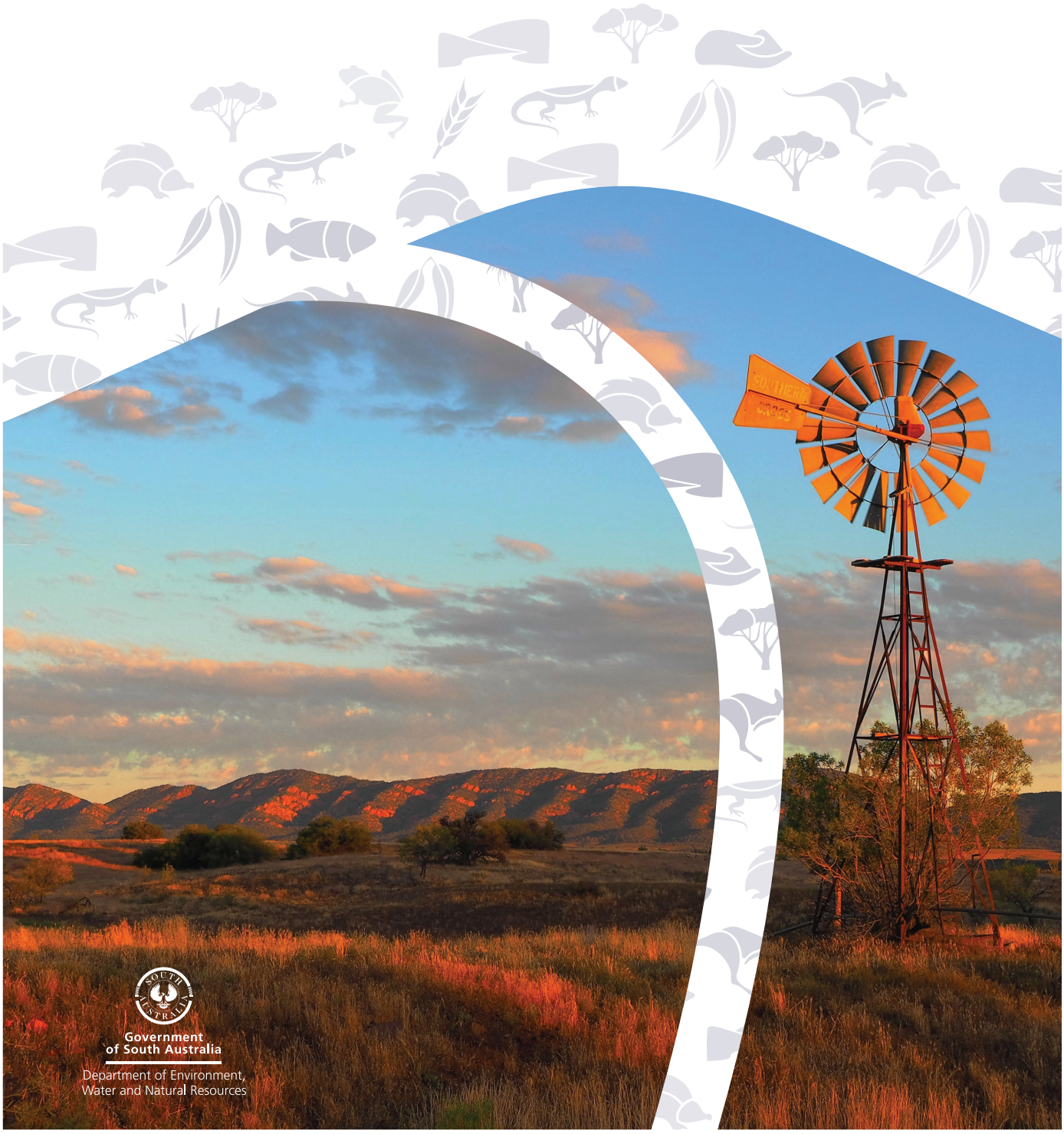
McLaren Vale PWA
Fractured rock aquifer

2016 Groundwater level and salinity status report



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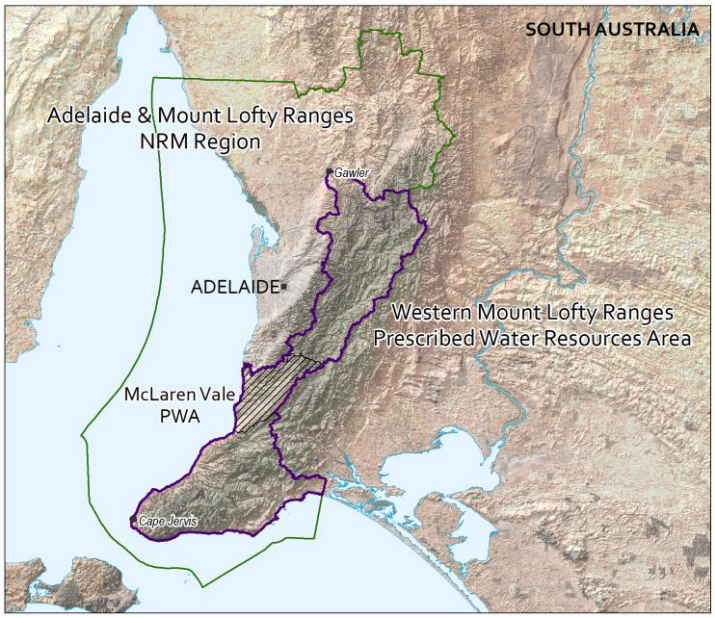
Regional setting



The McLaren Vale Prescribed Wells Area (PWA) is located approximately 35 km south of Adelaide. It lies within the Adelaide and Mount Lofty Ranges Natural Resource Management Region (location map left). For those groundwater resources located within the adjacent Western Mount Lofty Ranges (WMLR) Prescribed Water Resources Area (PWRA), but outside the McLaren Vale PWA, a separate groundwater level and salinity status report has been prepared and it can be found on the *Water Resource Assessments* page of WaterConnect. Both the McLaren Vale PWA and WMLR PWRA comprise regional-scale groundwater resources, for which groundwater has been prescribed under South Australia's *Natural Resources Management Act 2004*, and in each of these two areas a water allocation plan provides for the sustainable management of the water resources.

Underlying the McLaren Vale PWA is the Willunga Embayment, a structurally controlled trough containing sedimentary aquifers of Quaternary and Tertiary age that is bounded to the south-east by the Willunga Fault and to the north by basement outcrop. There are four aquifers described within the Willunga Embayment: the Quaternary aquifer; the Port Willunga Formation aquifer; the Maslin Sands aquifer; and the fractured rock aquifer (FRA).

This report focuses on the FRA, which occurs within the basement rocks which outcrop in the north and in the hills to the east of the Willunga Fault. The FRA comprises slates, quartzites, shales and limestone. Recharge to this aquifer takes place in these elevated areas as a result of infiltration of rainfall through the soil or by percolation from streamflow in drainage lines. The FRA is confined where it underlies the sedimentary aquifers of the Willunga Embayment. Groundwater flow within the FRA is variable and strongly influenced by the size, density and orientation of the fractures but 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 toward the coast.

