

Mallee PWA

Murray Group Limestone aquifer

2015 Groundwater level and salinity status report



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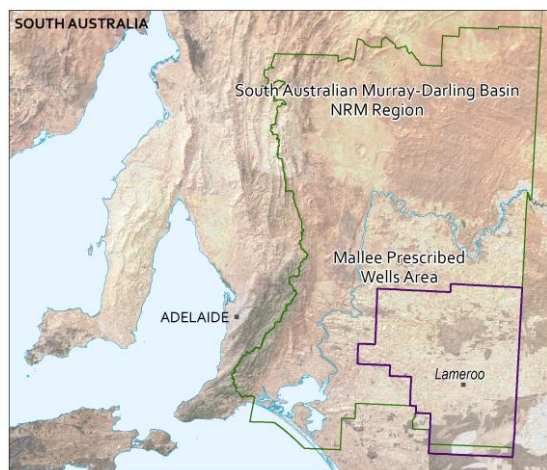
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2015 Summary



The Mallee Prescribed Wells Area (PWA) is located about 150 km east of Adelaide in the South Australian Murray-Darling Basin NRM Region and is underlain by sediments of the Murray Basin. It is a regional-scale resource for which groundwater resources are prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan provides for the sustainable management of the groundwater resources.

There are three main aquifer systems in the Mallee PWA, namely the confined Renmark Group aquifer, the semi-confined Murray Group Limestone (MGL) aquifer and the unconfined Pliocene sands aquifer. All licensed groundwater extractions in the Mallee PWA are from the MGL aquifer, primarily where the aquifer is confined in the north-east of the PWA, and is the focus of this report. The MGL aquifer comprises a consolidated, highly fossiliferous, fine to coarse, bioclastic limestone that has an average thickness of around 100 m.

The MGL aquifer is recharged in south-west Victoria (broadly located to the south-east of the Mallee PWA), with groundwater movement away from this area towards the north, north-west and west of the Mallee PWA.

The intensity and timing of rainfall and subsequent extraction practices can have an effect on groundwater levels and salinity in the MGL aquifer. For example, if the region experienced above-average rainfall during typically dry summer months, this could result in less groundwater being extracted from the aquifer for irrigation and therefore smaller declines (or possibly increases) in groundwater levels and stable or decreasing salinity.

The Pinnaroo rainfall station (BoM Station 24515) is located within the Mallee PWA and recorded 276 mm of rainfall in the 2014–15 water-use year. This is 17% less than long-term average annual rainfall (1900 to 2015) of 333 mm and 27% less than the five-year average annual rainfall (2010–15) of 376 mm (Figs 1 and 2). Although the five-year average annual rainfall is greater than the long-term average, a trend of declining rainfall over the past five years is evident (Fig. 2). Monthly rainfall data show a temporally uneven spread of rainfall in 2014–15, with November, January and April recording above-average rainfall, but the remaining months recording totals below their long-term average.

In 2014–15, licensed extractions totalled 34 303¹ ML, an increase of 11% from the previous water-use year and 8% above the five-year average of 31 652 ML (Fig. 3). A negative correlation is apparent between the declining rainfall over the past five years and increasing groundwater extractions (Figs 2 and 3), suggesting that the increase in groundwater extraction in 2014–15 is probably due to a declining trend in rainfall from 2013–14.

Long-term groundwater level monitoring shows seasonal drawdowns as a result of irrigation extraction from the MGL aquifer. Drawdowns are greater in areas of concentrated extraction, which primarily occurs where the aquifer is confined, within Border Zones 10A and 11A of the Designated Area. Between 2000–06 a new equilibrium was ostensibly reached, suggested by stable groundwater levels over this period. However, from 2007 to early 2009, an increase in seasonal drawdowns occurred in response to drought-induced increases in groundwater extraction. An overall recovery in groundwater levels was observed between 2009 and 2011.

