# CENTRAL ADELAIDE PWA

## T1 AQUIFER

Groundwater Level and Salinity Status Report

2013

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

Department of Environment, Water and Natural Resources
25 Grenfell Street, Adelaide
GPO Box 1047, Adelaide SA 5001

Telephone National (08) 8463 6946
International +61 8 8463 6946
Fax National (08) 8463 6999
International +61 8 8463 6999
Website www.environment.sa.gov.au



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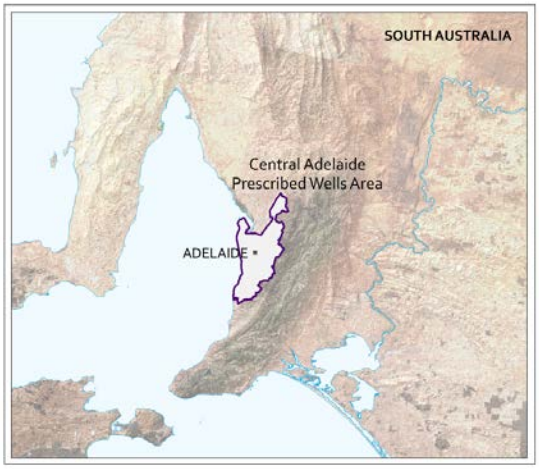
# 2013 SUMMARY




The Central Adelaide Prescribed Wells Area (PWA) encompasses the Adelaide metropolitan region; it extends from Outer Harbour in the north to Noarlunga in the south. The wells and the groundwater extracted within the PWA are prescribed under South Australia's *Natural Resources Management Act 2004* and a Water Allocation Plan is in the process of being produced to provide for the sustainable management of the groundwater resources.

The Central Adelaide PWA comprises several sedimentary and fractured rock aquifers. The aquifer most utilised in the PWA is the first confined tertiary sedimentary aquifer (T1 aquifer) and is the focus of this report.

The T1 aquifer comprises primarily of Hallett Cove Sandstone, Dry Creek Sand and limestone of the upper Port Willunga Formation. The direction of groundwater flow is from the Adelaide Hills to the St Vincent Gulf. The main source of recharge is from lateral throughflow from the fractured rock aquifers of the Mount Lofty Ranges area. The T1 aquifer can be divided into two main areas; the Adelaide Plains Sub-basin and the Golden Grove Embayment. These areas are separated by the Para Fault and show significant differences in thickness and extent in these two provinces. The T1 aquifer in the Golden Grove Embayment occurs as a semi-confined or unconfined aquifer and is relatively thin compared to in the Adelaide Plains Sub-basin (west of the Para Fault), where this aquifer is more uniform and continuous in terms of thickness and spatial distribution. Therefore, it is unsurprising that most groundwater extraction from this T1 aquifer is occurring from the Adelaide Plains Sub-basin.

The Adelaide area has a typical Mediterranean-type climate; hot, dry summers and cool, wet winters. Most rainfall occurs in the eastern region of the PWA, with lower rainfall recorded near the coast. The amount and timing of rainfall is a factor for consideration when assessing the status of a groundwater resource. For example, if the Central Adelaide PWA experienced above average rainfall during typically dry summer months, this could result in less groundwater being extracted from the T1 aquifer for irrigation purposes and the groundwater levels may not fall as much as would otherwise be expected. The annual rainfall in 2013 was 453 mm at the Seaton rainfall station (number 23024), 934 mm at the Cherry Gardens rainfall station (number 23709) and 459 mm near the city of Adelaide, recorded at the North Adelaide rainfall station (number 23011). Apart from the Cherry Gardens rainfall station, comparatively lower annual rainfall was recorded in 2013 compared to 2012. Records from the North Adelaide rainfall station indicate that there was higher than average rainfall in March and June, and lower than average rainfall at the start and end of the year, during the summer periods.

Data from the North Adelaide rainfall station was chosen for the analysis of rainfall in 2013 (Fig. 1). The long-term average monthly rainfall is graphed in orange and identifies periods where rainfall trends are above or below average on a monthly basis. Below average rainfall was experienced in 2013 for most of the year with the exception of the winter months when average to above average rainfall was recorded. Along with the comparatively lower annual rainfall, this could influence the change in maximum recovered groundwater levels observed for the T1 aquifer.