Groundwater level and salinity trends within the FRA are primarily climate driven: below-average rainfall results in reduced recharge to the aquifer. Below-average rainfall can also lead to increased extractions for irrigation, and these two elements combined can cause groundwater levels to fall and salinities to increase. Conversely, higher rainfall may result in increased recharge and decreased irrigation extraction. This may cause the groundwater level to rise and salinities may stabilise or decline.

2016 Status

The fractured rock aquifer of the McLaren Vale PWA has been assigned a yellow status for 2016:

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

The 2016 status of the fractured rock aquifer is based on:

- most monitoring wells (80%) showing a five-year trend of declining groundwater levels.

Although a majority of wells across the PWA show a five-year trend of declining groundwater levels, the median rate of decline is low (0.16 m/y).

Rainfall

The climate of the McLaren Vale PWA is characterised as Mediterranean with warm to hot, dry summers and mild, wet winters. The primary recharge area for the FRA is in the Mount Lofty Ranges and consequently, data from the Mount Bold Reservoir rainfall station (BoM station 23734) were chosen for analysis of rainfall trends. Mount Bold Reservoir rainfall station (BoM station 23734) recorded 755 mm in the 2015–16 water-use year, which is 38 mm greater than the long-term average annual rainfall (1900–2016) of 717 mm and commensurate with the five-yearly average of 762 mm (Fig. 2). Although above-average rainfall has been registered in two of the past five years (Fig. 2), a trend of declining rainfall is evident when compared with the long-term average (Fig. 1). Monthly rainfall data for 2015–16 show above-average recordings for January and February, but the remaining monthly totals were below their long-term averages.