In the five years to 2015, most monitoring wells (66%) show a five-year trend of declining groundwater level, and 3% show their historically lowest level in 2015 (Fig. 4). The widespread falls, which range between 0.02 and 0.90 m/y with a median of 0.17 m/y, are attributed to the increased demand on groundwater resources following the below-average rainfall over the past four years. Sixteen percent of monitoring wells show a rising trend in groundwater levels, with another 18% showing stable groundwater levels. Rises and falls in groundwater level in close proximity to each other reflect changes in irrigation location and intensity due to crop rotations.

Salinity monitoring in the confined portion of the MGL aquifer where most of the irrigation occurs has shown no significant change over the past 20 to 30 years; however, some wells have shown some variability in salinity, and several wells display seasonally

¹ The licensed groundwater use and managed aquifer recharge volumes for the 2014–15 water-use year are based on the best data available as of February 2016 and may be subject to change, as some extraction volumes are in the process of being verified.

fluctuating salinity induced by groundwater extractions. In 2015, salinities range between 590 and 4300 mg/L, with 64% of the 81 monitored wells showing salinities of less than 1500 mg/L (Fig. 5). These wells are mostly located around Lameroo, Parilla, Pinnaroo and Peebinga. As groundwater is an important source of water in the Mallee PWA, increases in salinity may pose a risk to industries that rely on the resource.

In the five years to 2015, 95% of monitoring wells show stable salinity, while salinity has decreased in the remaining 5% of wells (Fig. 6).

The Water Allocation Plan for the Mallee PWA (the WAP) has identified resource condition limits for the MGL aquifer that apply to the Designated Border Zones and the Parilla Red Management Area. These limits are designed to give early warning of unfavourable trends in groundwater levels and salinity that may impact on users of the resource.

Water levels: As stated in the WAP, each year groundwater levels need to recover to within a prescribed threshold water level, relative to the previous year's maximum recovered water level. If this threshold is not reached for two consecutive years, in more than 50% of monitoring wells within each zone or area, then an investigation is triggered. The threshold recovery levels vary for each zone and area: 65 cm for Border Zones 9A and 11A (Hundred McGorriery and Hundred Peebinga); 50 cm for Border Zone 10A; and 25 cm for the Parilla Red Management Area (outside Designated Area). In 2014–15, recovery to within the threshold water levels has occurred for more than 50% of wells in all zones (Table 1) and as such, the resource conditions limits have not been exceeded.

Table 1. Groundwater level condition limits for the Mallee Prescribed Wells Area for 2013–14 and 2014–15

Management Area or Border Zone	No. ObsWells	2013–14		2014–15	
		Did not recover to within threshold	Recovered to within threshold	Did not recover to within threshold	Recovered to within threshold
9A	1	0%	100%	0%	100%
10A	22	5%	95%	5%	95%
11A-MCG	8	0%	100%	0%	100%
11A-PEB	10	0%	100%	0%	100%
Parilla Red M.A.	9	11%	89%	44%	56%

Salinity: As stated in the WAP, if an increase in groundwater salinity in the MGL confined aquifer measures greater than 2% per year for five consecutive years, across at least 50% of monitoring wells, then an investigation is triggered. In 2014–15, half of all salinity monitoring wells have not shown five consecutive years of salinity increases greater than 2%, which indicates that the resource conditions limits have not been exceeded.

To determine the status of the MGL aquifer 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 Murray Group Limestone aquifer of the Mallee PWA 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 Murray Group Limestone aquifer is based on:

- most monitoring wells (66%) show a five-year trend of declining groundwater pressure levels.

Although the WAP resource condition limits for water levels and salinity have not been exceeded, a conservative approach has been taken and a yellow status has been assigned to the Murray Group Limestone aquifer, based on the majority of wells showing a declining trend in groundwater pressure levels over the past five years.

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on [WaterConnect](#).

