McLaren Vale PWA

Fractured rock aquifer

2015 Groundwater level and salinity status report

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

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ISBN 978-1-925369-95-3

Preferred way to cite this publication

DEWNR, 2016, *McLaren Vale PWA fractured rock aquifer 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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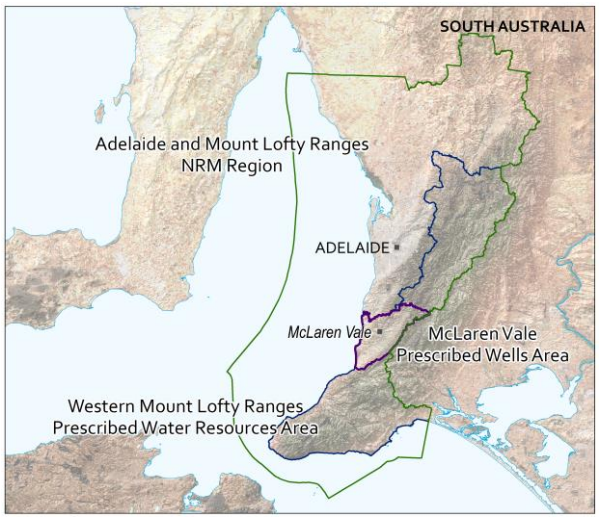
2015 Summary



The McLaren Vale Prescribed Wells Area (PWA) is located approximately 35 km south of Adelaide. It lies within the Adelaide and Mount Lofty Ranges Natural Resources Management Region (location map left). For those groundwater resources located within the adjacent WMLR 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 in 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, and is expressed at ground surface as outcrop in the north, and the hills to the east of the Willunga Fault. It comprises slates, quartzites, shales and limestone that form the ranges located east of the Willunga Fault, and also to the north of the PWA. Recharge to this aquifer takes place in these elevated 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 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 is 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 level to fall and salinity to increase. Conversely, higher rainfall may result in increased recharge and decreased irrigation extraction. This may cause the groundwater level to rise, allowing salinity to 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 (BoM station 23734) were chosen for analysis of rainfall trends. Mount Bold Reservoir recorded 630 mm in the 2014–15 water-use year, 82 mm less than the long-term average annual rainfall (1900–2015) of 712 mm and 177 mm less than the five-yearly average of 807 mm (Figs. 1 and 2). Though three of the last five water-use years have recorded above-average rainfall, a trend of declining rainfall is evident (Fig. 2).

Licensed groundwater extractions (excluding stock and domestic use) from the FRA totalled 991 ML[1] in 2014–15, an increase of 19% on the previous water-use year (Fig. 3). Groundwater extraction has increased over the past five water-use years as rainfall has declined. (Figs 2 and 3). 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.

Variations in groundwater levels in the FRA tend to correlate with rainfall and show an overall declining trend for the majority of monitoring wells over the past 40 years. In the five years to 2015, 77% of the available monitoring wells show declining groundwater level trends, with a quarter of these wells at their lowest level on record in 2015 (Fig. 4). These wells are mostly concentrated near the northern boundary of the PWA, and on both sides of the Willunga Fault. The remaining 23% of monitoring wells show a trend

[1] The licenced groundwater use for the 2014–15 water-use year is based on the best data available as of March 2016 and could be subject to change, as some extraction volumes may be in the process of being verified.

of either rising or stable groundwater levels. Declines in groundwater levels ranged between 0.03 and 0.5 m/y with a median of 0.18 m/y. One well located very close to the Willunga Fault in the central zone (WLG148) shows its lowest level on record since it was drilled in 2003, and a declining trend of 4.5 m/y. Rises in groundwater levels ranged between 0.03 and 0.4 m/y with a median gain of 0.25 m/y. These wells are mostly located towards the west of the PWA.

Groundwater salinity in the FRA was not measured in 2015 and as such, the salinity trend analyses are based on the most recent data available (2010 to 2014). Groundwater salinities in the FRA are variable, ranging from 995 to 3370 mg/L, with 61% of wells showing salinities above 1500 mg/L (Fig. 5). In the five years to 2014, nearly all wells show a trend of stable or decreasing salinity, with just two wells showing a rising salinity trend (Fig. 6).

