Angas Bremer PWA

Murray Group Limestone aquifer

2014 Groundwater level and salinity status report

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

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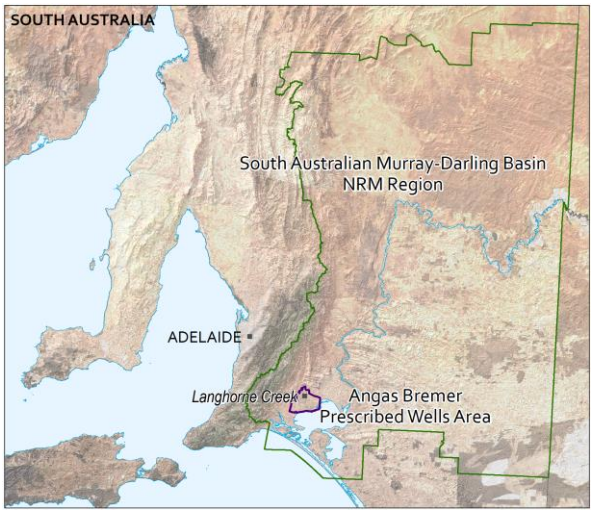
2014 Summary



The Angas Bremer Prescribed Wells Area (PWA) is located on the western side of Lake Alexandrina, approximately 60 km south-east of Adelaide and is underlain by sediments of the Murray Basin. It is within the boundary of the Eastern Mount Lofty Ranges Prescribed Water Resources Area (PWRA), and within the South Australian Murray-Darling Basin NRM Region. It is a regional-scale resource for which groundwater resources are prescribed under South Australia's *Natural Resources Management Act 2004*. Water management policy for the Angas Bremer PWA has been incorporated into the *Water Allocation Plan for the Eastern Mount Lofty Ranges* and provides for the sustainable management of the groundwater resources.

There are three aquifer formations underlying the Angas Bremer PWA, namely the Quaternary aquifer, confined Murray Group Limestone (MGL) aquifer and Renmark Group aquifer. All licensed groundwater extractions occur from the confined MGL aquifer, which is the focus of this report.

The confined MGL aquifer is up to 100 m thick and varies in composition from soft clayey limestone, hard sandy limestone to soft bryozoal limestone layers. The general groundwater flow direction is in a south-easterly direction towards Lake Alexandrina. Irrigation supplies are generally obtained from the fossiliferous limestone member, which can be cavernous in some areas. Well yields vary from about 5 L/s in the north to over 15 L/s to the south, with occasional yields of up to 40 L/s.

Despite being a confined aquifer that does not receive direct recharge from rainfall, 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 purposes and therefore smaller declines in groundwater levels and stable or improving salinity.

Data from the Langhorne Creek rainfall station (number 24515) were chosen for the analysis of rainfall trends in 2014. The total annual rainfall recorded was 314 mm in 2014, compared to 396 mm in 2013 and a long-term average (1889–2014) of 389 mm. While 2014 rainfall was lower than the annual average, unseasonable heavy rainfall was recorded in February (Fig. 1).

Metered extractions totalled 1665[1] ML in 2013–14, a 17% decrease from the previous water-use year (Fig. 2). This extracted water includes water that had been stored in the aquifer by irrigators over previous years through managed aquifer recharge (MAR). The decrease in groundwater extraction in 2013–14 may be reflective of reduced groundwater demand due to alternative, lower salinity water being utilised from Lake Alexandrina or piped from the River Murray. The total volume of managed aquifer recharge to the MGL aquifer in the 2013–14 water-use year was 1211[1] ML, which represents a 20% decrease from 2012–13 (Fig. 2).

The groundwater level trends observed in the MGL aquifer are highly influenced by groundwater extractions and managed aquifer recharge. Widespread rises or stabilisation of groundwater levels were observed in the MGL aquifer from 2010 to 2012 due to the reduced demand on groundwater resources following the recovery of Lake Alexandrina, coupled with the significant volumes of managed aquifer recharge to the aquifer.

A comparison of the maximum recovered groundwater levels of the MGL aquifer between 2013 and 2014 in the 34 monitoring wells where data are available shows that approximately 59% wells registered a minor decrease in levels, mostly in the southern half of the PWA. Decreases in groundwater level ranged up to 0.6 m, but were mostly between 0.25 to 0.5 m; groundwater level increases of up to 0.75 m were observed in 12% of wells, but were mostly less than 0.3 m (Fig. 3). Negligible change in the groundwater level was recorded in 29% of the observations wells, where the change in the maximum recovered groundwater level between 2013 and 2014 was less than 0.1 m. Overall, there was a median groundwater level decrease of 0.27 m and may be due to the reduction in managed aquifer recharge.