To view the *Mallee 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 download groundwater level and salinity data from monitoring wells within the Mallee PWA, please visit the *Groundwater Data* page under the Data Systems tab on [WaterConnect](#).

For further details on the Mallee PWA, please see *The Water Allocation Plan for the Mallee Prescribed Wells Area* on the Natural Resources SA Murray-Darling Basin [website](#).

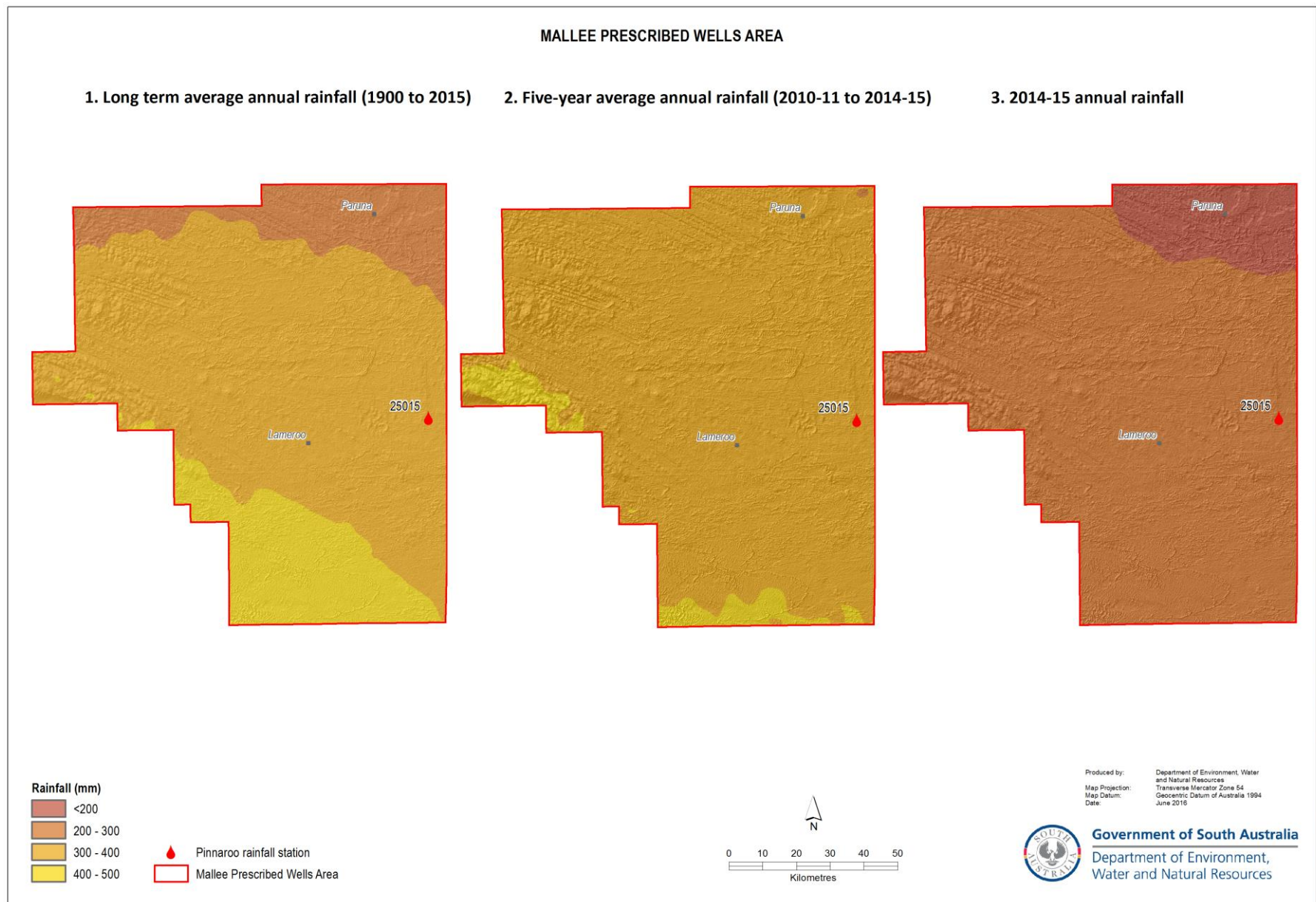


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2014–15 water-use year in Mallee Prescribed Wells Area²

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.