To determine the status of the fractured rock aquifer 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 aquifer of the McLaren Vale Prescribed Wells Area has 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 aquifer is based on:

- most monitoring wells (76%) showing a five-year trend of declining groundwater levels.

Although a 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 (0.19 m/y).

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, relevant groundwater-dependent ecosystems and location of rainfall stations, 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 Natural Resources Adelaide and Mount Lofty Ranges website.

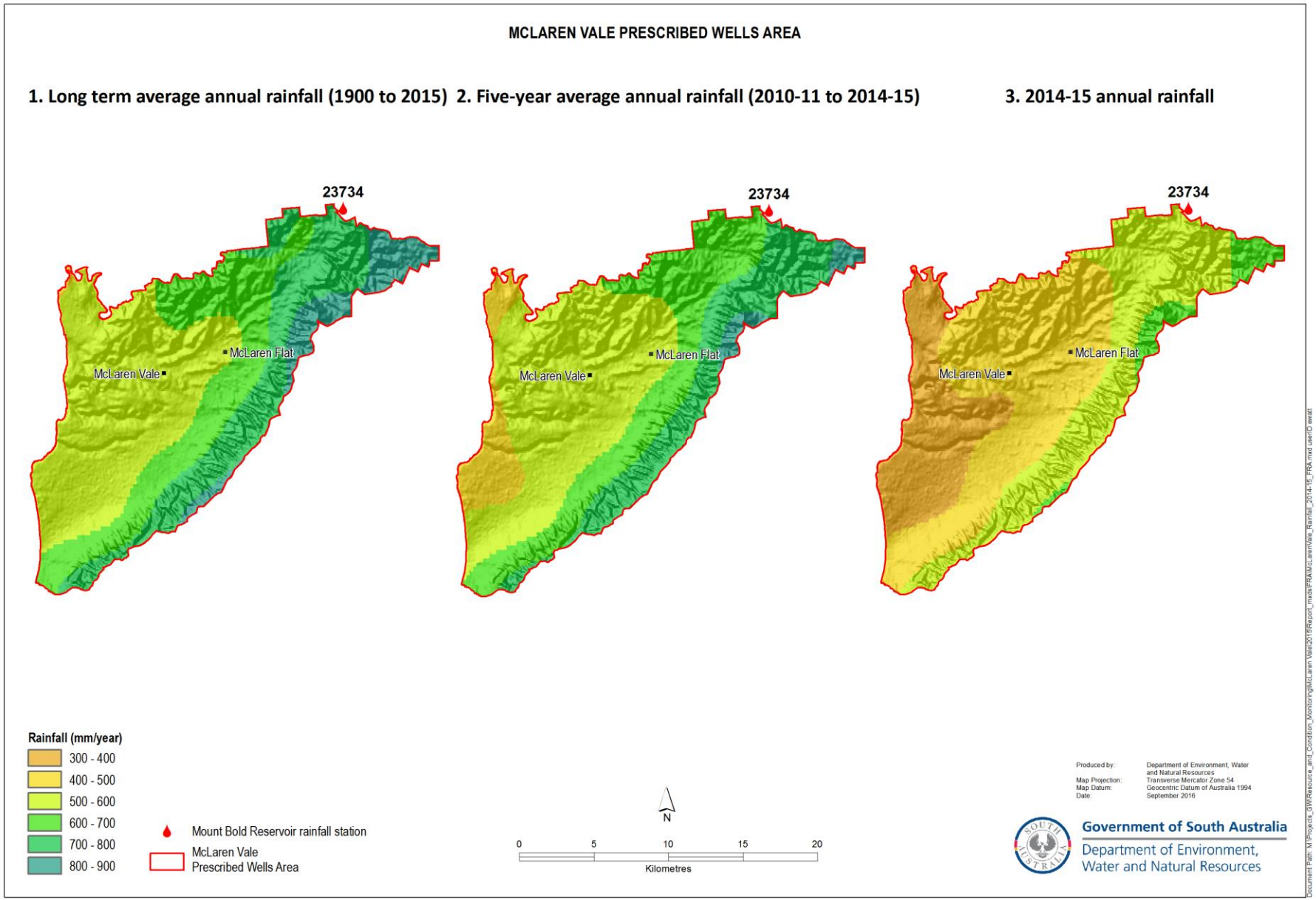


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year in the McLaren Vale Prescribed Wells Area[2]

[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.

