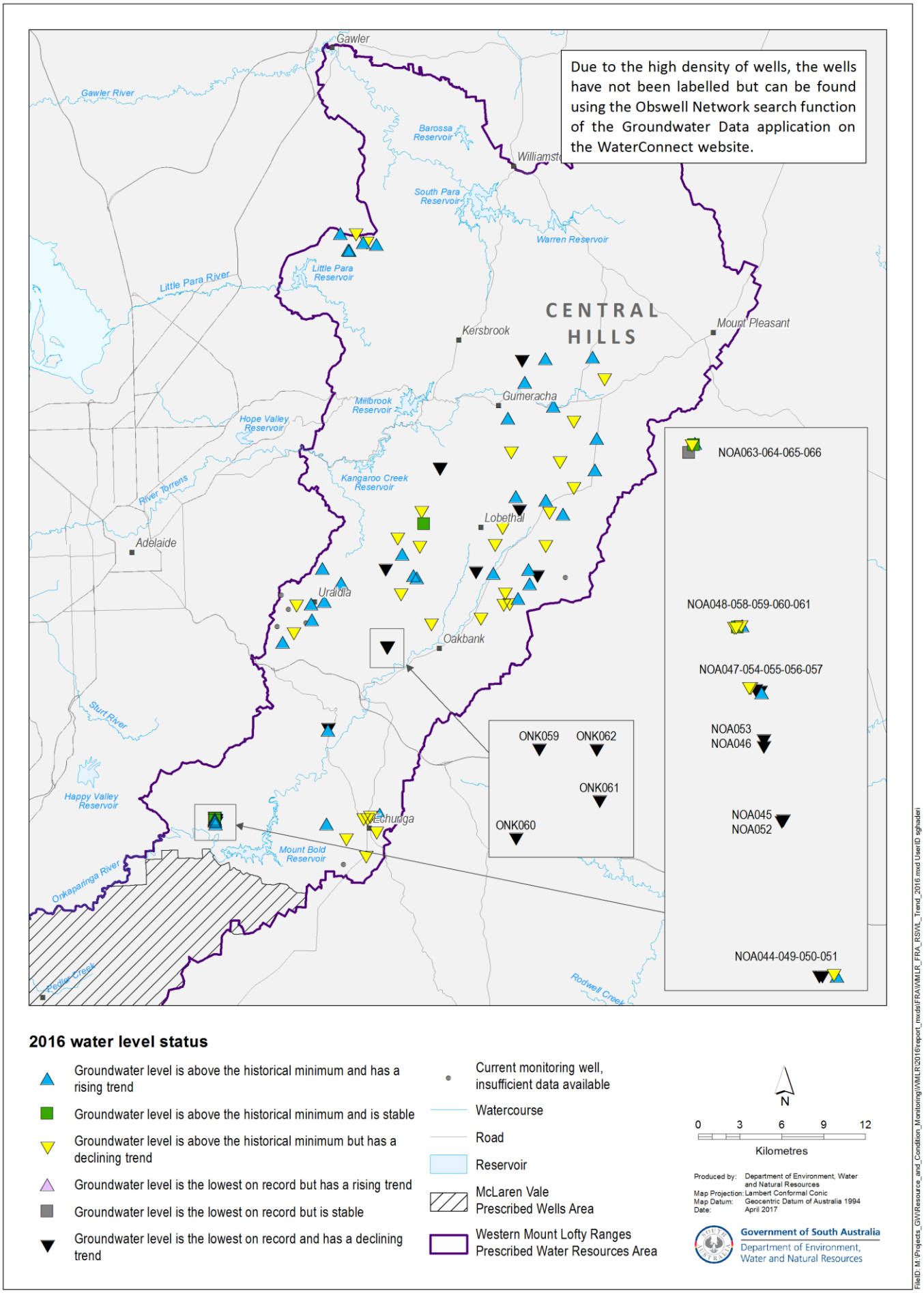


Figure 3. 2016 status of groundwater levels in the fractured rock aquifers (Western Mount Lofty Ranges PWRA), based on five-year trends from 2012 to 2016