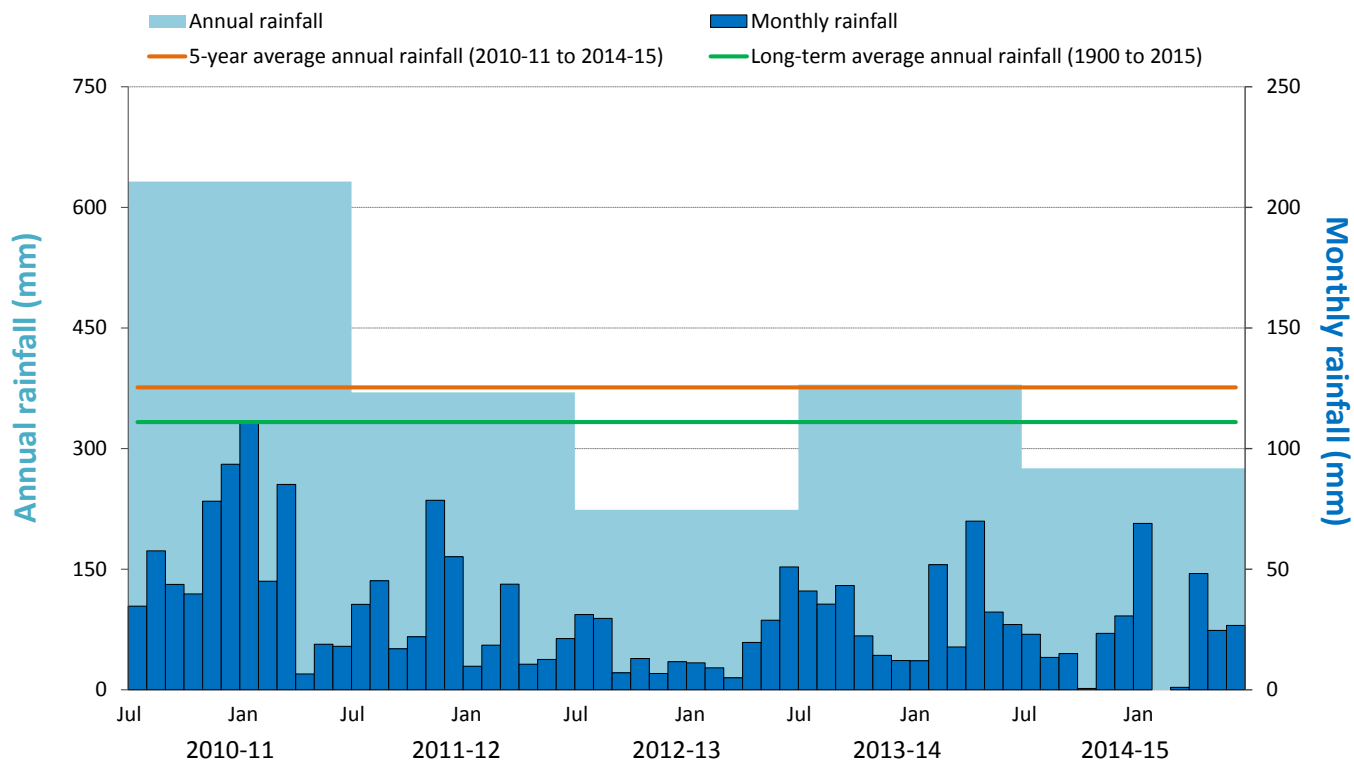


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Pinnaroo (BoM Station 25015)³

