CENTRAL ADELAIDE PWA

T1 AQUIFER

Groundwater Level and Salinity Status Report

2012

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

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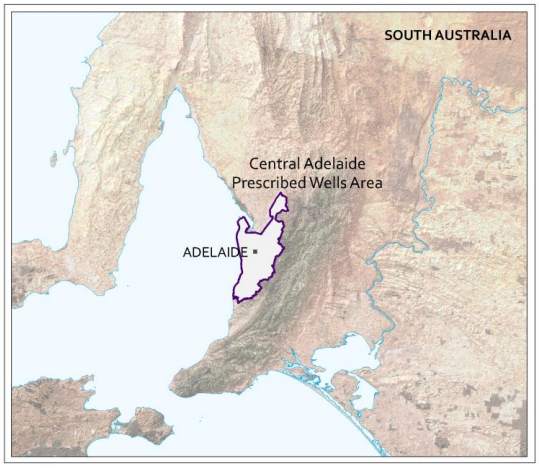
2012 SUMMARY



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 different hydrogeological regimes, including 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 interbedded limestone, sandstone and fossiliferous sands. 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 (Fig. 2) 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 2012 was 466 mm at the Seaton rainfall station (number 23024), 924 mm at the Cherry Gardens rainfall station (number 23709) and 486 mm near the city of Adelaide, recorded at the North Adelaide rainfall station (number 23011). Apart from the Seaton rainfall station, comparatively higher annual rainfall was recorded in 2012 compared to 2011.

Data from the North Adelaide rainfall station was chosen for the analysis of rainfall in 2012 (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. During March, May, June and August average to above average rainfall was experienced in 2012. Along with the comparatively higher 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 the West Lakes–Grange area. 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.

A comparison of the maximum recovered groundwater levels of the T1 aquifer recorded in 2011 and 2012 indicates that nearly all the observation wells (30 out of 36) recorded a rise in water level ranging from 0.15–2.2 m. Only six observation wells experienced a decline in groundwater level, ranging from <0.01–0.58 m. Overall, the rise in water levels occurred in the region of the PWA that typically experiences the most drawdown (Fig. 3).

The latest salinity concentrations recorded in 2012 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. Based on the salinity monitoring data available, almost all of the salinity monitoring wells indicate an increasing salinity trend over the last five to nine years, with an average salinity increase of 14 mg/L/y, however this represents a wide range of increasing trends, from 1 to 34 mg/L/y.

When comparing the 2012 salinity data available for 12 of the current salinity observation wells to the latest preceding salinity record for the same wells (in either 2009 or 2011), five experienced an increase in salinity concentration, five displayed a decrease and two indicated that the salinity records did not change a great deal from one year to the next (i.e. an increase or decrease less than or equal to 5 mg/L).

The T1 aquifer underlying the Central Adelaide PWA has been assigned a green status for 2012:

2012 STATUS 

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

This means that groundwater levels and salinity concentrations are observed to be stable (i.e. no significant change) or improving over the reporting period. Continuation of these trends favours a very low likelihood of negative impacts on beneficial use (i.e. drinking water, irrigation or stocking water) of the resource. The 2012 status for the T1 aquifer underlying the Central Adelaide PWA is supported by the following:

- 83% of monitoring wells indicate a rise in the maximum recovered water level when compared to 2011 data
- 41% of monitoring wells indicated a decrease in groundwater salinity in 2012 and 16% recorded no significant change when compared to that previously recorded

To view the *Central Adelaide PWA Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, location of rainfall stations and relevant groundwater dependent ecosystems, visit WaterConnect.

To view descriptions of all status symbols, click here.