[1] The licensed groundwater use and managed aquifer recharge volumes for the 2013–14 water-use year are 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.

The low-salinity groundwater of the MGL aquifer is limited to relatively narrow zones near the Angas and Bremer Rivers, where salinity ranges from less than 1500 mg/L to 3000 mg/L. Towards the margins of the prescribed area to the east and west, salinities can be as high as 10,000 mg/L.

Increases in salinity in the MGL aquifer have been identified as the main threat to the long-term sustainability of irrigation in the Angas Bremer PWA. Downward leakage from the overlying brackish to saline Quaternary aquifer is the predominant cause of such salinity increases and is driven by the head difference between the two aquifers. The head difference and downward leakage are higher during periods of high extraction, both on a regional scale and locally where large drawdowns in an individual irrigation well may induce significant leakage. However, observation well salinity monitoring results over the last 10 years exhibit stable to declining levels, the declining levels are probably due to MAR activity.

Each year, irrigators in the Angas Bremer PWA are required to submit a salinity sample from their wells to the Department of Environment, Water and Natural Resources for analysis. The 2014 results from the irrigators' wells have been included in this report along with measurements from the department's salinity monitoring network (Fig. 4). These salinity concentrations were compared to the salinity readings from 2013, with 48 of the 81 current salinity monitoring wells having readings for both years. Overall, 85% of the wells displayed a decrease in salinity of up to 58%, most less than 15%; the remaining 15% of wells displayed a median increase in salinity of 18%. In 2014, approximately 72% of the 81 current salinity monitoring wells had a salinity greater than 1500 mg/L, which is typically considered to be the salinity tolerance level for most crop types.

The Water Allocation Plan (WAP) for the EMLR PWRA region has identified resource condition indictors which apply to the MGL aquifer within the Angas Bremer PWA. These limits are designed to give early warning of unfavourable trends in salinity that may affect other users of the resource. As stated in the WAP, the water resources to be monitored in the Angas Bremer PWA are the two zones (Zone A and Zone B) where the groundwater salinity is 2500 mg/L or less, as identified in the Angas Bremer PWA Groundwater Status Report 2007. If an increase in groundwater salinity of 1.5% or more per year for three consecutive years across at least 50% of monitoring wells occurs, then an investigation is triggered. As no wells within the monitored zones have had three consecutive years of salinity increases greater than 1.5%, the resource conditions limits have not been exceeded.

The Murray Group Limestone aquifer of the Angas Bremer PWA has been assigned a green status for 2014:

2014 Status  "No adverse trends, indicating negligible risk to the resource"

This means that the groundwater status was observed to be stable (i.e. no significant change) or improving over the 12-month reporting period. Continuation of these trends favours a very low likelihood of negative impacts on the 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 recording a decline in groundwater salinity in 2014 when compared to 2013 water level data, and the resource conditions limits were not exceeded.

As increases in salinity in the MGL aquifer have been identified as the main threat to the long-term sustainability of irrigation in the Angas Bremer PWA, the minor declines in the maximum recovered groundwater level did not affect the status for 2014.

The use of the MGL aquifer for the storage of water of adequate water quality, which can later be extracted during irrigation season, enables the continued beneficial use of this aquifer.

To view descriptions for all status symbols, please visit WaterConnect.

To view the *Angas Bremer 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 observation wells within the Mallee Prescribed Wells Area, please visit Groundwater Data on WaterConnect.

For further details about the Angas Bremer PWA, please see the *Water Allocation Plan for the Eastern Mount Lofty Ranges* on the South Australian Murray-Darling Basin Natural Resources Management website.

