

Mallee PWA

Murray Group Limestone aquifer

2014 Groundwater level and salinity status report



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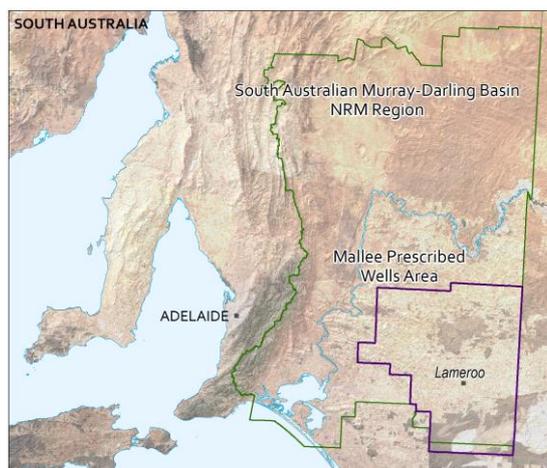
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2014 Summary



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 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 large depth to the watertable (40–60 m) means that there is little direct correlation between groundwater levels and variations in rainfall. However, there can be an indirect correlation, with lower rainfall resulting in increased groundwater pumping, which in turn may lead to a decline in groundwater levels. Data recorded at Pinnaroo rainfall station (number 25015) were chosen for analysis of rainfall trends in 2014. In Figure 1, the long-term monthly average rainfall is graphed in orange with the 2014 monthly rainfall graphed in blue. Rainfall during 2014 was characterised by well above-average rainfall in February and April and well below-average rainfall between July and October, usually the wettest period of the year. In 2014, the total annual rainfall was 317 mm, 6% below the long-term (1889–2014) annual average of 336 mm.

Metered extractions in 2013–14 totalled 30 914 ML¹, a 16% decrease in use compared to the previous water-use year (Fig. 2).

Long-term groundwater level monitoring has recorded drawdowns as a result of irrigation extraction from the MGL aquifer. Drawdowns are greater in areas of concentrated extraction, which primarily occurs in the Border Groundwater Agreement Zones 10A and 11A (Fig. 3). Between 2000 and 2006 an equilibrium was reached, indicated by stable water level trends. However, from 2007 to early 2009, an increase in seasonal drawdowns occurred in response to drought-induced increases in groundwater extraction. Although an overall rise in groundwater level was observed between 2009 and 2011, the area has recorded groundwater level declines since 2012.

A comparison of the maximum recovered groundwater levels of the MGL aquifer recorded in 2013 and 2014 indicates that 25 out of 69 wells available for comparison (36%) showed a decrease in groundwater level of between 0.1 and 1.4 m, with a median of 0.2 m (Fig. 3). The observation wells in the central-eastern area of the Border Groundwater Agreement Zone 11A show the biggest water level declines (Fig. 3). Groundwater level rises were observed in 11 of the observation wells (16%), ranging from 0.12 to 1.5 m, with a median of 0.3 m. Rises and falls in groundwater level in close proximity to each other reflect changes in irrigation location and intensity due to crop rotations. A localised area of recovery was observed in the southern-most area of Zone 11A, an area of long-term drawdowns, reflecting reduced groundwater extraction in the immediate vicinity during 2014. Negligible change in water level was observed in 33 of the observation wells (48%), where the change in maximum recovered water level between 2013 and 2014 was less than 0.1 m.

As groundwater is an important source of water in the Mallee PWA, increases in salinity represent a significant risk to the resource. Salinity monitoring in the confined portion of the MGL aquifer where the majority of irrigation occurs has shown no significant change over the past 20 to 30 years; however, some MGL wells have shown minor increases or decreases, and several wells display seasonally fluctuating salinity induced by groundwater extractions.