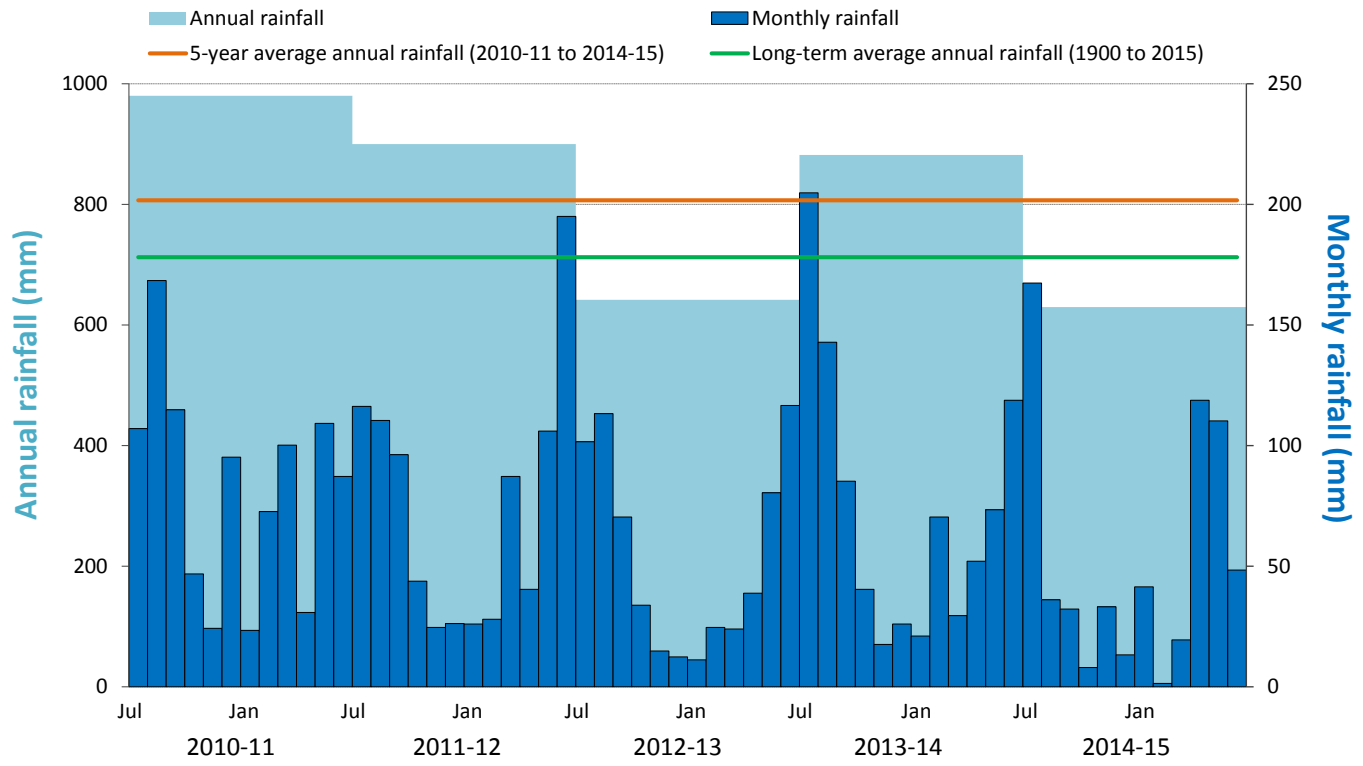


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-yearly and long-term average annual rainfall recorded at Mount Bold Reservoir (BoM Station 23734)[3]