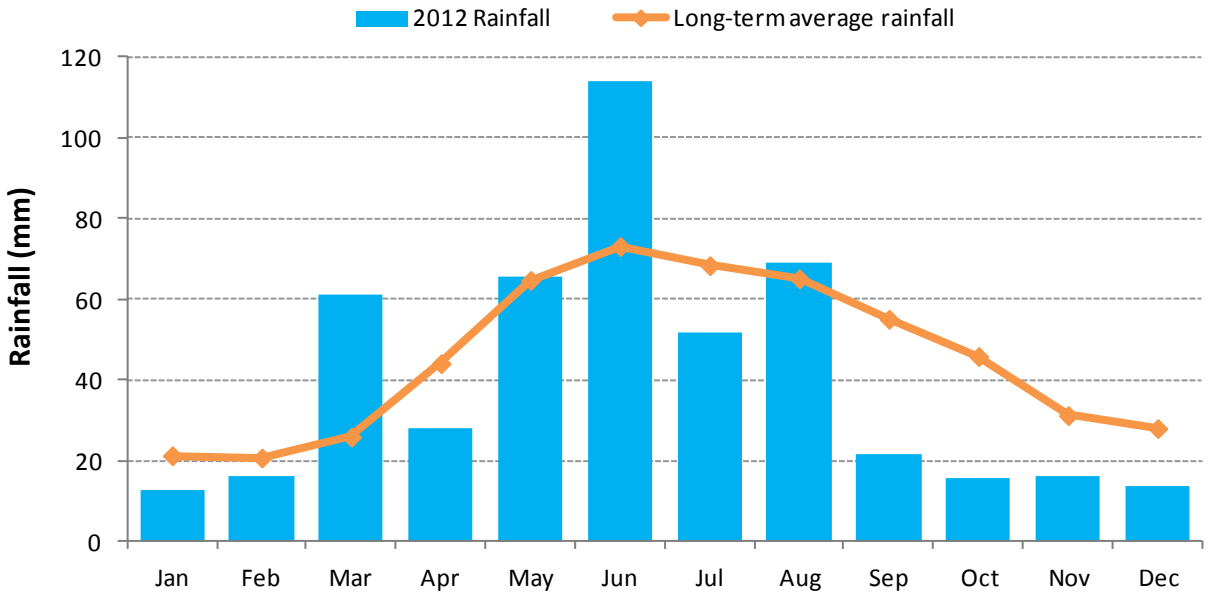


Figure 1. Monthly rainfall (mm) for 2012 and the long-term average monthly rainfall (mm) at the North Adelaide rainfall station (number 23011) in the Central Adelaide PWA