Water use

Licensed groundwater extractions from the FRA in 2015–16 totalled 1031 ML[1], an increase of 4% on the previous water-use year (Fig. 3) and 17% greater than the five-year average (2011–12 to 2015–16). The FRA accounted for 21% of the groundwater extracted from the McLaren Vale PWA in 2015–16.

Groundwater levels

Variations in groundwater levels in the McLaren Vale FRA tend to correlate with rainfall trends and over the past 40 years, show an overall declining trend for the majority of monitoring wells. In the five years to 2016, 80% of monitoring wells show declining groundwater level trends. In 2016, nearly half of these wells show their lowest level on record (Fig. 4) and are mostly located near the northern boundary of the PWA, and along the Willunga Fault. The remaining 20% of monitoring wells show a trend of either rising or stable groundwater levels. The rates of decline in groundwater levels range between 0.03 and 0.47 m/y with a median of 0.14 m/y. Rates of rise in groundwater levels range between 0.26 and 0.36 m/y with a median of 0.29 m/y. These wells are mostly located towards the mid-north of the PWA. The observation well WLG148, located very close to the Willunga Fault in the central zone, shows its lowest level on record (since 2003) and a declining trend of 4.4 m/y. This amplified response to nearby extraction is likely to be explained by local geological structures that may be inhibiting inter-aquifer connectivity.

Groundwater salinity

Groundwater salinity in the FRA is variable across the PWA. In 2016, five available monitoring wells have shown salinities ranging between 761 and 3476 mg/L, with 80% of these recording salinities under 1500 mg/L (Fig. 5). However, due to a paucity of salinity data to complete a five-year analysis, salinity has not been included in the assessment of the status of the resource for the current (2016) reporting period.

[1] The licenced groundwater use for the 2015–16 water-use year is based on the best data available as of March 2017 and could be subject to change, as some extraction volumes may be in the process of being verified.

More information

To determine the status of the fractured rock aquifer of the McLaren Vale PWA for 2016, the trends in groundwater level 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 *McLaren Vale PWA Groundwater Level and Salinity Status Report 2009–10*, 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 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 Adelaide and Natural Resources Mount Lofty Ranges website.