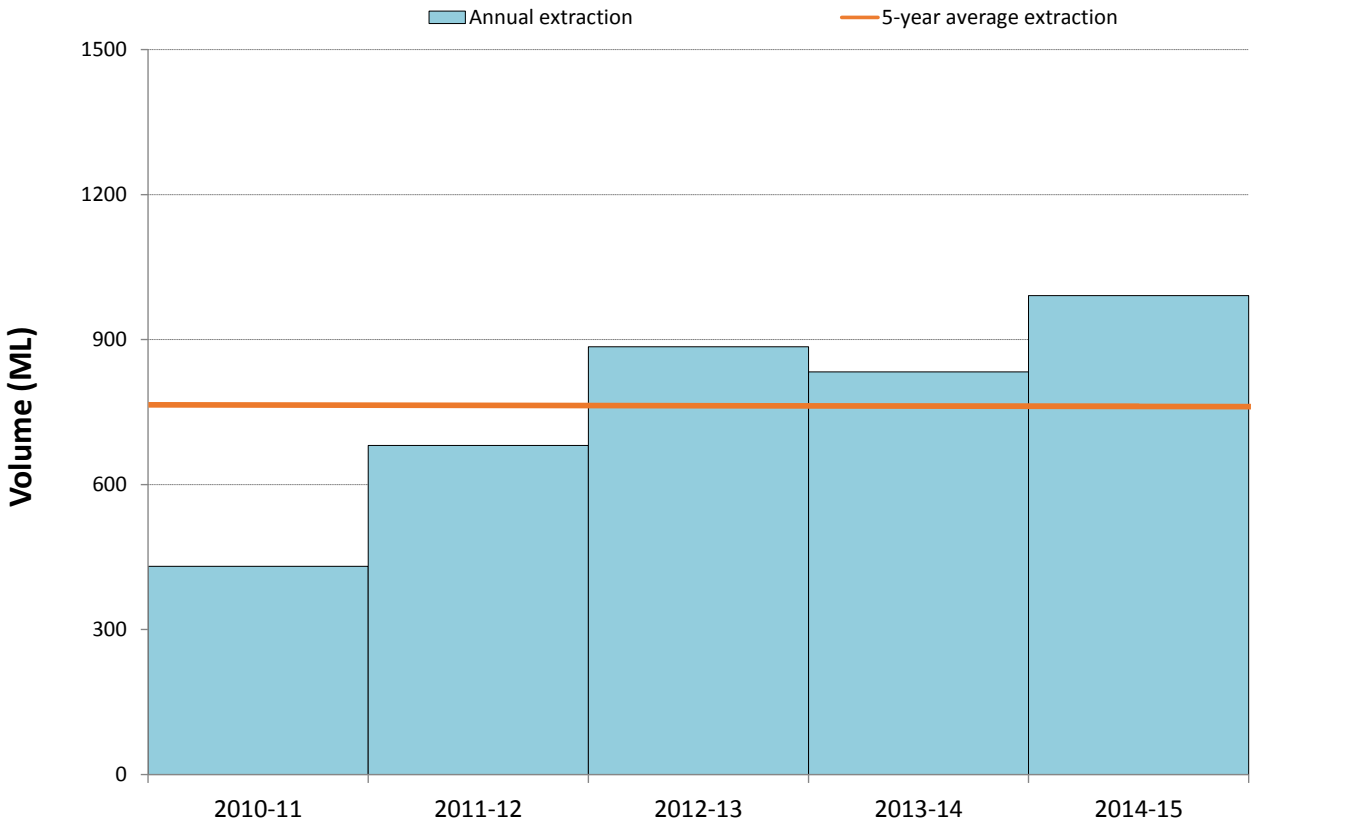


Figure 3. Licensed groundwater extraction volumes[4] for the past five water-use years, for the fractured rock aquifer in the McLaren Vale Prescribed Wells Area

[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 2014–15 water-use year is based on the best data available as of March 2016 and could be subject to change, as some extraction volumes may be in the process of being verified.