¹ The licensed groundwater use for the 2013–14 water-use year is based on the best data available as of February 2015 and may be subject to change, as some extraction volumes are in the process of being verified

Salinity concentrations for 2014 were available for 59 monitoring wells at the time of reporting; salinity ranged between 544 and 3950 mg/L, with 49% of monitored wells recording a salinity of less than 1500 mg/L (Fig. 4), the maximum recommended salinity concentration for most crop types. Out of 59 observation wells with sufficient data for comparison, a total of 44 (75%) recorded a change in salinity of less than 5% in 2014 when compared with 2013 salinity data, indicating stable salinity overall.

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

Water levels: As stated in the WAP, water levels should recover to within a certain level of the previous year's maximum recovered water level each year. If this recovery level is not reached for two consecutive years in more than 50% of all monitoring wells within each zone or area, then an investigation is triggered. The recovery levels vary for each zone and area: 65 cm for Border Management Zones 9A and 11A (Hundred McGorriery and Hundred Peebinga), 50 cm for Zone 10A and 25 cm for the Parilla Red Management Zone (outside Zone 10A). Table 1 indicates that, in 2013–14, recovery to within the trigger levels has occurred for greater than 50% of wells in all zones and as such the resource conditions limits have not been exceeded.

Salinity: As stated in the WAP, if an increase in groundwater salinity of 2% or more per year for five consecutive years across at least 50% of monitoring wells occurs within the MGL confined aquifer, then an investigation is triggered. No monitoring wells have had five consecutive years of salinity increases greater than 2%, which indicates that the resource conditions limits have not been exceeded.

The Murray Group Limestone aquifer in the Mallee Prescribed Wells Area has been assigned a green status for 2014:

2014 STATUS



“No adverse changes, indicating negligible risk to the resource.”

This means the groundwater status was observed to be stable, i.e. no significant change, or improving over the 12-month reporting period. If these conditions were to continue, there is a very low likelihood of negative impacts on beneficial uses of the resource (e.g. drinking water, irrigation or stock watering).

The 2014 status for the Murray Group Limestone aquifer is supported by:

- most wells showing stable or increasing maximum recovered groundwater level when compared with 2013 groundwater level data
- most wells showing stable salinity when compared with 2013 data.

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, location of rainfall stations 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 Mallee PWA, please visit [Groundwater Data](#) 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](#).

