# Central Adelaide PWA

## T1 aquifer

2014 Groundwater level and salinity status report

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

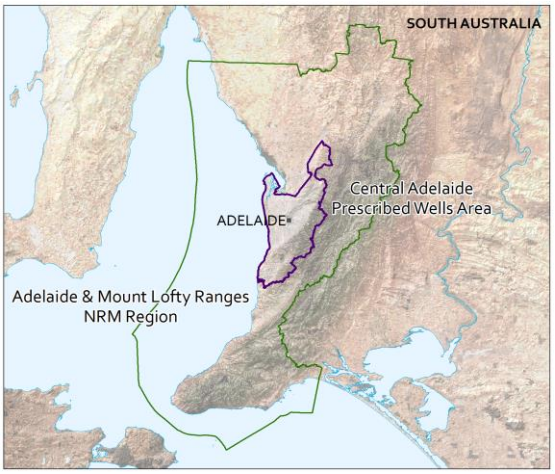
| | | |
|---|---|---|
| Telephone | National | (08) 8463 6946 |
| | International | +61 8 8463 6946 |
| Fax | National | (08) 8463 6999 |
| | International | +61 8 8463 6999 |
| Website | www.environment.sa.gov.au | |




ISBN 978-1-922255-41-9

This document is available online at www.waterconnect.sa.gov.au/Systems/GSR/Pages.

# 2014 Summary




The Central Adelaide Prescribed Wells Area (PWA) encompasses the Adelaide metropolitan region, extending from Outer Harbour in the north to Noarlunga in the south, within the Adelaide and Mount Lofty Ranges NRM Region. It is prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan is being developed to provide for the sustainable management of the groundwater resources.

The Central Adelaide PWA comprises several sedimentary and fractured rock aquifers. Most groundwater extractions in the PWA occur from the T1 aquifer, the shallowest confined Tertiary sedimentary aquifer and this aquifer is the focus of this report. Due to the lack of extractions from the other aquifers in the PWA, they have not been reported on.

The T1 aquifer comprises primarily 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 Gulf St Vincent. The main source of recharge is from lateral throughflow from the fractured rock aquifers of the Mount Lofty Ranges. 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.

Despite being a confined aquifer that does not receive direct recharge from rainfall, the intensity and timing of rainfall and subsequent extraction practises can have an effect on groundwater levels and salinity in the T1 aquifer. 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 therefore smaller declines in groundwater levels and stable or improving salinity.

Most rainfall occurs in the eastern region of the PWA, with lower rainfall recorded near the coast. The annual rainfall in 2014 was 465 mm at the Seaton rainfall station (number 23024), 764 mm at the Cherry Gardens rainfall station (number 23709) and 485 mm at the North Adelaide rainfall station (number 23011). Apart from the Seaton rainfall station, comparatively lower annual rainfall was recorded in 2014 compared to 2013. Below-average rainfall was recorded at the North Adelaide rainfall station for most of 2014, with the exception of the winter months when average to above-average rainfall was recorded, and in February when rainfall was four times more than the monthly average (Fig. 1).

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 from all aquifers 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 is concentrated near Thebarton, where there is industrial extraction, and in the West Lakes–Grange area where there is seasonal irrigation. Long-standing cones of depressions in the pressure level surface have formed in these areas (Fig. 2), but long-term groundwater level trends appear to have stabilised suggesting a new equilibrium has been established.

All observation wells with long-term monitoring records that are located in the Adelaide Plains Sub-basin to the west of the city show the impacts of drought extractions for public water supply before 1970. Quite large drawdowns of up to 20 m were recorded at that time. More recently, the groundwater level fluctuations in the T1 aquifer can be divided into two groups: summer irrigation extractions and year-round industrial extractions. Summer irrigation pumping causes major seasonal fluctuations, with declines in the groundwater level during summer and recovery of levels in winter. However, significant increases in drawdown are not expected because there is limited potential for an expansion of the irrigated areas (golf courses and school ovals). Industrial extractions occur all year round and although seasonal fluctuations are smaller than those resulting from summer irrigation, there is no opportunity for water levels to fully recover and consequently, a long-standing cone of drawdown results.