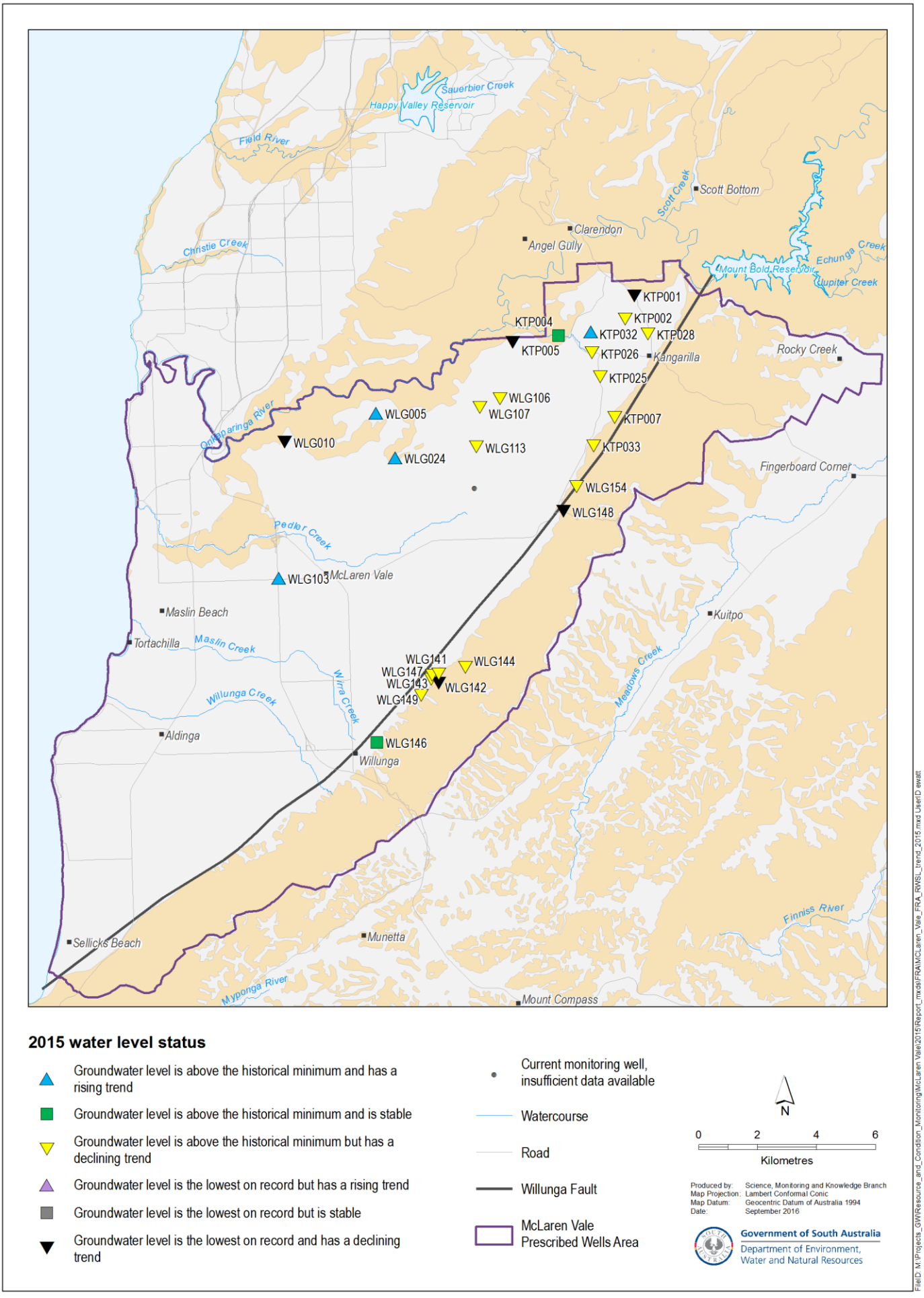


Figure 4. 2015 status of groundwater levels in the fractured rock aquifer of the McLaren Vale Prescribed Wells Area based on the five-year trend from 2011 to 2015