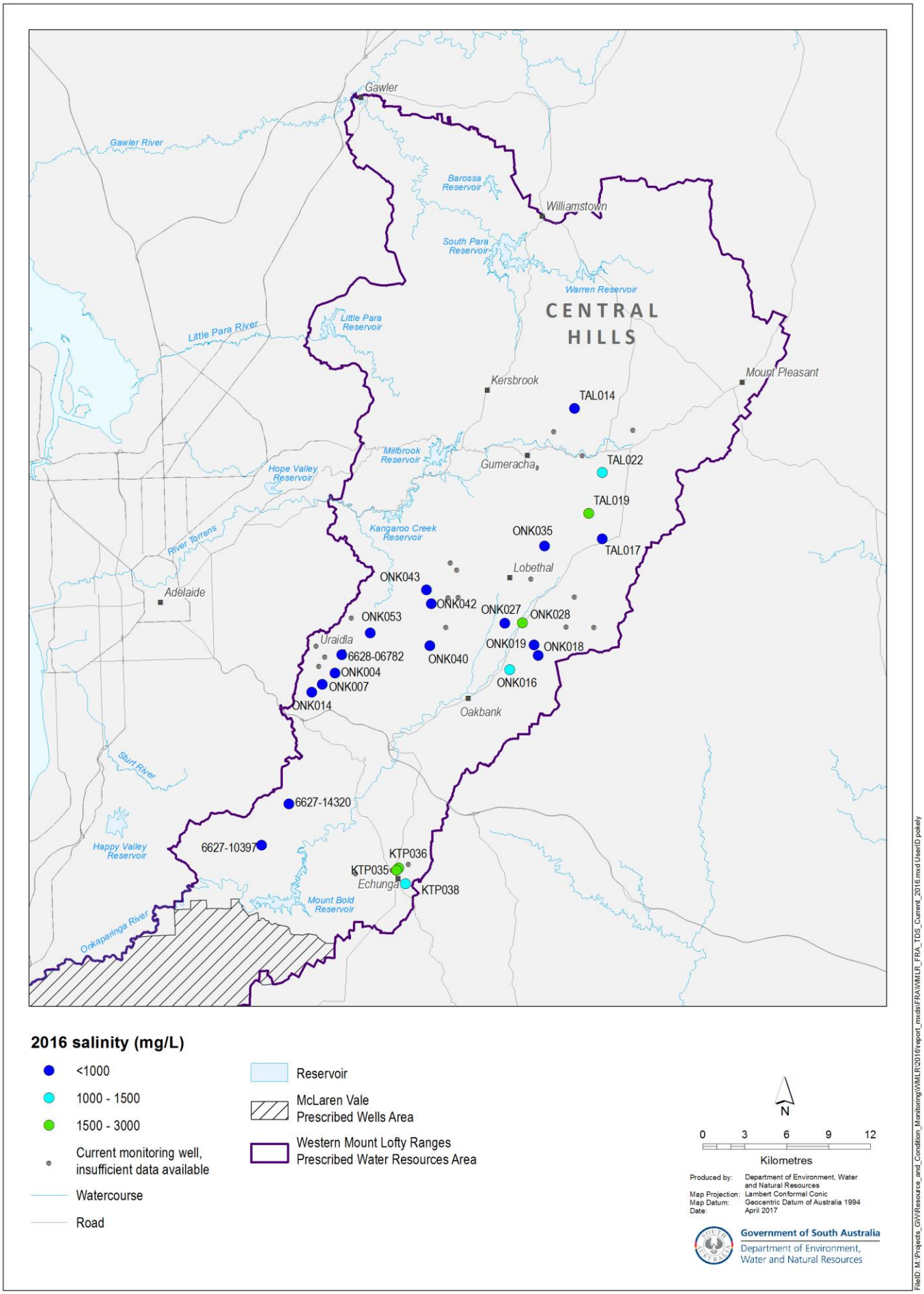


Figure 4. 2016 groundwater salinity of the fractured rock aquifers (Western Mount Lofty Ranges PWRA)