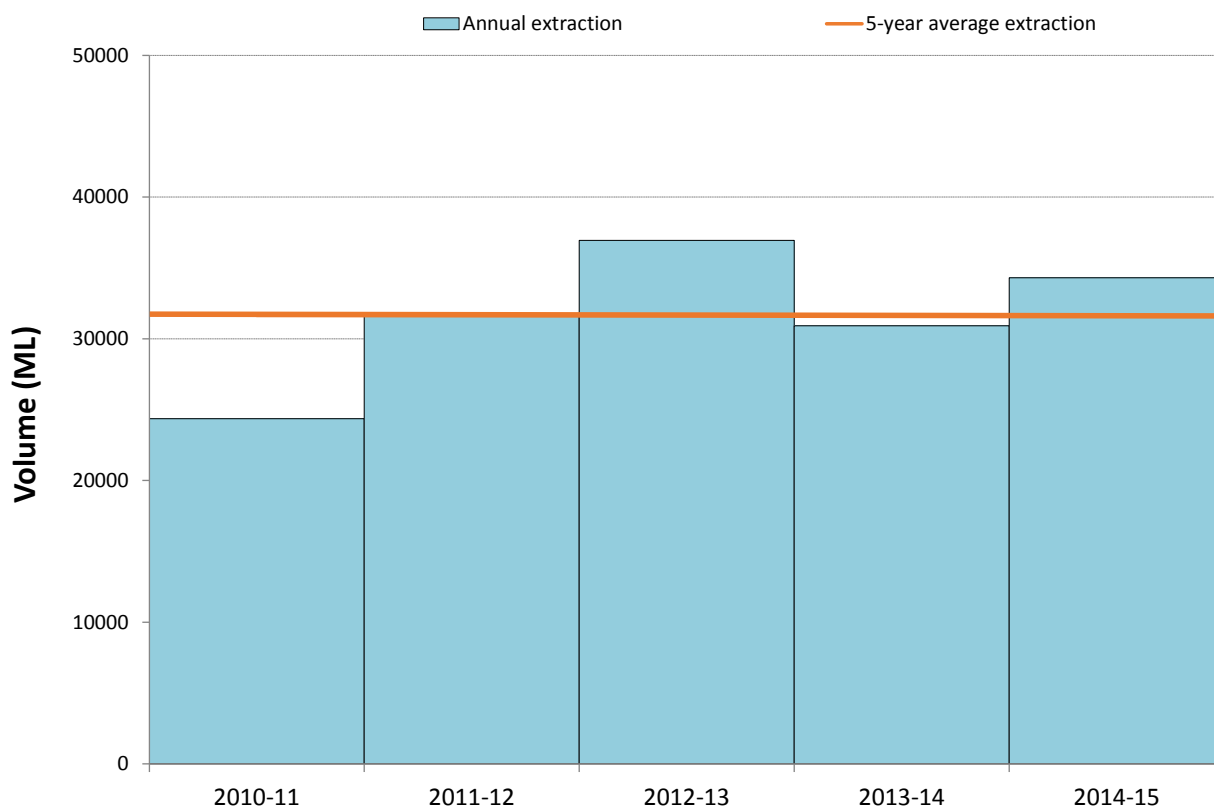


Figure 3. Licensed groundwater extraction volumes⁴ for the past five water-use years, for the Murray Group Limestone aquifer in the Mallee Prescribed Wells Area

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 licensed groundwater use volumes for the 2014–15 water-use year are based on the best data available as of February 2016 and may be subject to change, as some extraction volumes are in the process of being verified.