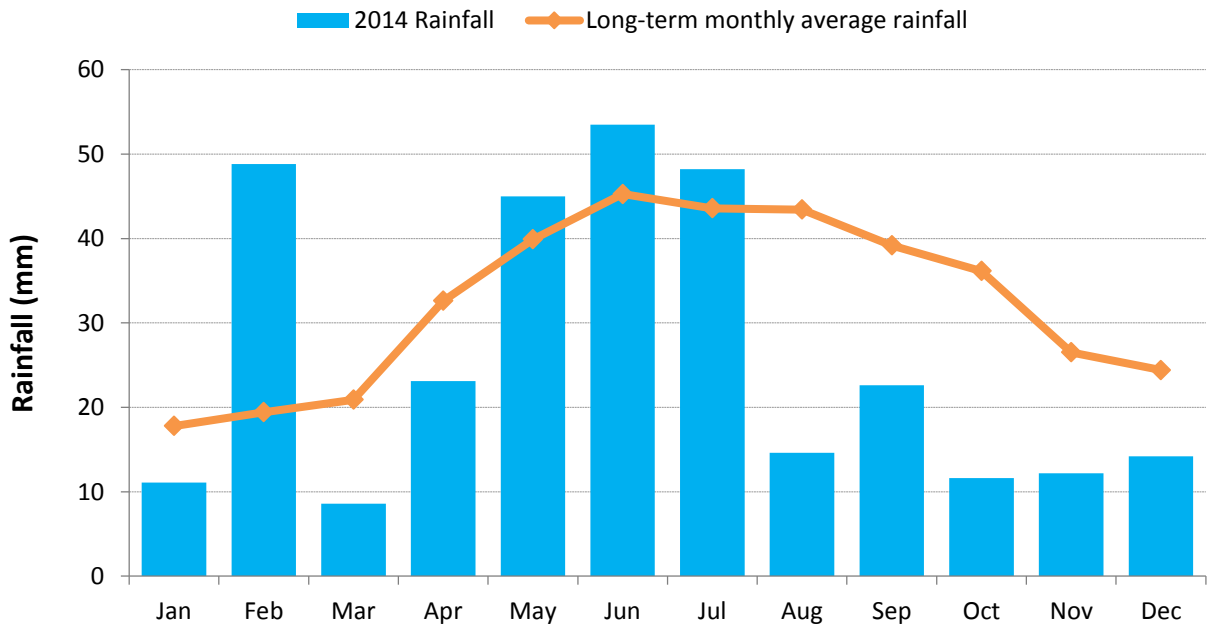


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Langhorne Creek rainfall station[2] (number 24515) in the Angas Bremer Prescribed Wells Area