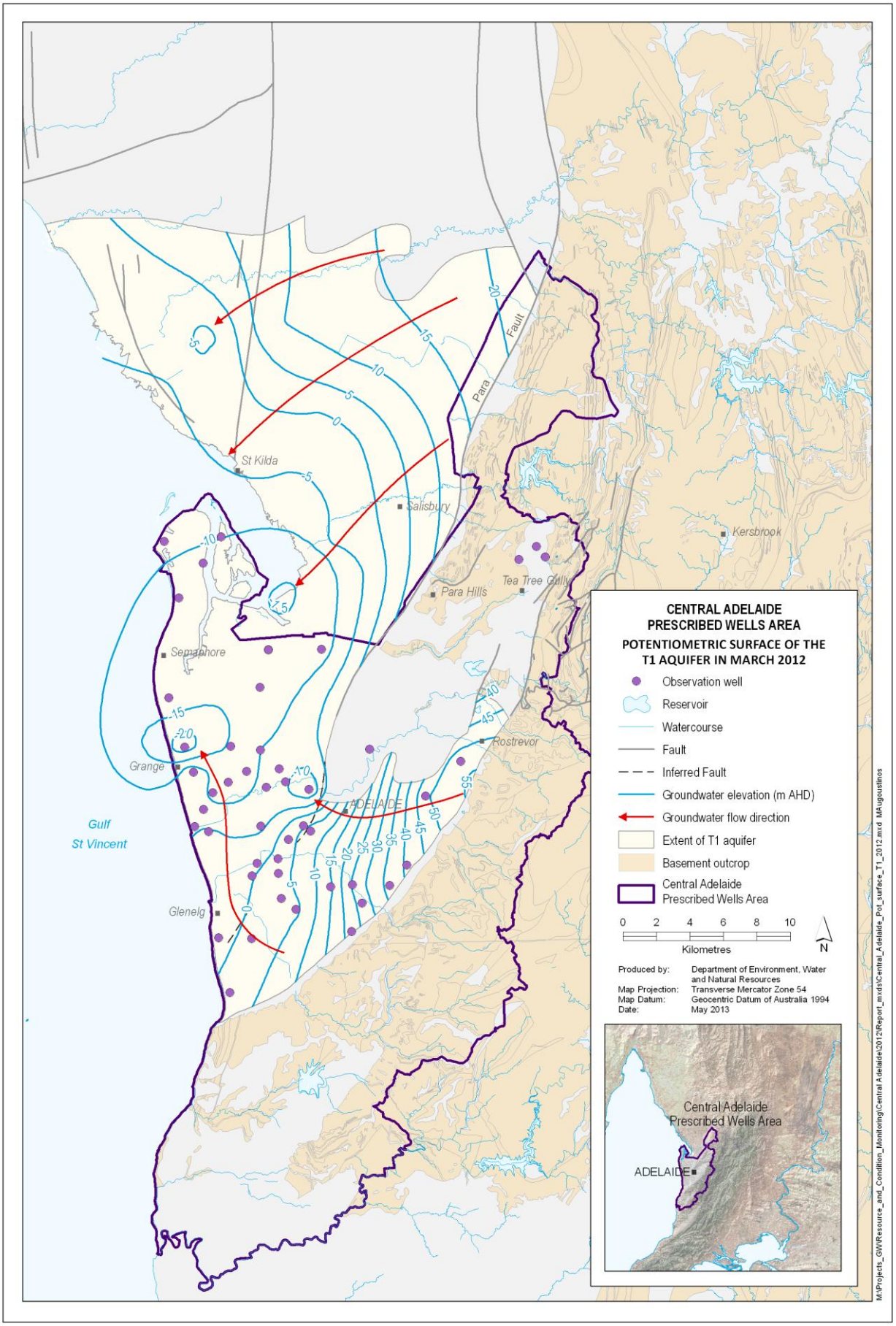


Figure 2. Potentiometric surface and direction of groundwater flow in the T1 aquifer of the Central Adelaide Prescribed Wells Area in March 2012

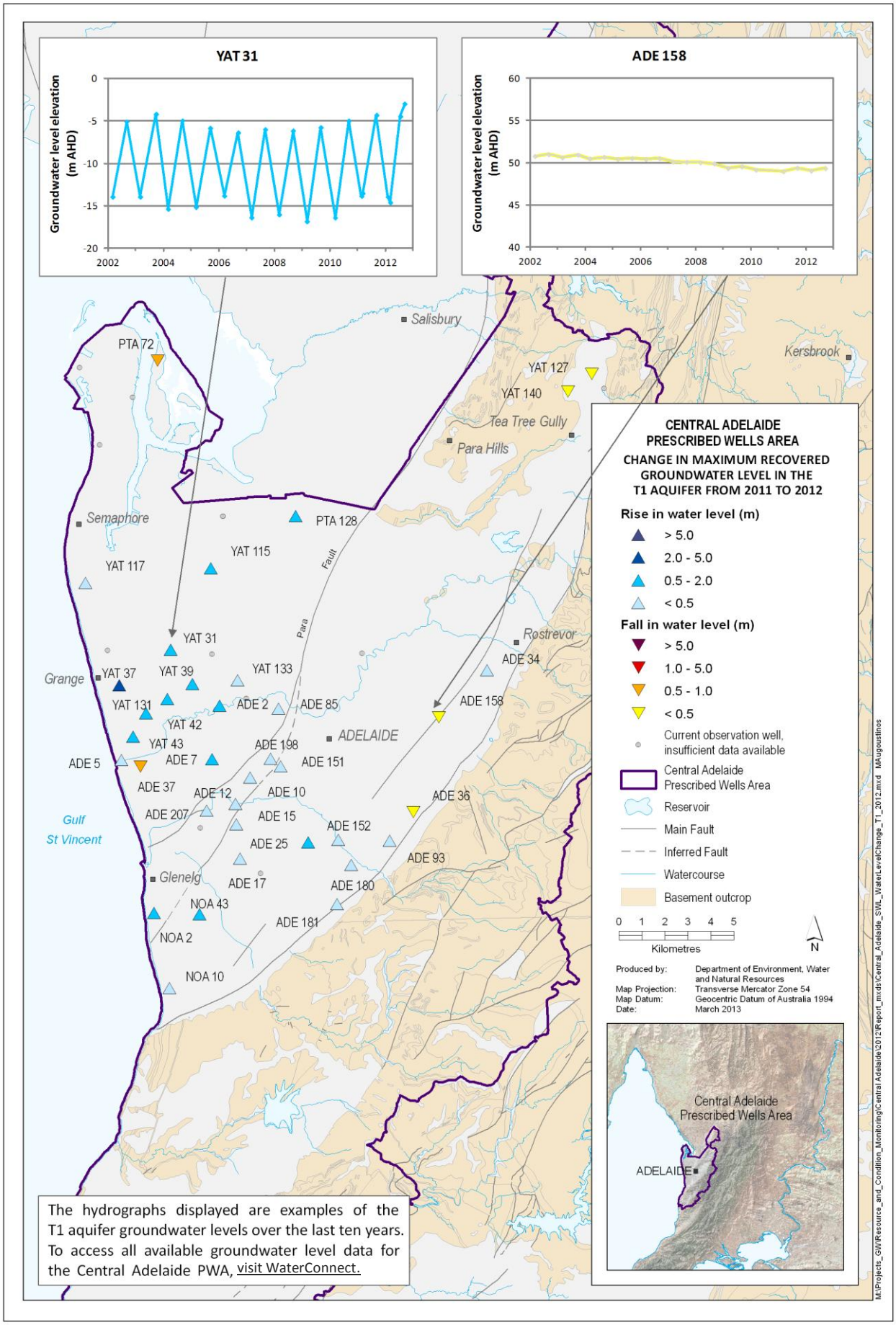


Figure 3. Overall changes in maximum groundwater levels in T1 aquifer of the Central Adelaide PWA from 2011 to 2012