Of the 40 observation wells within the T1 aquifer that have both 2013 and 2014 data available for comparison, 30 (75%) recorded a rise in the maximum recovered groundwater level. This may be attributed to the significantly above-average rainfall in February

causing reduced extractions for irrigation purposes. Rises in water level ranged from 0.16 to 7.2 m (Fig. 3), with a median of 0.5 m. The observation well that recorded the largest rise (ADE085) is located at Thebarton where intensive industrial extraction occurs. Pumping from this well no longer occurs, hence the large recovery in water level. Negligible change in water level was recorded in three of the observation wells, where the change in maximum recovered water level between 2013 and 2014 was less than 0.1 m. The remaining 7 wells recorded declines of between 0.36 m and 1.5 m, with a median of 0.7 m. The observation wells that recorded a more pronounced decline in water levels are located in the West Lakes–Grange area where extensive summer irrigation pumping occurs (Fig. 3). The overall median change in the annual maximum recovered water level was an increase of 0.4 m.

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 that may prevent the full range of natural variations from being observed.

Of the 24 wells that samples were collected from during 2014, 79% returned salinity values of less than 1500 mg/L, the salinity threshold for most irrigated crops (Fig. 4). From 18 wells with available data for both 2013 and 2014, 17 wells experienced a decrease in salinity concentration.

The T1 aquifer of the Central Adelaide Prescribed Wells Area has been assigned a green status for 2014:

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

This means that the groundwater status was observed to be stable (i.e. negligible 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 the beneficial uses of the resource (e.g. drinking water, irrigation or stock watering).

The 2014 status for the T1 aquifer of the Central Adelaide PWA is supported by:

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

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on WaterConnect.

To view the *Central Adelaide PWA Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, please visit the *Water Resource Assessments* page WaterConnect.

To view or download groundwater level and salinity data from observation wells within the McLaren Vale Prescribed Wells Area, please visit Groundwater Data on WaterConnect.

For further details about the Central Adelaide Prescribed Wells Area, please see the Natural Resources Adelaide and Mount Lofty Ranges website.

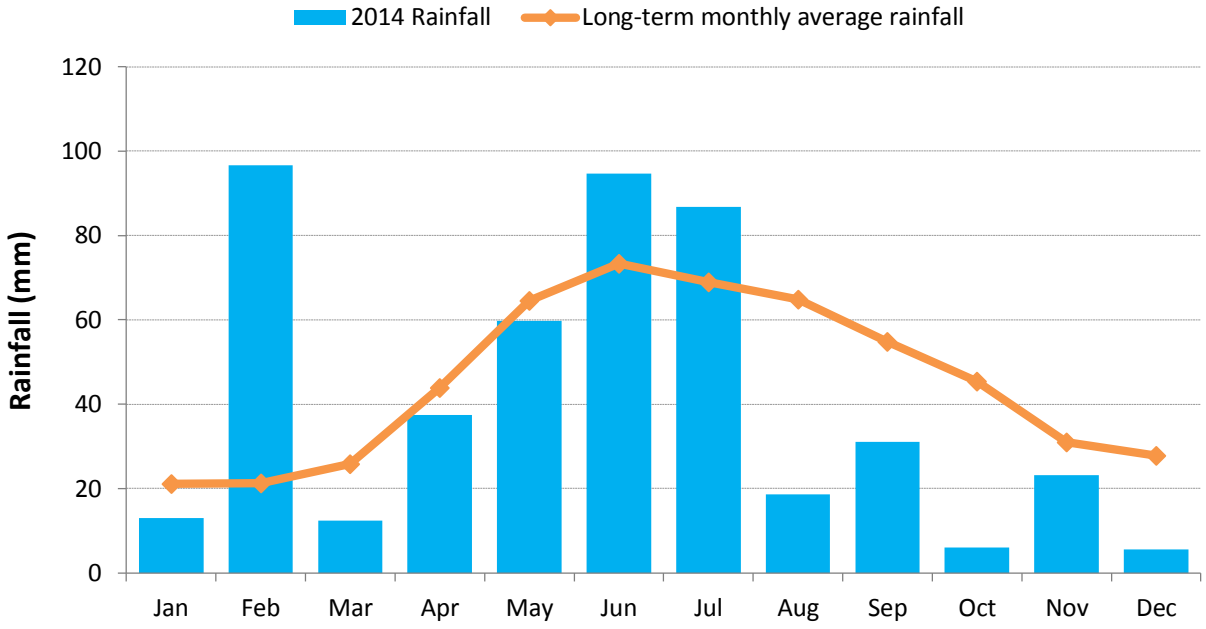



Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the North Adelaide rainfall station (number 23011)[1] in the Central Adelaide PWA

[1] 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.