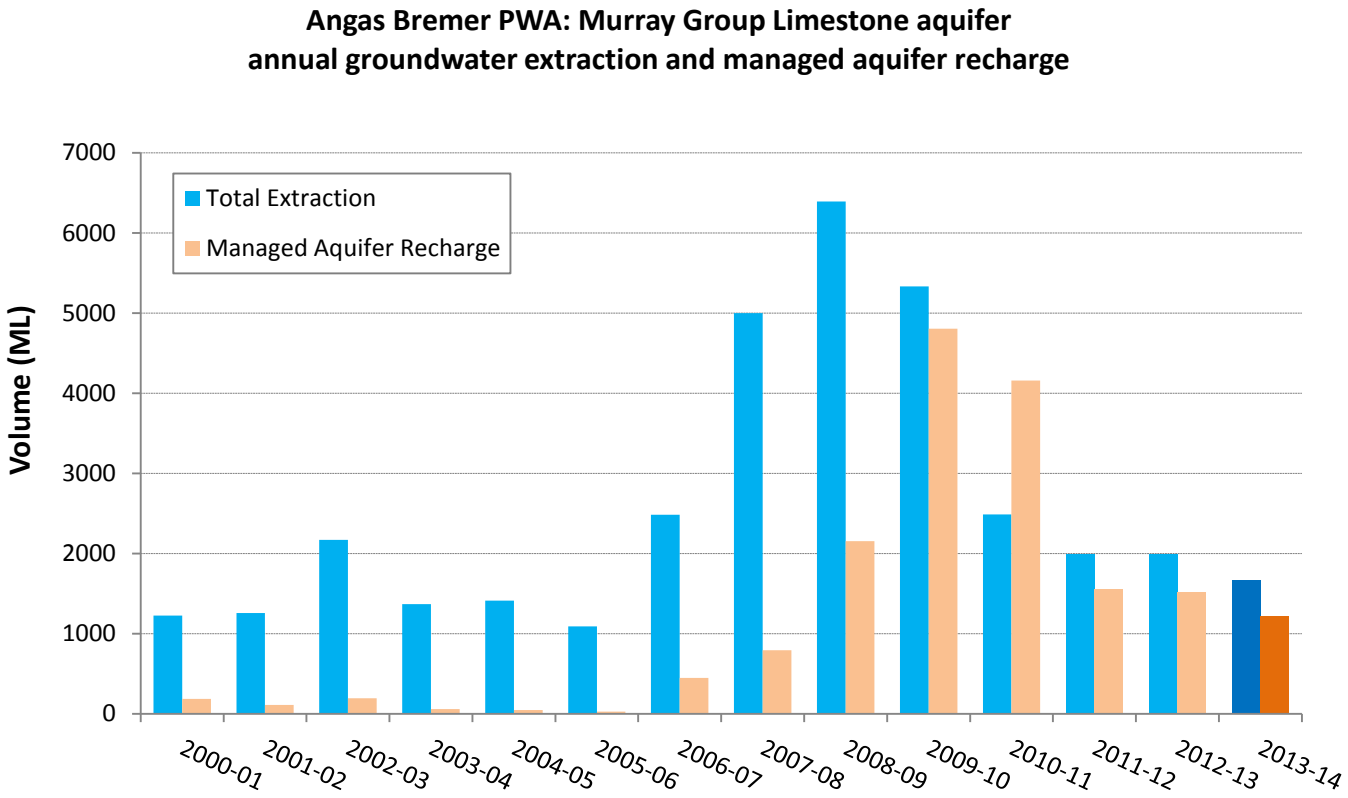


Figure 2. Historical licensed groundwater use and managed aquifer recharge for the confined Murray Group Limestone aquifer in the Angas Bremer Prescribed Wells Area

[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.

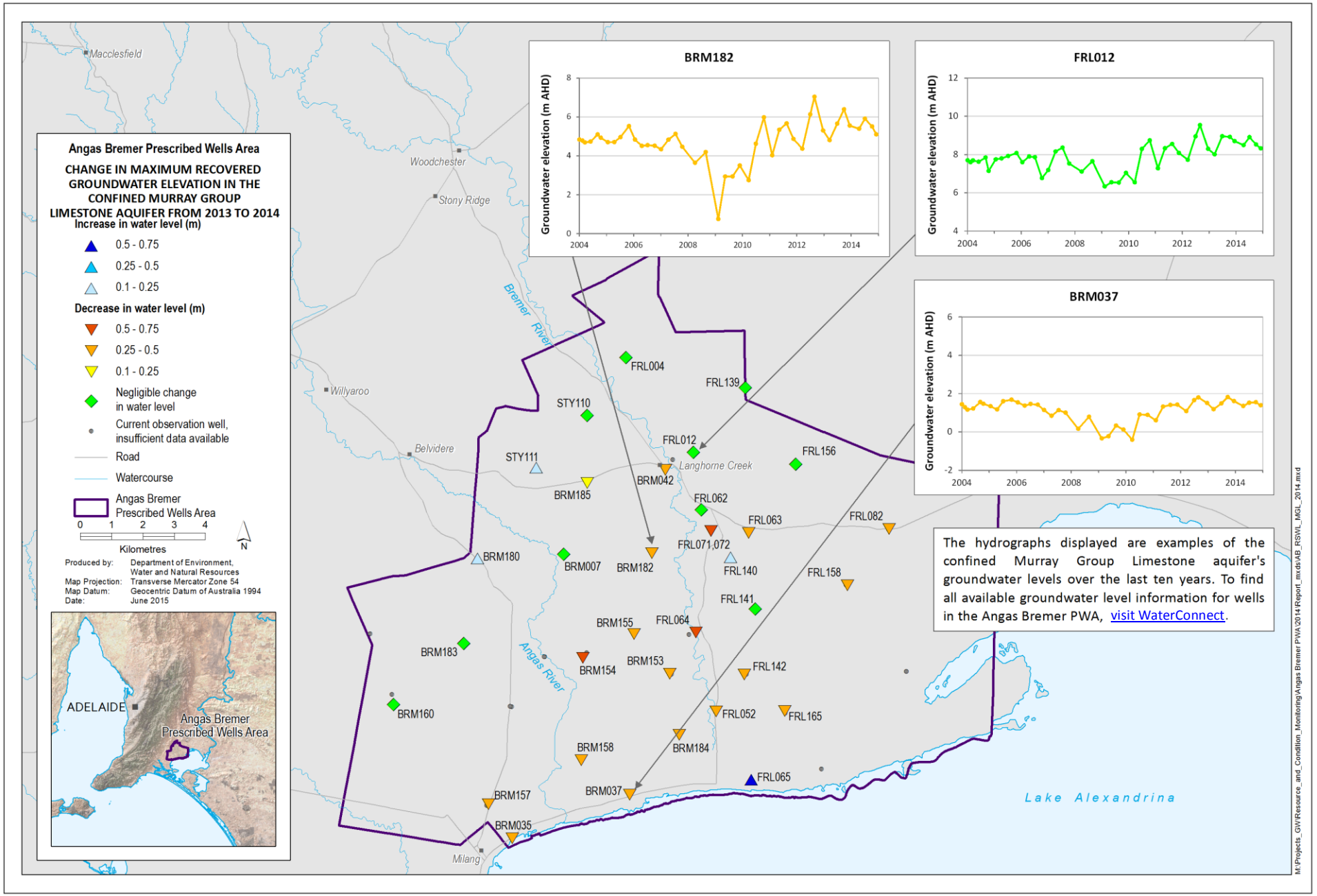


Figure 3. Overall changes in maximum groundwater levels in the confined Murray Group Limestone aquifer in the Angas Bremer Prescribed Wells Area from 2013 to 2014