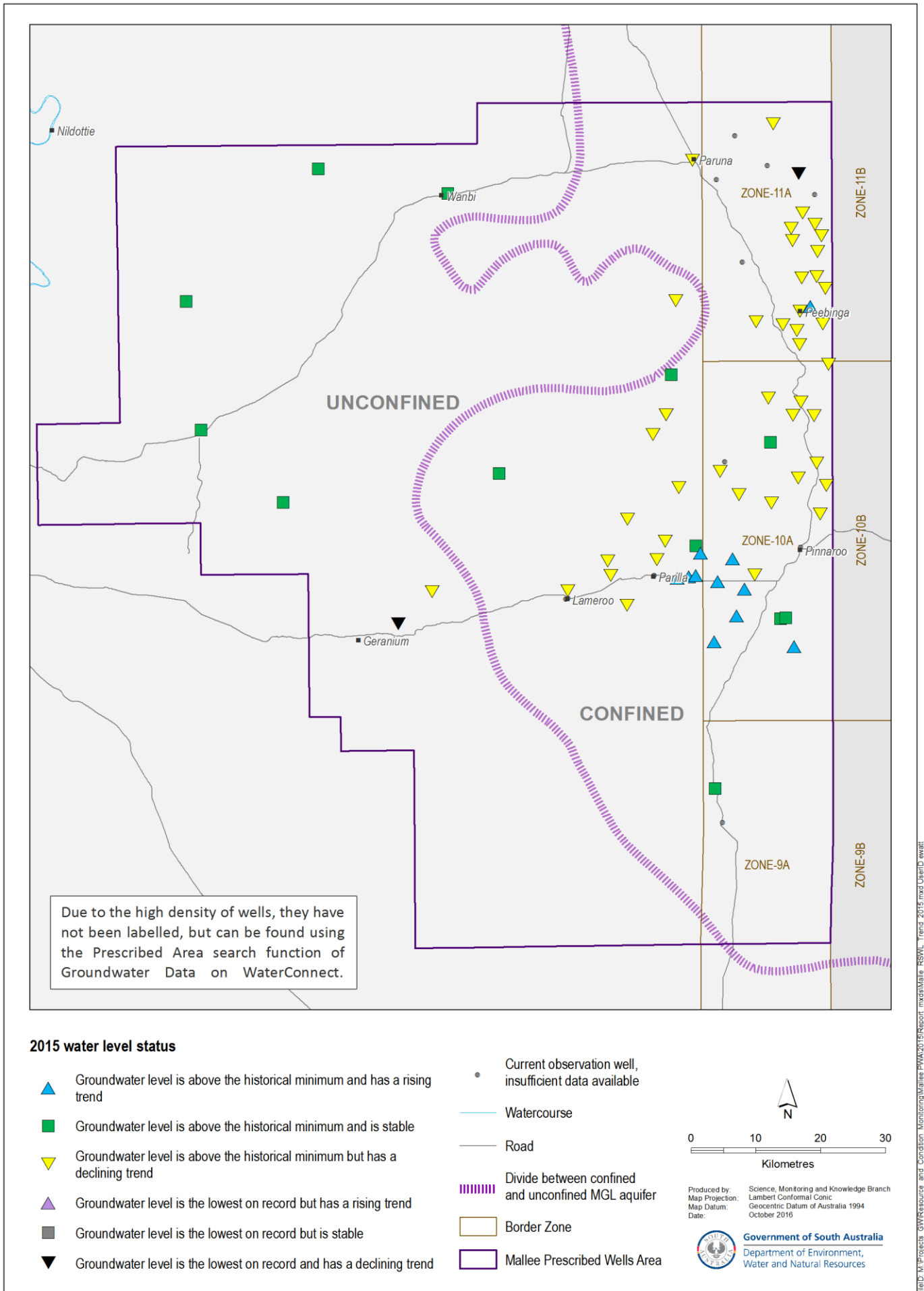


Figure 4. 2015 status of the groundwater levels in the Murray Group Limestone aquifer in the Mallee Prescribed Wells Area, based on the 5-year trend from 2011 to 2015