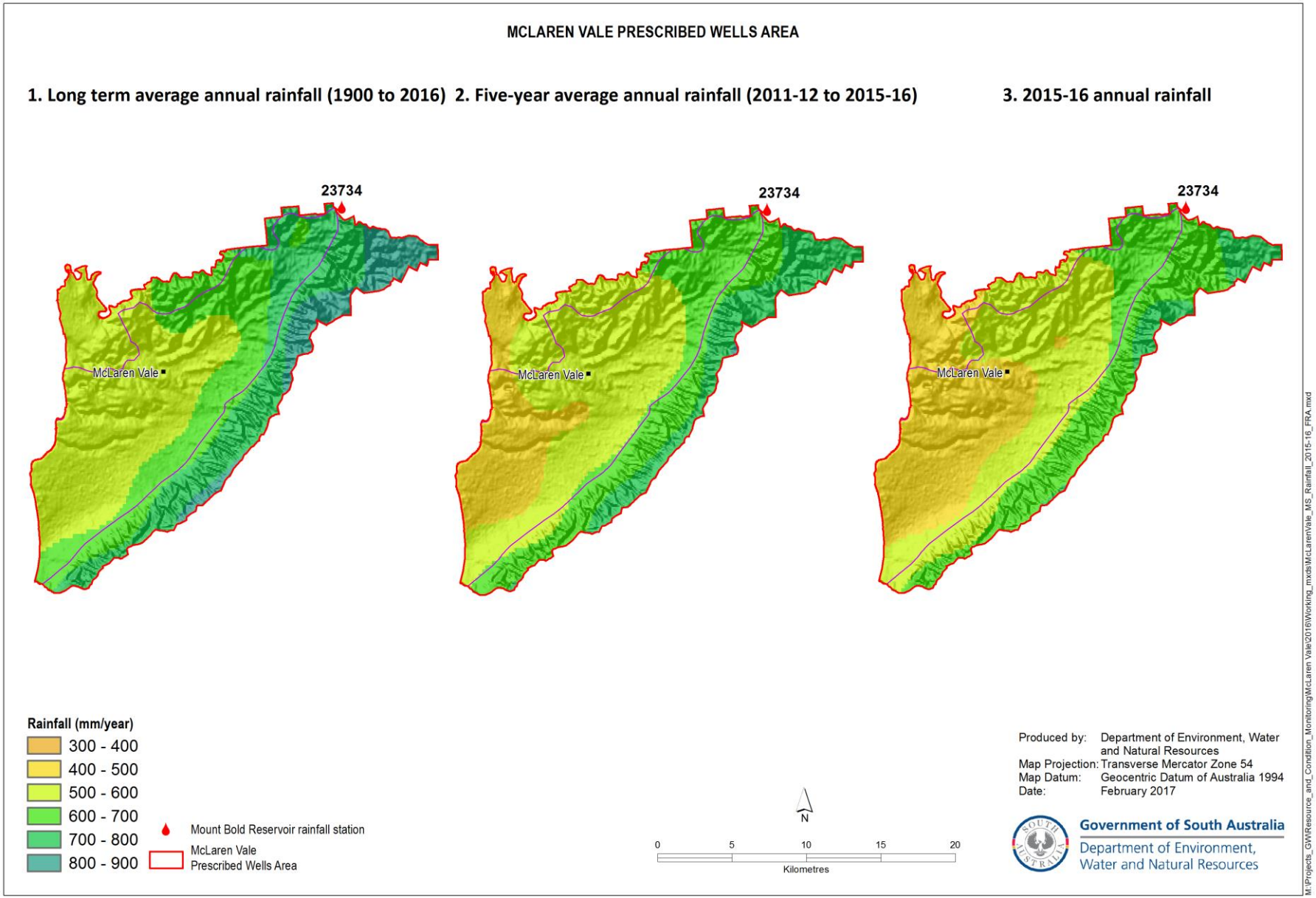


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2015–16 water-use year in the McLaren Vale PWA[2]

[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.