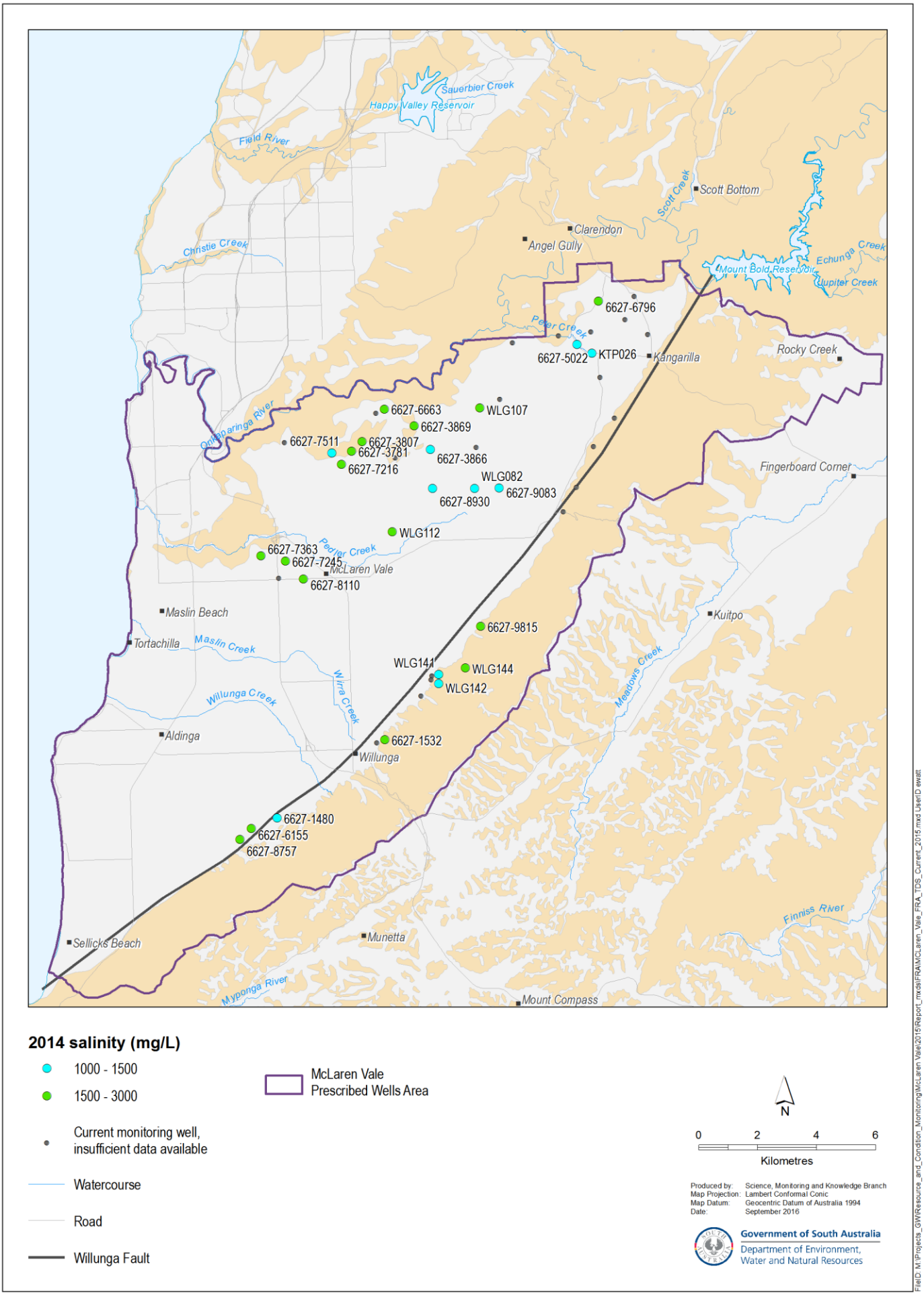


Figure 5. 2014 groundwater salinities of the fractured rock aquifer in the McLaren Vale Prescribed Wells Area