Although the Central Adelaide PWA is prescribed, licences have not yet been issued and there is currently no comprehensive metering of extractions. The most recent estimate of use in the Adelaide Metropolitan Area, which is located in the Adelaide Plains Sub-basin, is about 10 000–12 000 ML/y. Groundwater extraction from the T1 aquifer appears to be concentrated near Osborne, Thebarton and in the West Lakes-Grange where there is seasonal irrigation. Long-standing depressions in the pressure level surface have formed in these areas (Fig. 2), but long-term groundwater water level trends appear to have stabilised which suggests a new equilibrium has been established.

In 2013, there were 38 observation wells with sufficient data to allow a comparison of changes in maximum recovered water levels from the levels recorded in 2012. A decline was recorded in 79% of these observation wells in maximum recovered groundwater levels of up to 4.4 m, however in 18% of wells groundwater levels recovered by up to 0.46 m and one well recorded no change. The median change in the annual maximum recovered water level was a decline of 0.33 m. This could be attributable to increased extraction over the 2012/2013 summer for the purpose of irrigation, noting that lower than average rainfall was noted during this period. The observation wells that recorded a more pronounced decline in water levels are located in the Grange – West Lakes area where extensive summer irrigation pumping occurs (Fig. 3).

The latest salinity concentrations recorded in 2013 are shown in Fig. 4. It is difficult to assess long term salinity trends within the Central Adelaide PWA, as there are large data gaps in the salinity monitoring record which may prevent the full range of natural variations from being observed. Of the 25 salinity observation wells that samples were collected from during 2013, 76% returned salinity values less than 1500 mg/L (the salinity threshold for most irrigated crops). There is sufficient data available for 20 salinity observation wells to compare the salinity recorded in 2013 to the latest preceding salinity record (in either 2011 or 2012). Fourteen wells experienced an increase in salinity concentration ranging from 6 to 119 mg/L, while six displayed a decrease ranging from 17 mg/L to 33 mg/L. Based on the salinity monitoring data available, the majority of salinity monitoring wells indicate an increasing salinity trend over the last five to seven years, with an average salinity increase of 13 mg/L/y, however this represents a wide range of increasing trends in individual wells, from 4 to 30 mg/L/y.

The T1 aquifer underlying the Central Adelaide PWA has been assigned a yellow status for 2013:

2013 STATUS 

"Gradual adverse trends, indicating low risk to the resource in the medium term"

This means that gradual adverse trends in groundwater levels and salinity concentrations have been observed over the reporting period. Continuation of these trends is unlikely to negatively impact the beneficial use (i.e. drinking water, irrigation or stocking water) of the resource for at least 15 years. The 2013 status for the T1 aquifer underlying the Central Adelaide PWA is supported by the following:

- an overall decline in the maximum recovered water level when compared to 2011 data
- an overall increase in groundwater salinity in 2013.

To view the *Central Adelaide PWA Groundwater Level and Salinity Status Report 2012*, which includes background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, and to view the descriptions of all status symbols, please visit the *Water Resources* page on WaterConnect.

For further details about the Central Adelaide PWA, please see the Adelaide and Mount Lofty Ranges Natural Resources Management website.