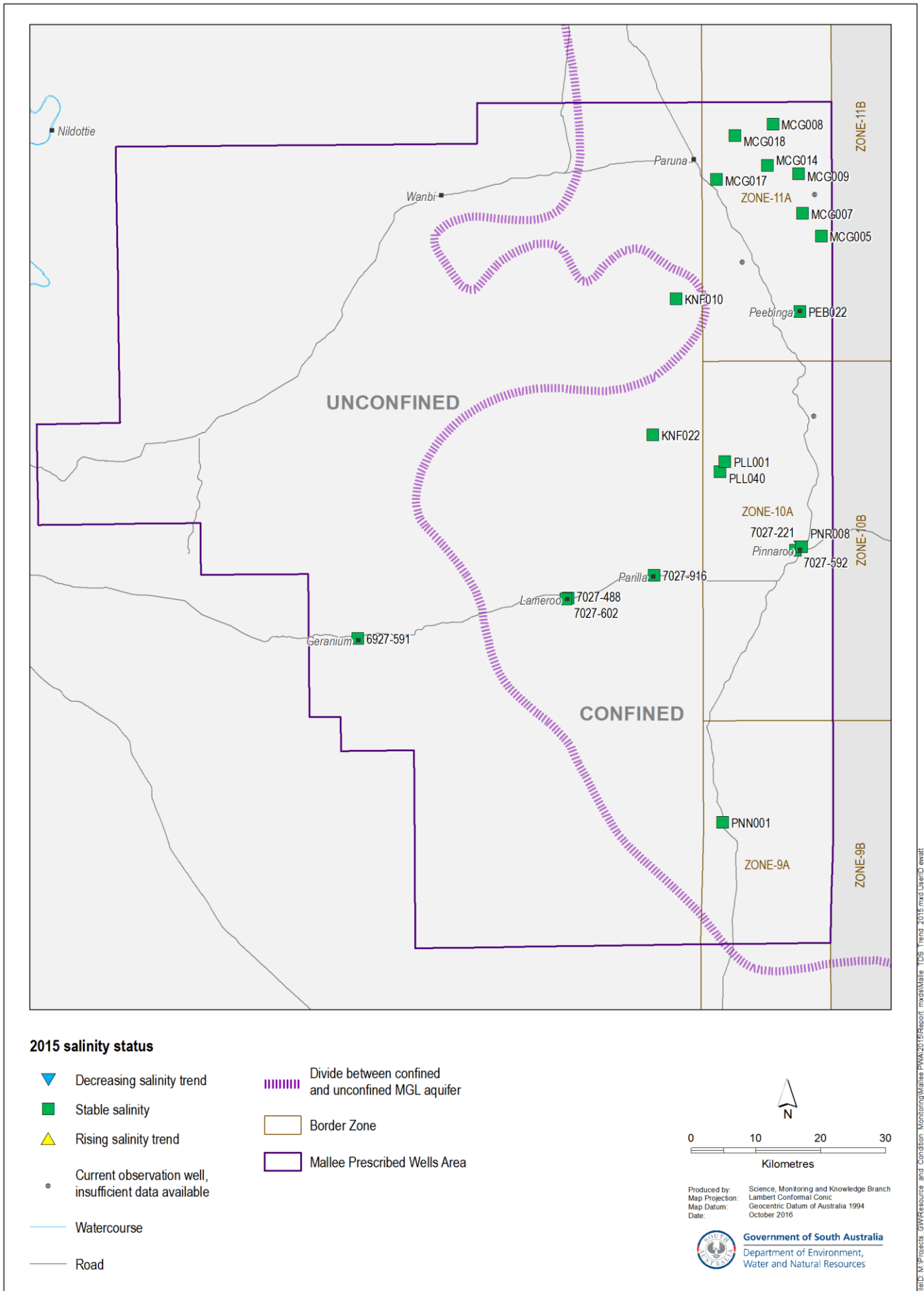


Figure 6. 2015 status of salinity in the Murray Group Limestone aquifer of the Mallee Prescribed Wells Area, based on the 5-year trend from 2011 to 2015