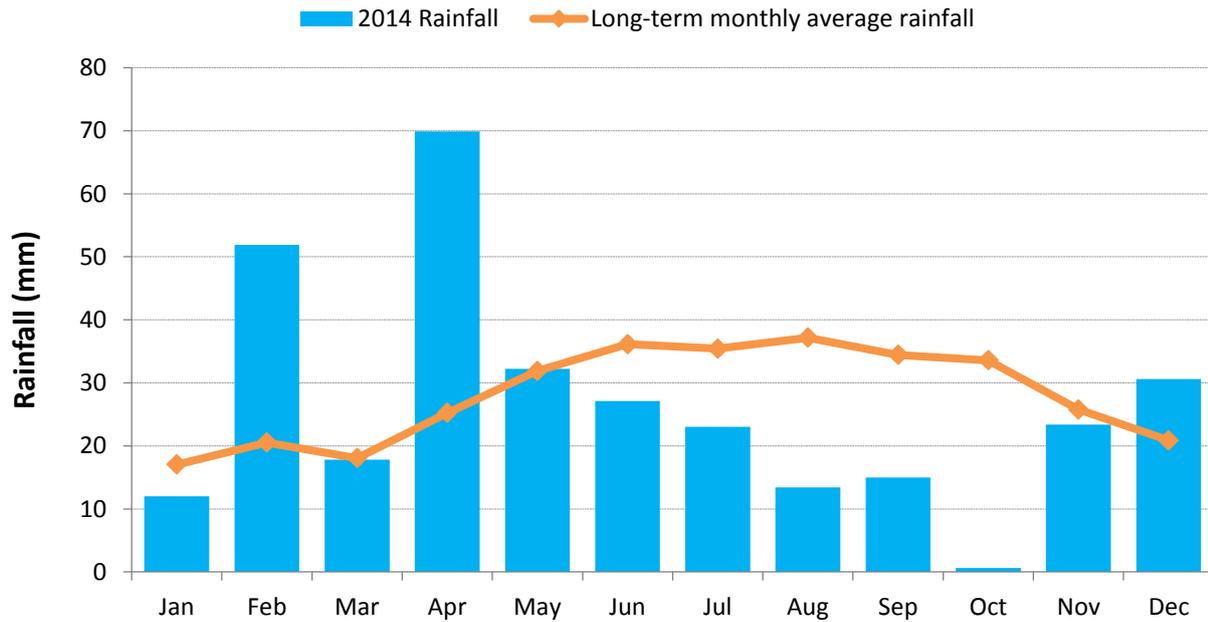


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Pinnaroo rainfall station² (number 25015) in the Mallee Prescribed Wells Area

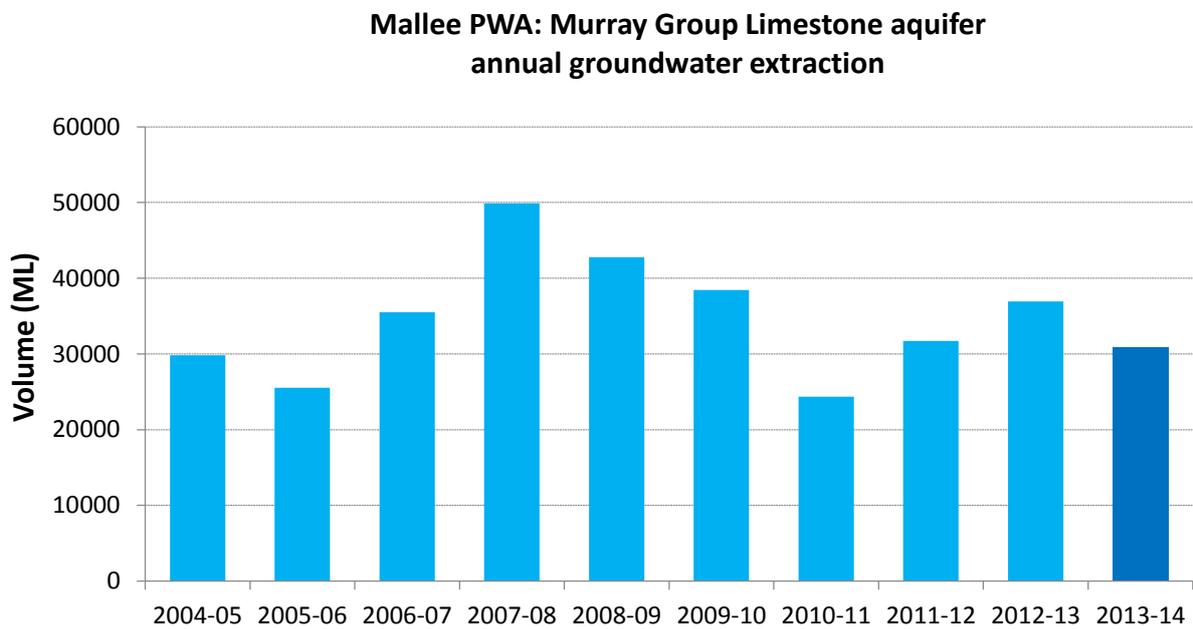


Figure 2. Historical licensed groundwater use from the Murray Group Limestone aquifer in the Mallee PWA

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.