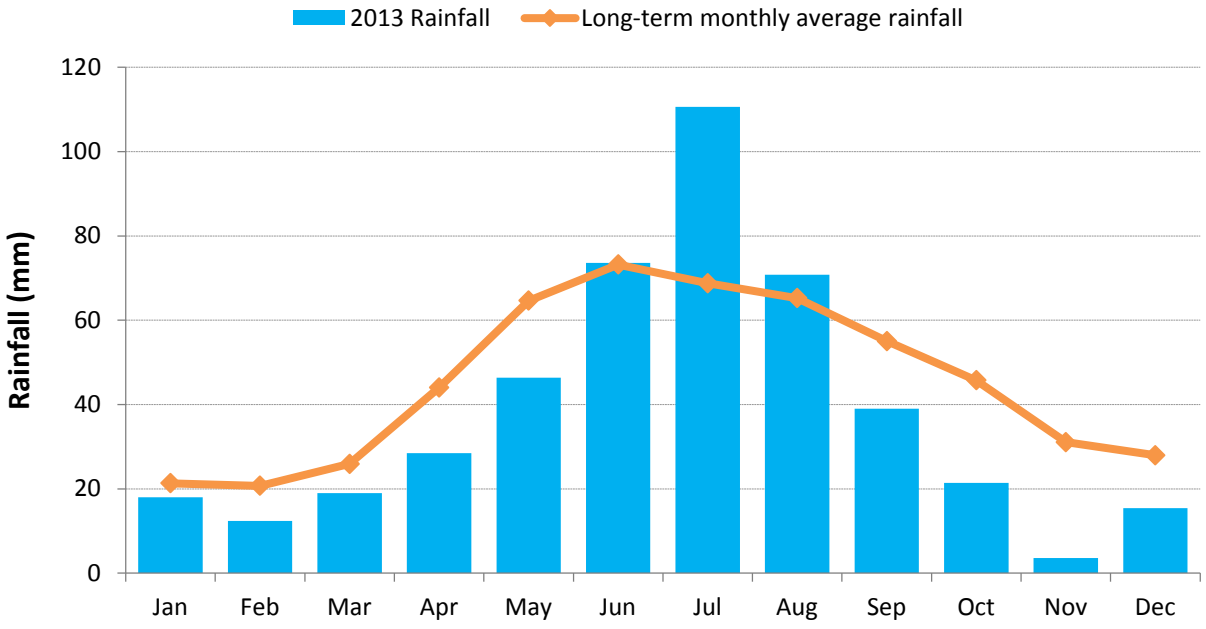



Figure 1. Monthly rainfall (mm) for 2013 and the long-term average monthly rainfall (mm) at the North Adelaide rainfall station (number 23011) # in the Central Adelaide PWA

*# 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](www.longpaddock.qld.gov.au/silo)*