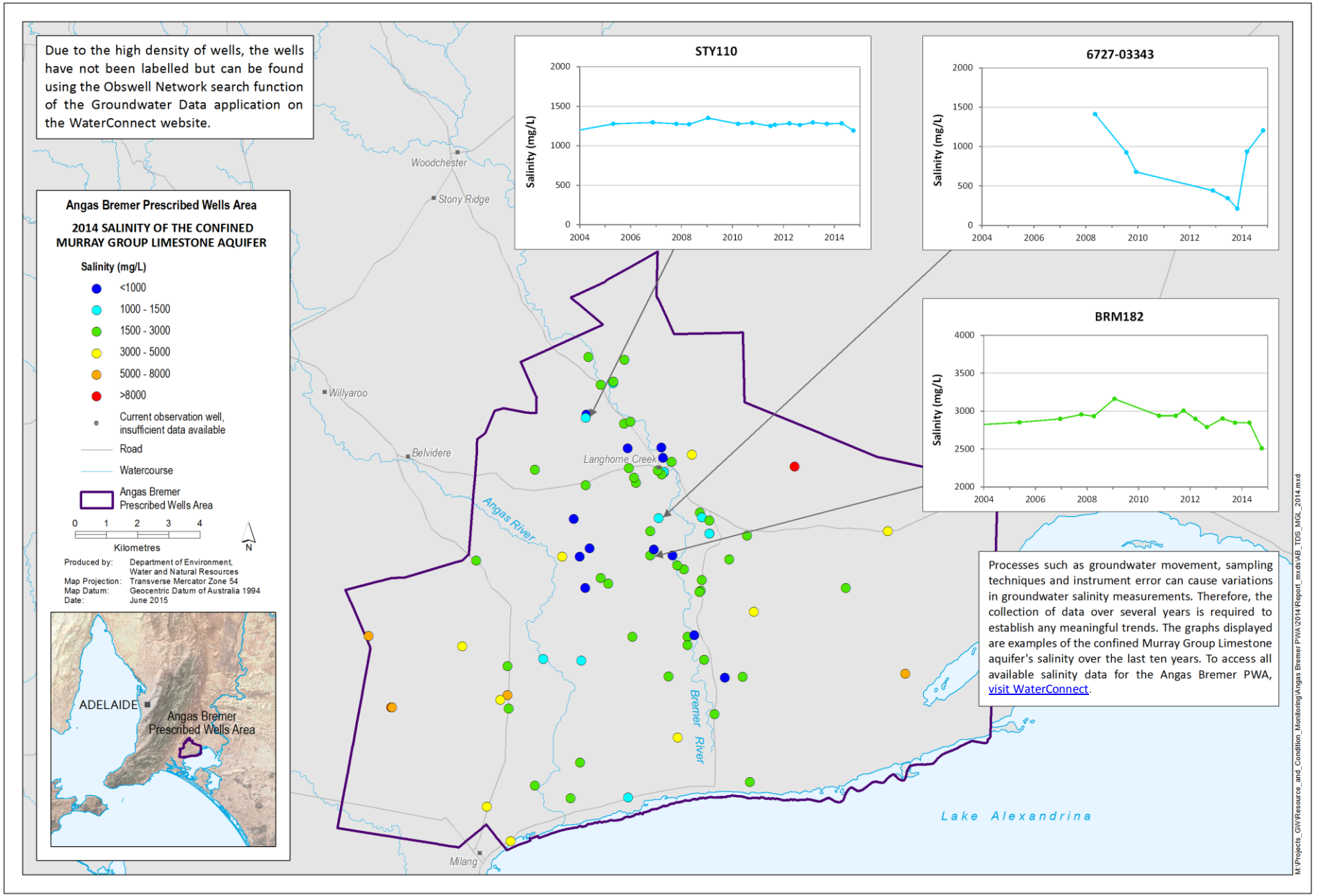


Figure 4. Groundwater salinity of the confined Murray Group Limestone aquifer in the Angas Bremer Prescribed Wells Area for 2014