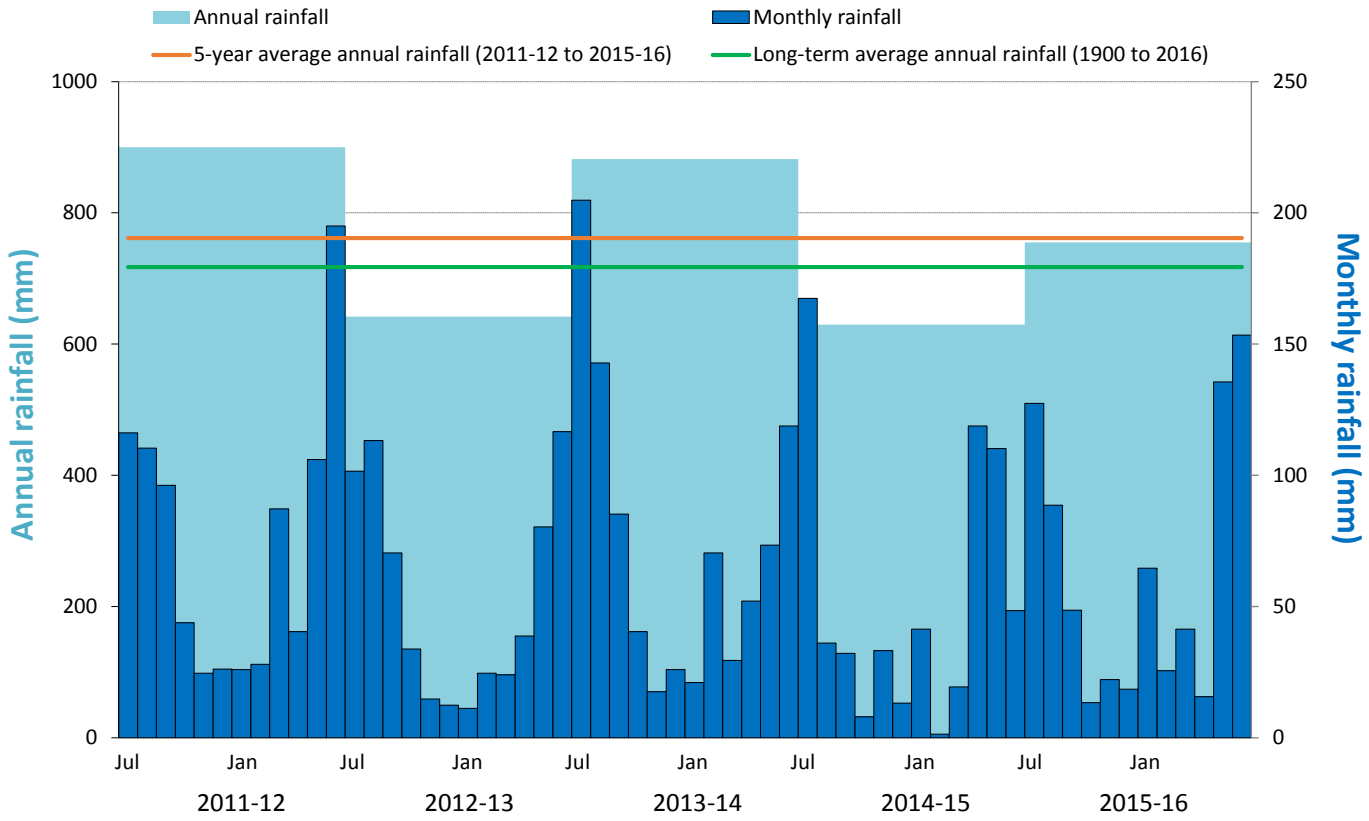


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-yearly and long-term average annual rainfall recorded at Mount Bold Reservoir (BoM Station 23734)[3]

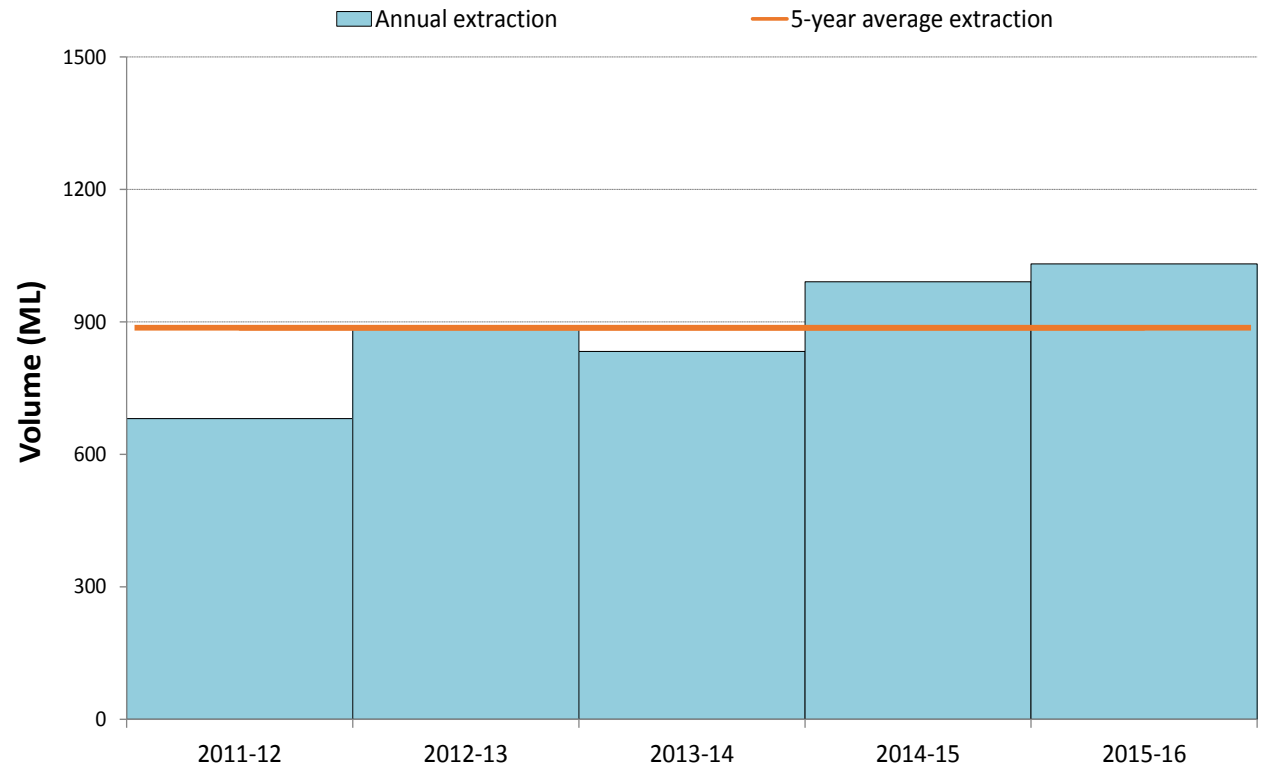


Figure 3. Licensed groundwater extraction volumes[4] from the fractured rock aquifer for the past five water-use years

[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.