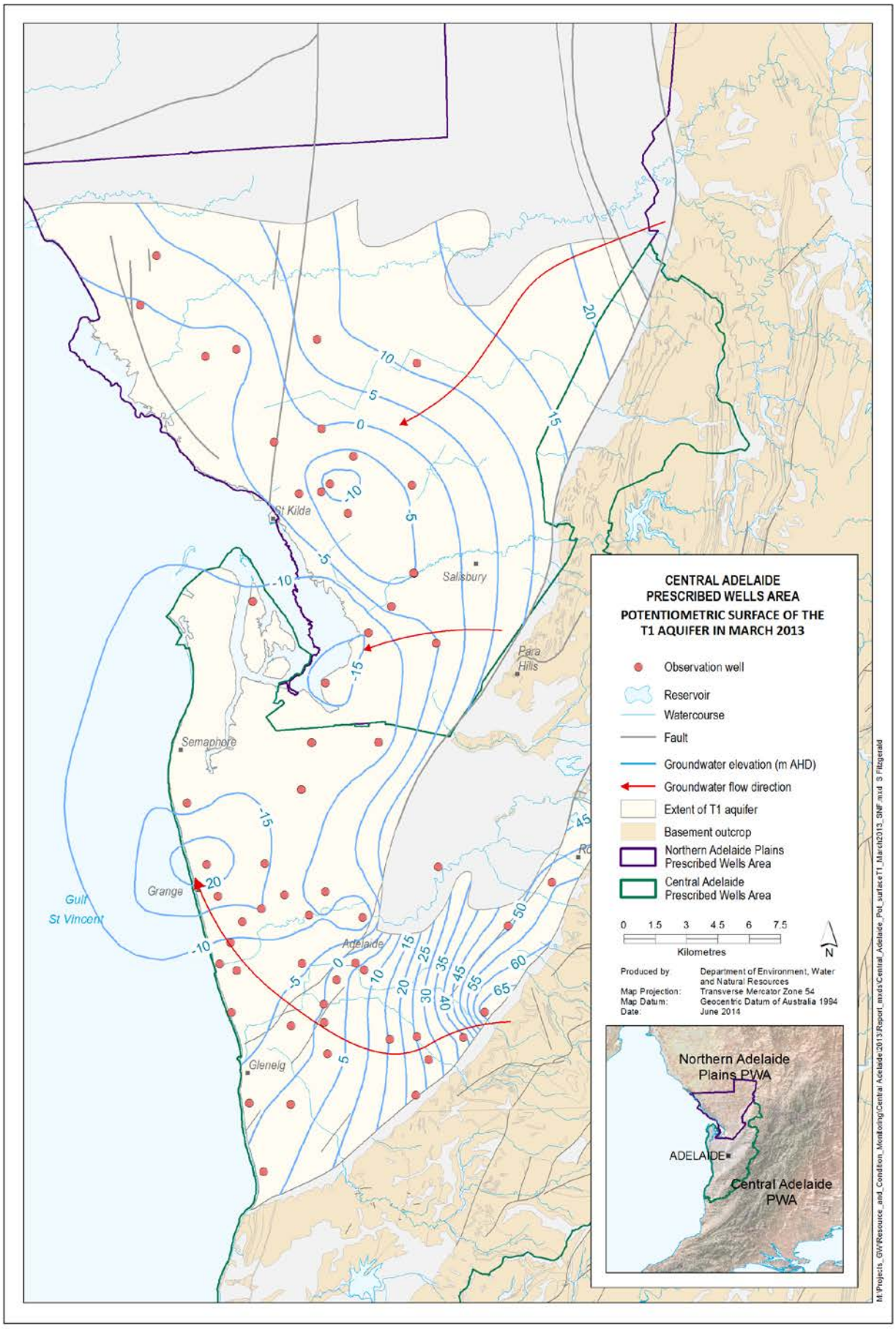



Figure 2. Potentiometric surface and direction of groundwater flow in the T1 aquifer of the Central Adelaide Prescribed Wells Area in March 2013

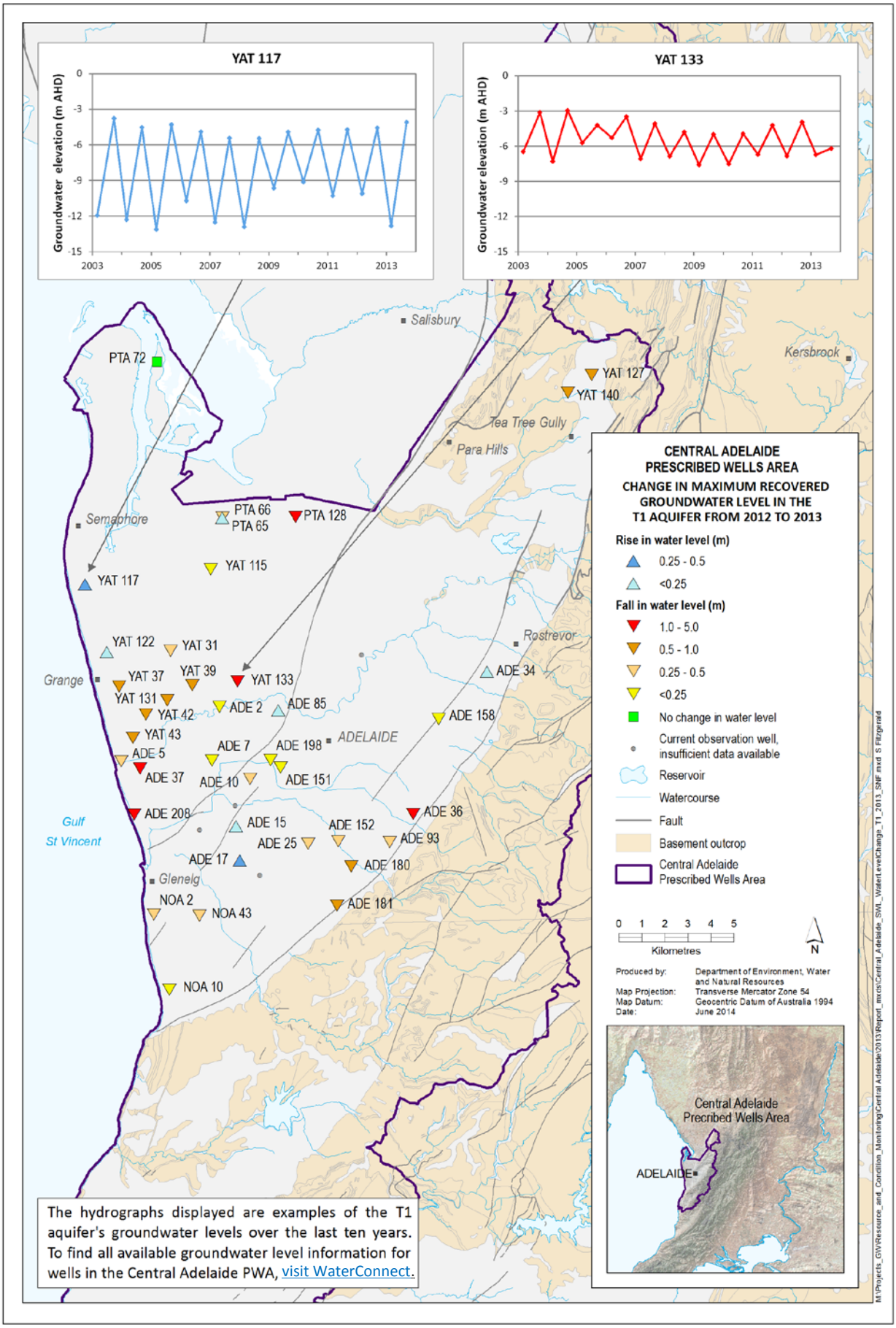



Figure 3. Overall changes in maximum groundwater levels in T1 aquifer of the Central Adelaide PWA from 2012 to 2013