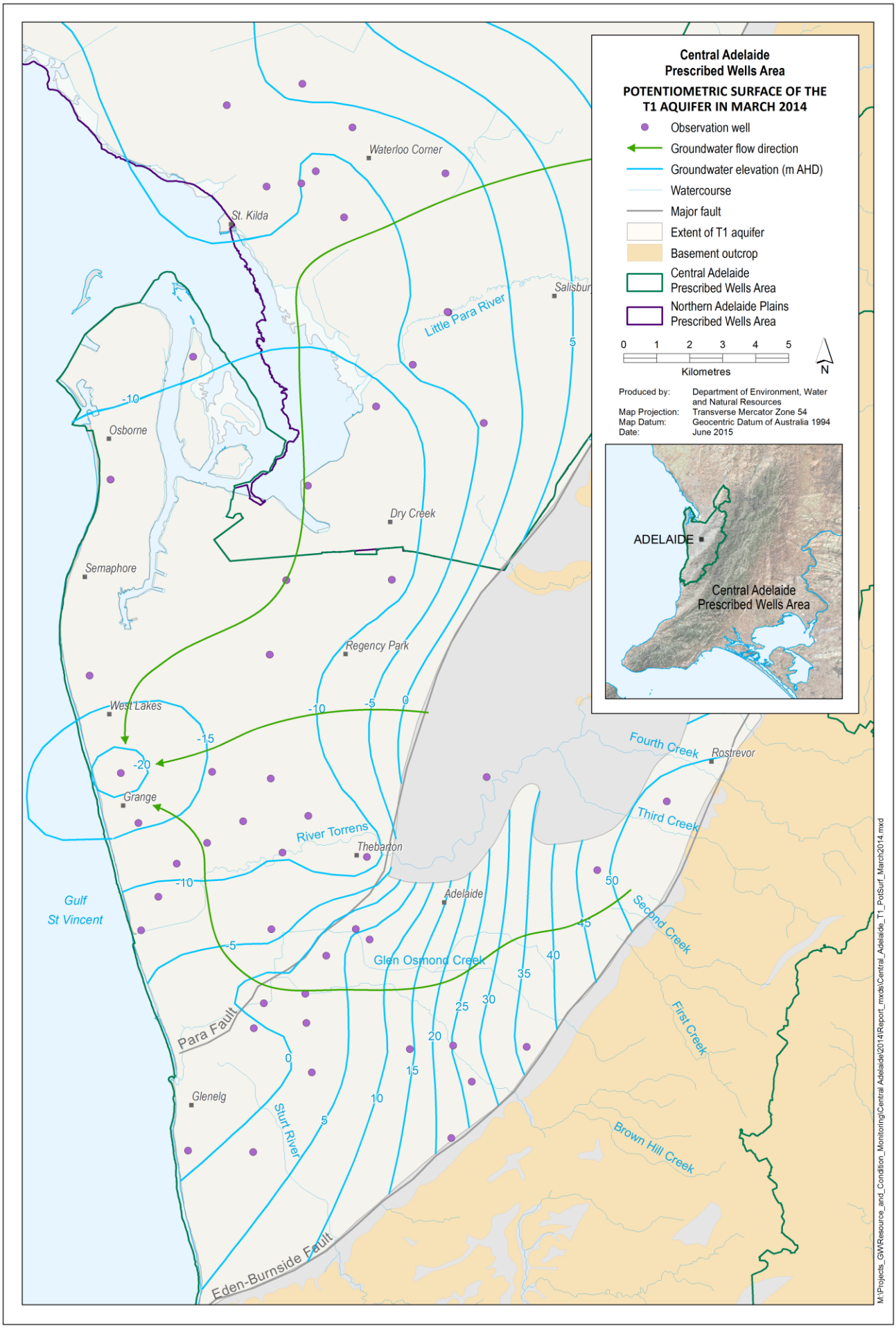



Figure 2. Potentiometric surface and direction of groundwater flow in the T1 aquifer of the Central Adelaide Prescribed Wells Area in March 2014