[4] The licenced groundwater use for the 2015–16 water-use year is based on the best data available as of January 2017 and could be subject to change, as some extraction volumes may be in the process of being verified.

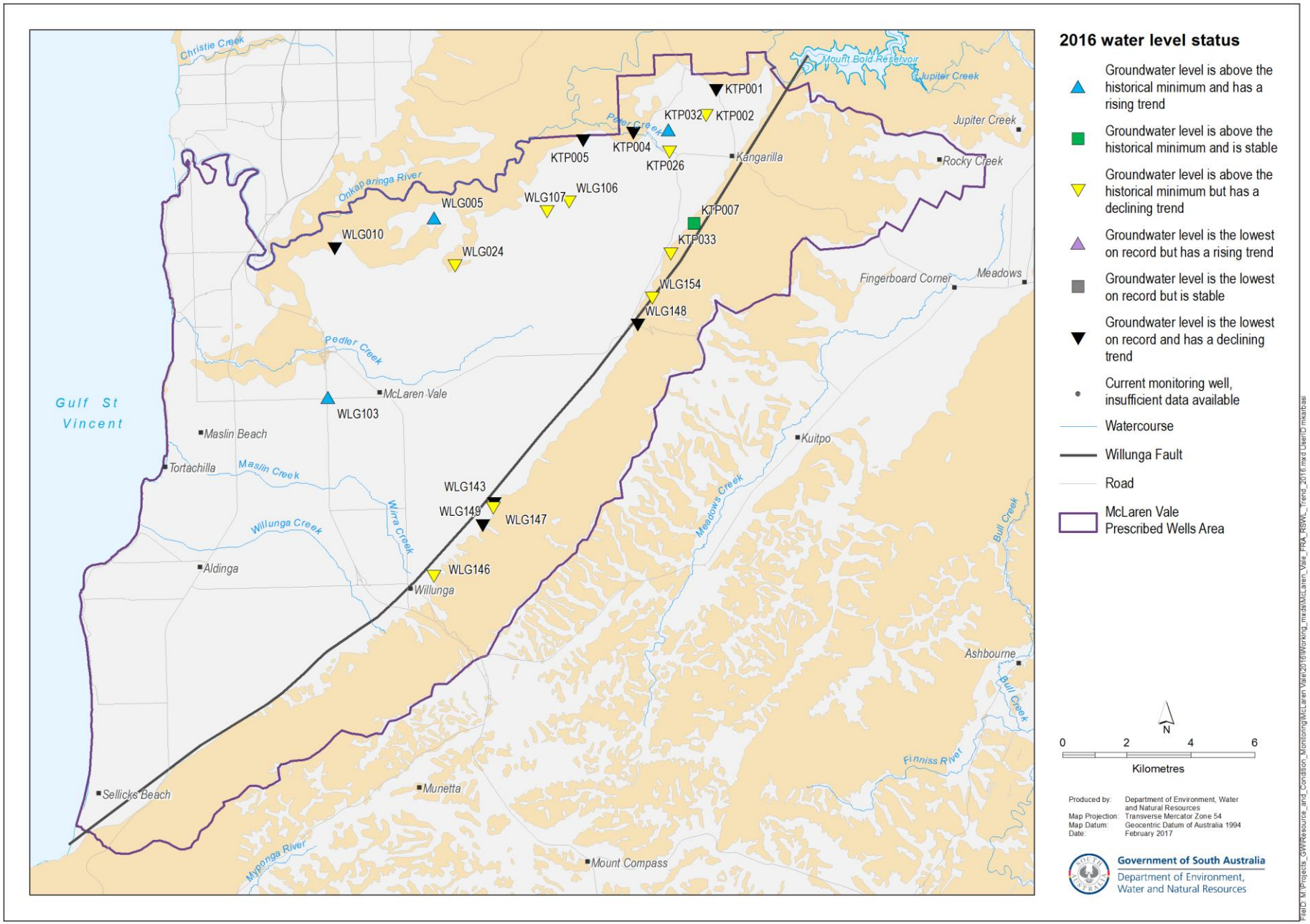


Figure 4. 2016 status of the water level in the fractured rock aquifer (McLaren Vale PWA) based on the five-year groundwater level trend from 2012 to 2016