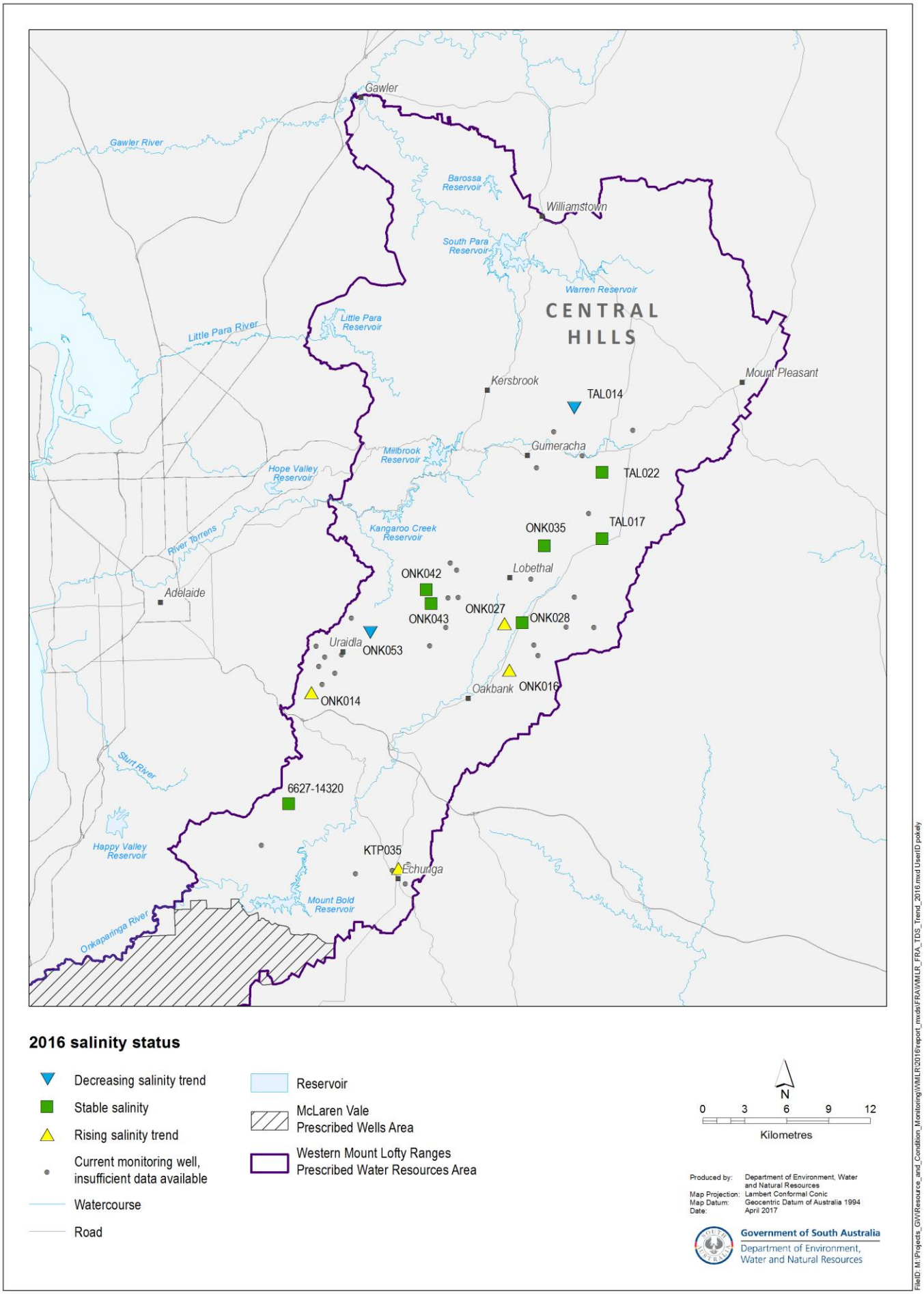


Figure 5. 2016 status of groundwater salinity in the fractured rock aquifers (Western Mount Lofty Ranges PWRA), based on five-year trends from 2012 to 2016

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