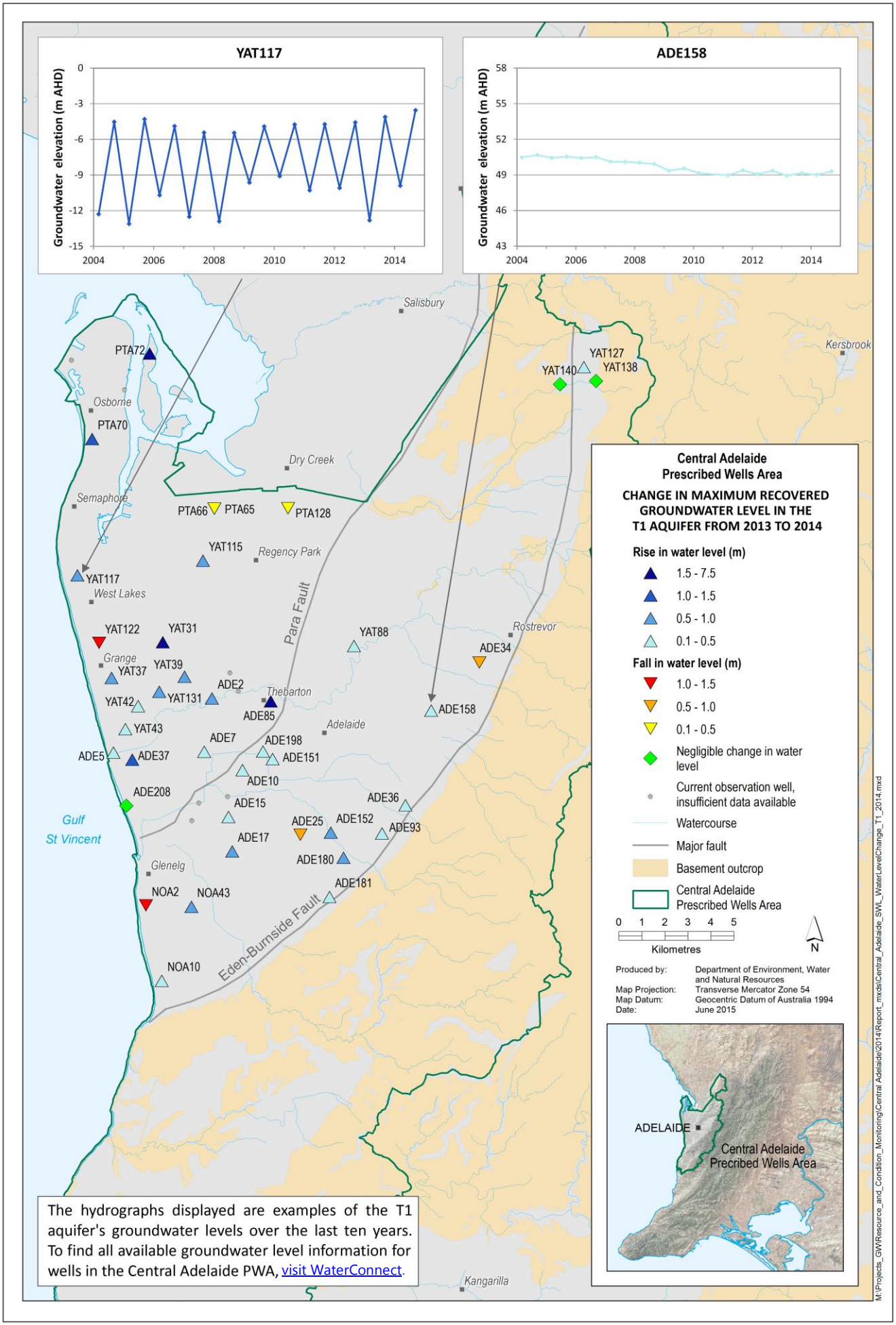



Figure 3. Overall changes in maximum groundwater levels in T1 aquifer of the Central Adelaide PWA from 2013 to 2014