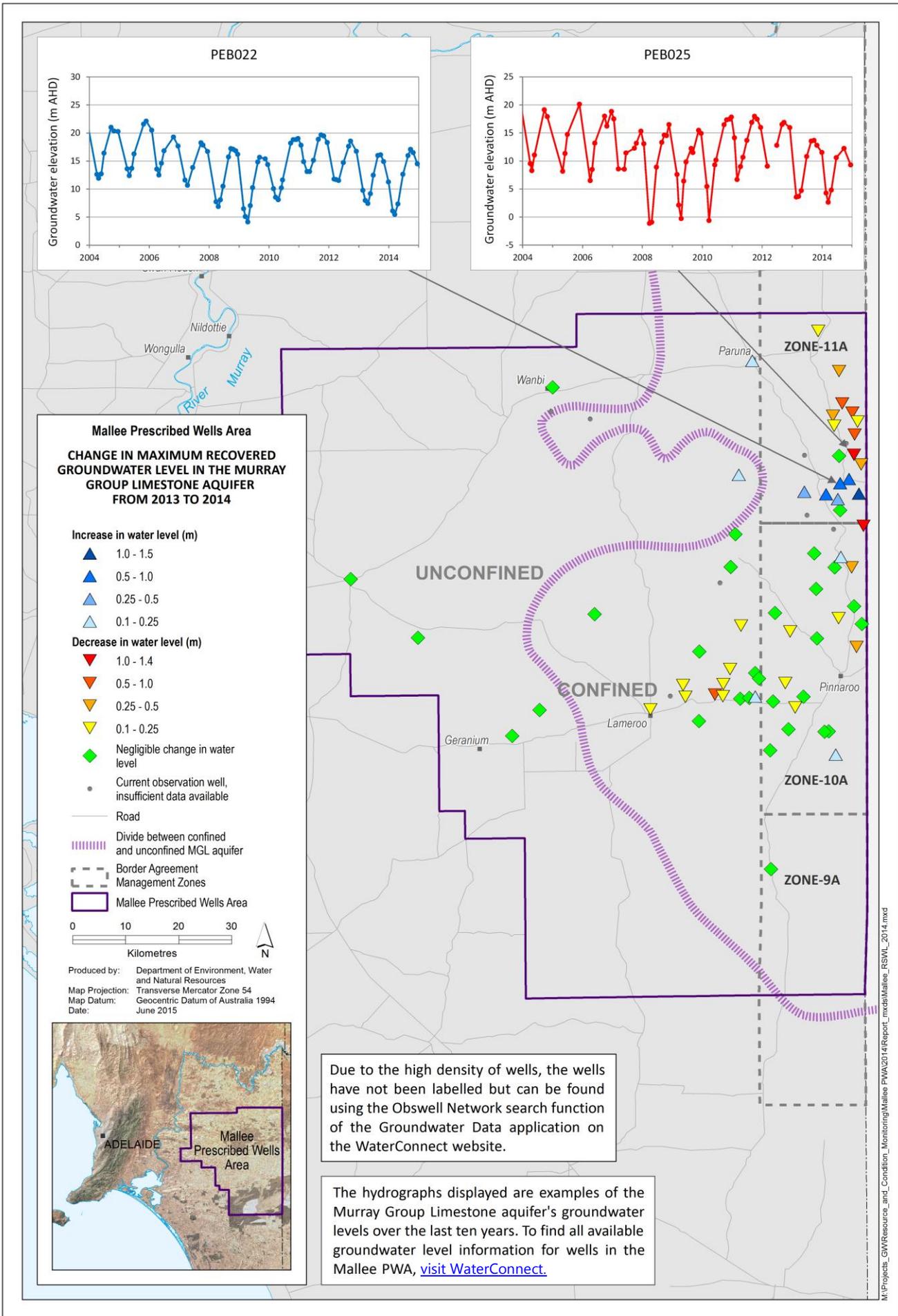


Figure 3. Overall changes in maximum recovered groundwater levels of the Murray Group Limestone aquifer in the Mallee Prescribed Wells Area from 2013 to 2014