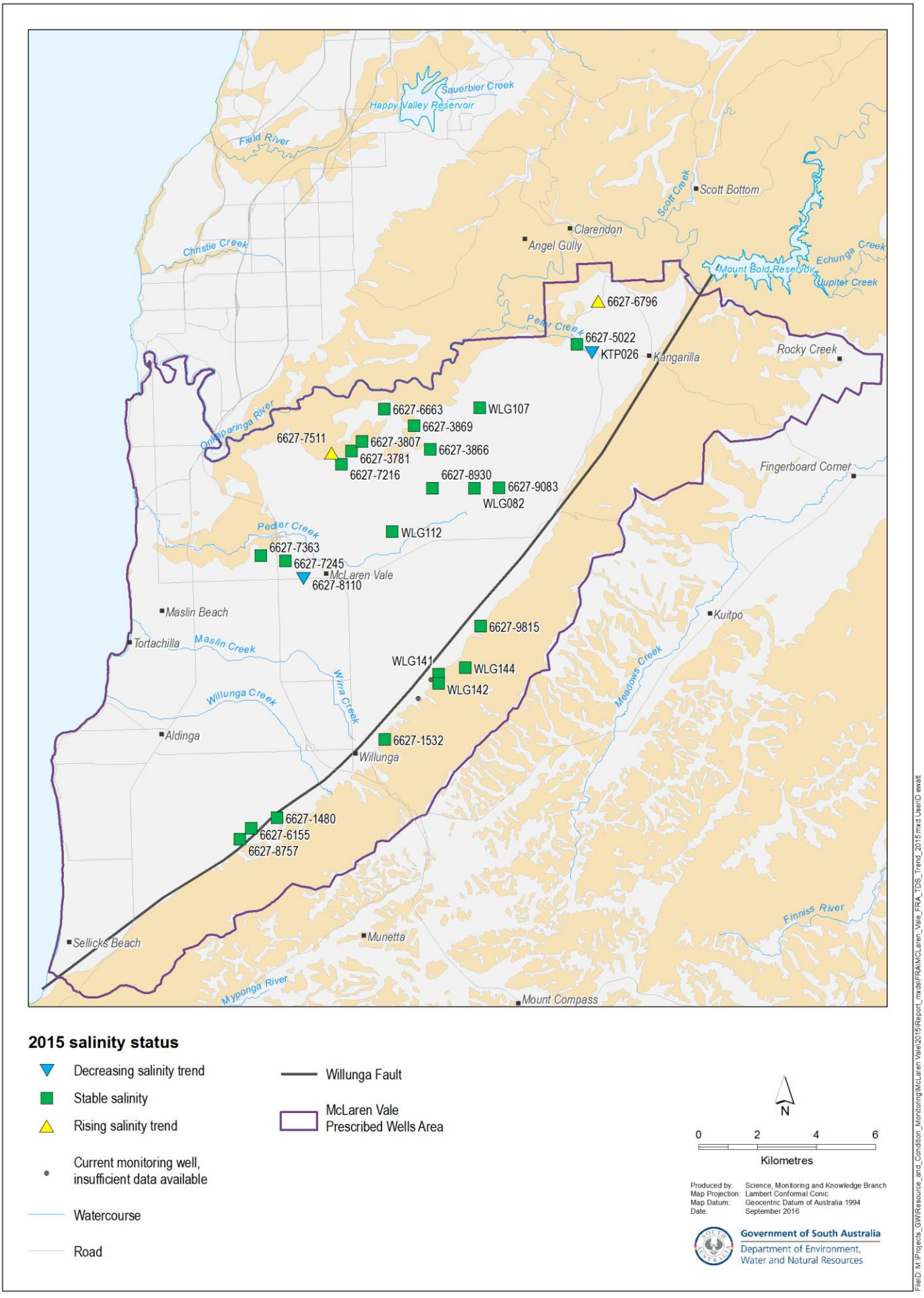


Figure 6. 2015 status of groundwater salinity in the fractured rock aquifer of the McLaren Vale Prescribed Wells Area based on the five-year trend from 2010 to 2014

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