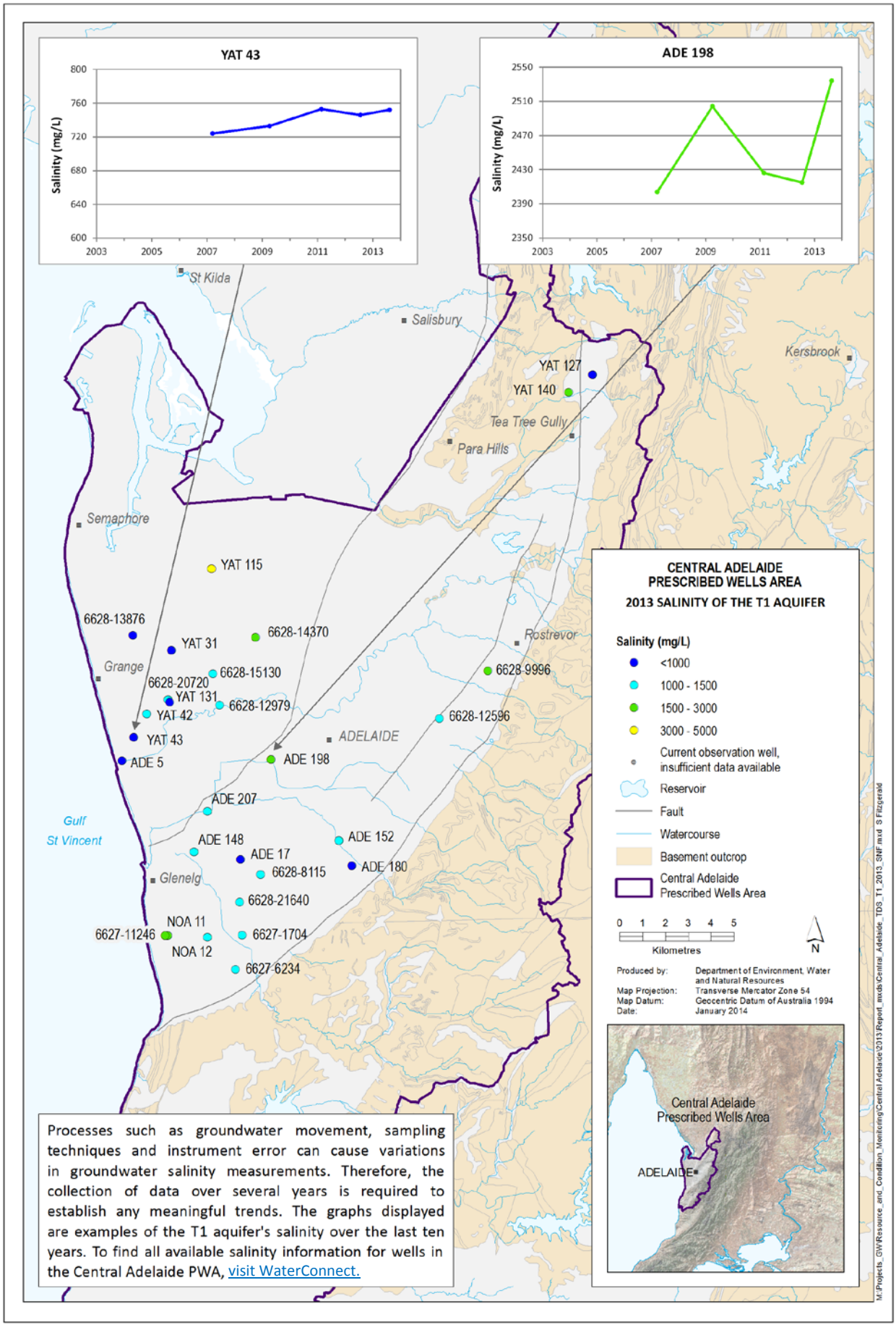



Figure 4. Latest groundwater salinity recorded for the T1 aquifer of the Central Adelaide PWA in 2013