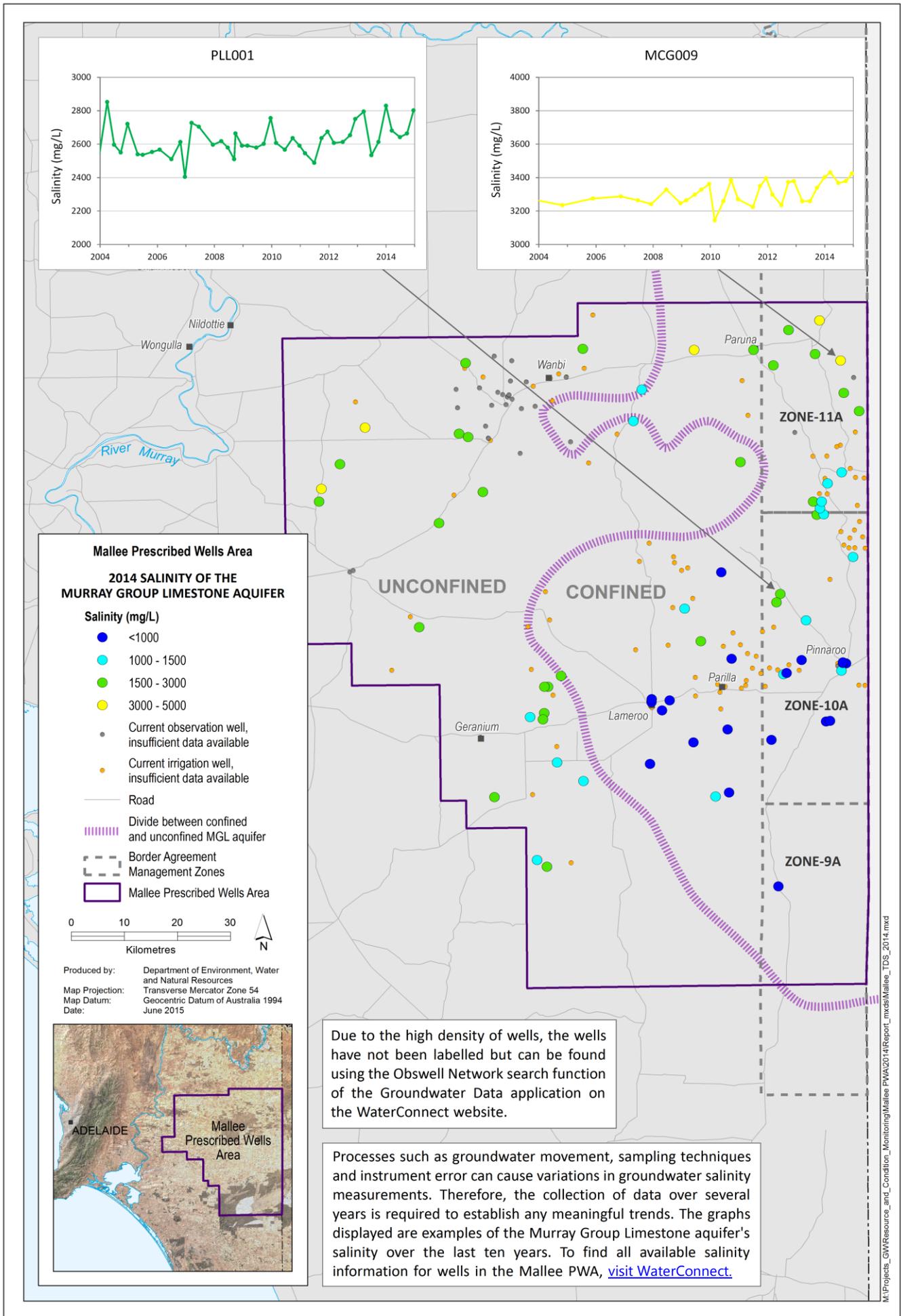


Figure 4. Groundwater salinity of the Murray Group Limestone aquifer in the Mallee Prescribed Wells Area for 2014

Table 1. Water level condition indicators for the Mallee Prescribed Wells Area for 2012–13 and 2013–14.

Management Zone or Area	No. ObsWells	2012–13		2013–14	
		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	23	9%	91%	4%	96%
11A-MCG	9	67%	33%	11%	89%
11A-PEB	13	85%	15%	0%	100%
Parilla Red M.A.	9	0%	100%	11%	89%