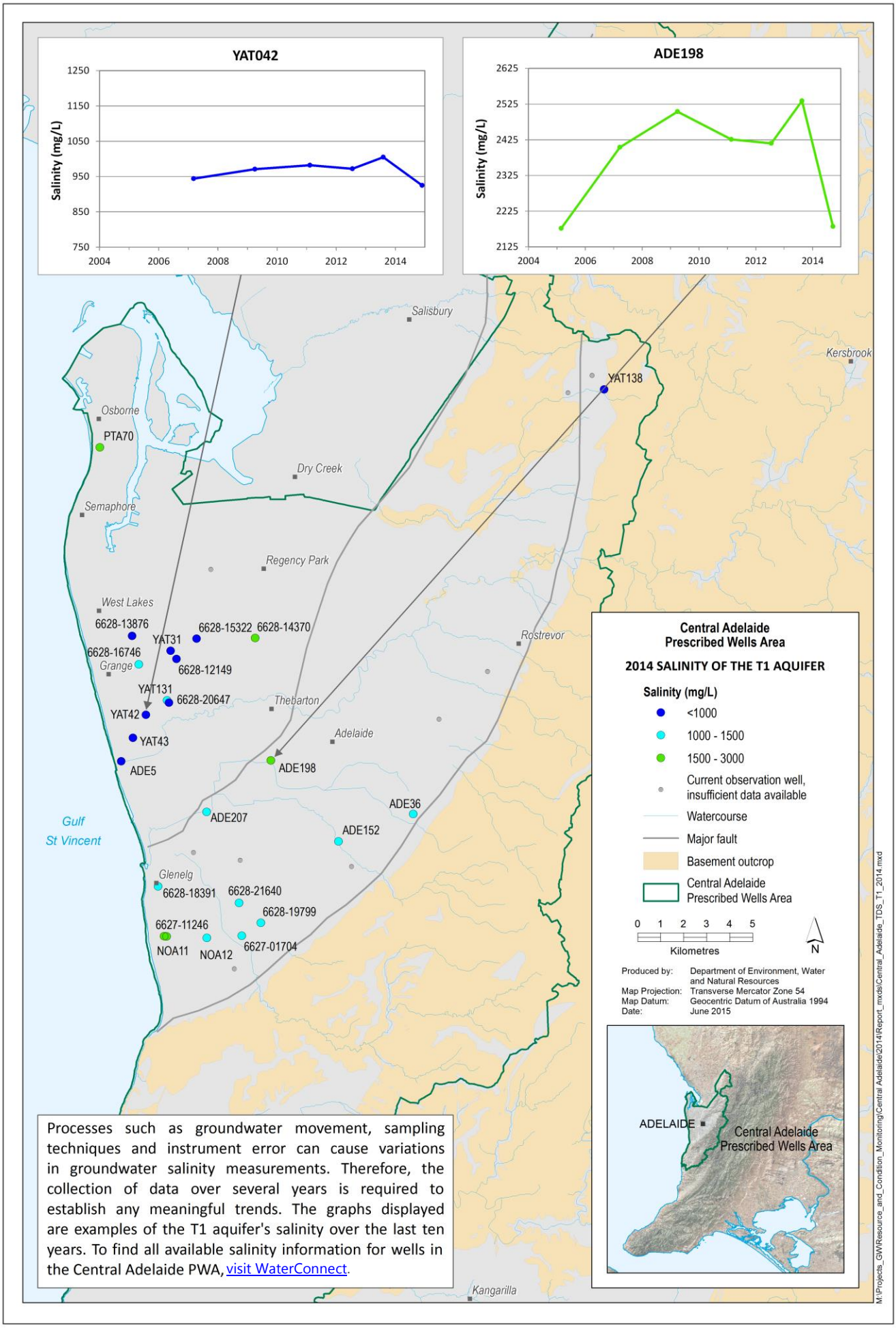



Figure 4. Latest groundwater salinity recorded for the T1 aquifer of the Central Adelaide PWA in 2014