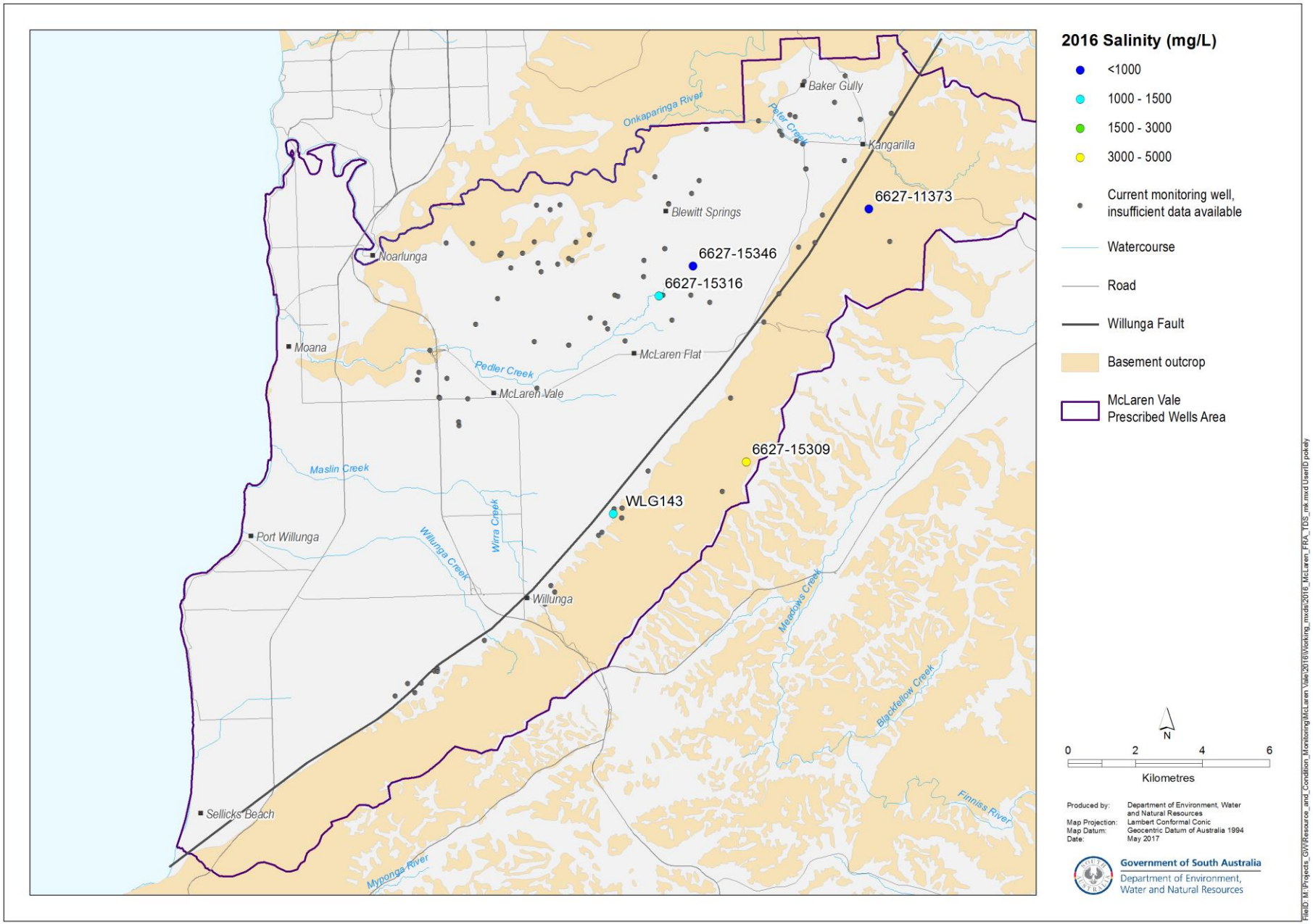


Figure 5. 2016 groundwater salinity of the fractured rock aquifer (McLaren Vale PWA)

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