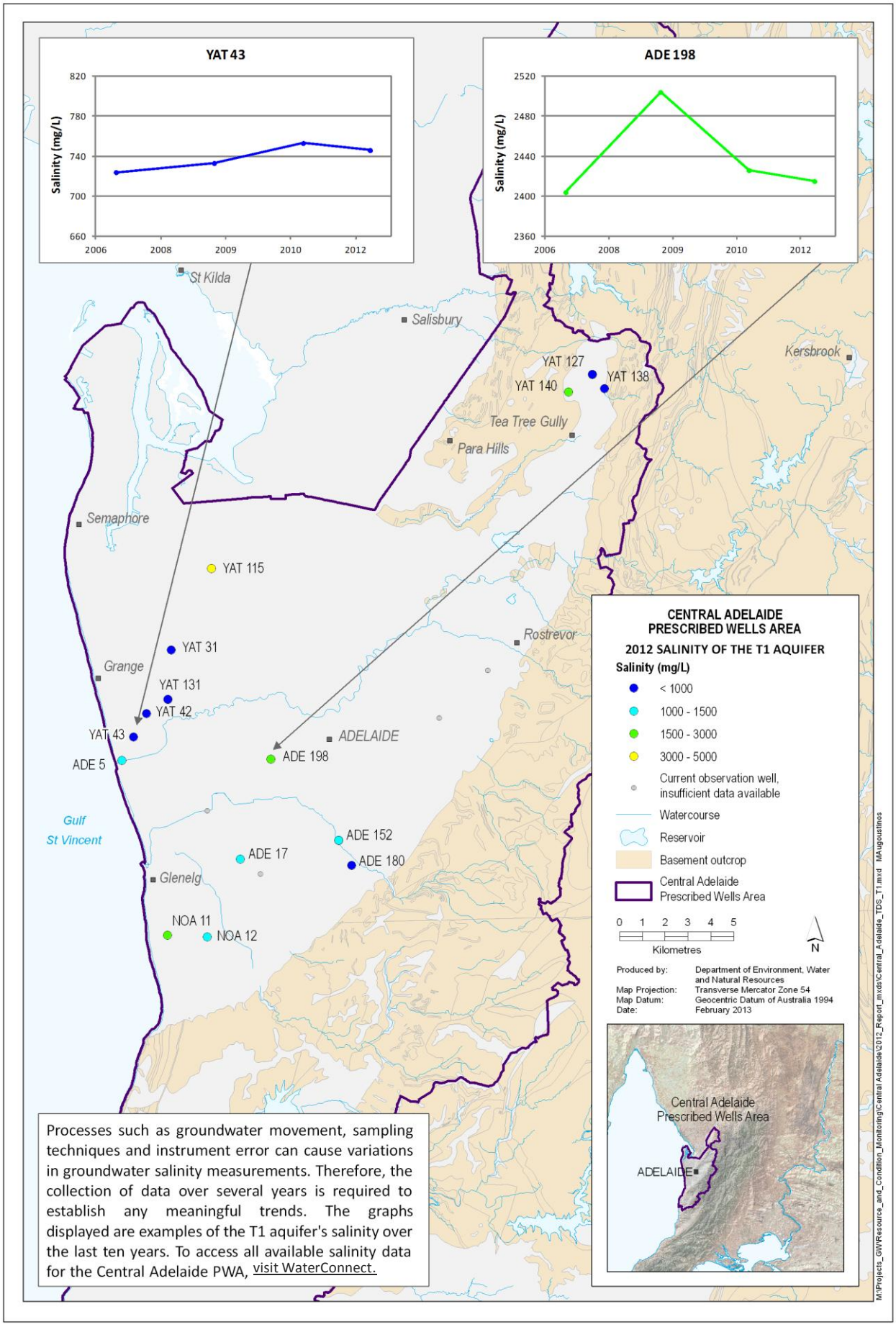


Figure 4. Latest groundwater salinity recorded for the T1 aquifer of the Central Adelaide PWA in 2012