

Northern Adelaide Plains PWA

T2 aquifer

2014 Groundwater level and salinity status report



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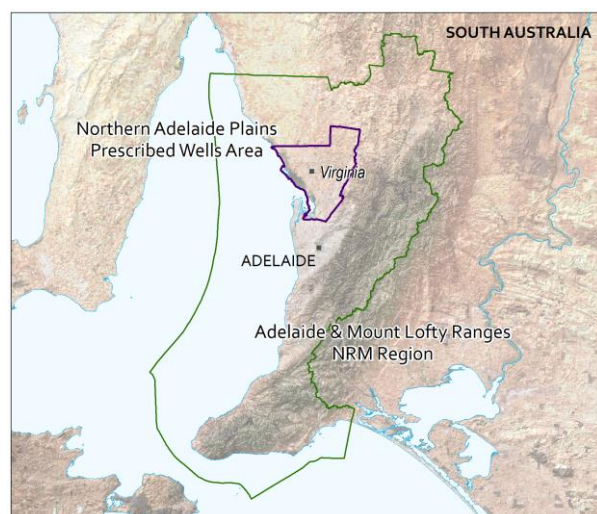
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2014 Summary



The Northern Adelaide Plains Prescribed Wells Area (NAP PWA) is located immediately to the north of the Adelaide metropolitan area, in 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 provides for the sustainable use of the groundwater resources.

Within the NAP PWA, the first two aquifers intersected in the Tertiary-aged sediments, namely the T1 and T2 aquifers, are the main sources of groundwater withdrawals for irrigation purposes.

The T2 aquifer, which underlies the T1 aquifer and is the focus of this report, occurs throughout the entire NAP PWA and consists of well-cemented limestone of the lower Port Willunga Formation.

The main source of recharge to the aquifer is from the Mt Lofty Ranges, which lie to the east of the NAP PWA. Rainfall events in the ranges recharge the fractured rock system, which in turn recharges the sedimentary aquifers beneath the plains by lateral flow across the faults.

Although there is no direct recharge from rainfall to the confined T2 aquifer, there may be an indirect correlation between water levels and rainfall, as dry years will result in increased groundwater pumping, which in turn may lead to a lowering of groundwater levels. Conversely, groundwater levels may rise after a wet year due to reduced extractions.

The Smithfield rainfall station (number 23025) is located in the centre of the NAP PWA and recorded 422 mm of rainfall in 2014. This is 11% less than the long-term average annual rainfall of 476 mm for that station and also less than the 466 mm of rainfall recorded in 2013. The monthly rainfall data for 2014 indicate that while significantly above-average rainfall was observed for February, there was below-average rainfall for eight out of the 12 months, with a period of below-average rainfall from August to December (Fig. 1).

Metered extractions from the T2 aquifer totalled 8655 ML¹ in 2013–14, a 11% decrease from the previous water-use year (Fig. 2). This volume of extraction equates to 33% of the total allocation volume of 26 500 ML and represents approximately 67% of the total licensed groundwater extractions in the NAP PWA.

Between 1969 and 1999, extractions from the T2 aquifer have created long-standing cones of depression centred on Virginia where intensive irrigation occurs (Fig. 3). After a slight recovery in water levels from 2002 to 2005, below-average rainfall from 2006 led to increased extraction and a slight downward trend in water levels. Over the last five years, levels either stabilised or rose. Near the coast in the south-west of the PWA, industrial extraction has recently significantly decreased leading to a recovery of water levels in this area.

In 2014, there were 47 observation wells with adequate records to allow a comparison of maximum recovered water levels with the previous year. Rises of up to 2.48 m, with a median increase of 0.62m, were recorded in 46% of wells. Decreases ranging from 0.18 to 6.14 m, with a median decrease of 0.78 m, were recorded in 38% of wells which are generally located in the Virginia to Angle Vale area (Fig. 4). Negligible change in water level was recorded in the remaining 16% of the observation wells, where the change in maximum recovered water level between 2013 and 2014 was less than 0.1 m. Overall, there was a median increase of 0.5 m. The observed fluctuations in the groundwater level are within the natural, long-term variability of the resource and are linked to fluctuations in rainfall and extraction volumes.

Between 1960 and 1980, the salinity of the T2 aquifer was relatively stable in most wells. Since 2000, the salinity is generally higher, particularly in the north of the PWA, but has been relatively stable over the last ten years.

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.

In 2014, salinity ranged between 573 and 2750 mg/L, with 86% of 242 monitored wells recording a salinity of less than 1500 mg/L (Fig. 5). These wells are primarily located along the Gawler River and around the Virginia area, with salinity generally increasing north and south of these areas. A total of 192 wells recorded salinity in both 2013 and 2014, and 61% of these wells recorded an increase in salinity in 2014 when compared to 2013 salinity data. The median change in salinity for these wells was an increase of 1%.

The T2 aquifer of the Northern Adelaide Plains PWA has been assigned a yellow status for 2014:

2014 Status



“Gradual adverse changes, indicating a low risk to the resource in the medium term”

This means that minor adverse changes in the resource status have been observed over the 12-month reporting period. If these conditions were to continue, they are unlikely to negatively impact the beneficial uses of the resource (e.g. drinking water, irrigation or stock watering) for at least 15 years.

The 2014 status for the T2 aquifer is supported by:

- declines in the maximum recovered groundwater level in the Virginia area when compared with 2013 water level data
- an overall increase in groundwater salinity when compared with 2013 salinity data.

To view descriptions for all status symbols, please visit the *Water Resources Assessment* page on [WaterConnect](#).

To view the *Northern Adelaide Plains 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 Resources Assessment* page on [WaterConnect](#).

To view or download groundwater level and salinity data from observation wells within the Northern Adelaide Plains PWA, please visit [Groundwater Data](#) on WaterConnect.

For further details about the Northern Adelaide Plains PWA, please see the *Adelaide Plains Water Allocation Plan* on the Natural Resources Adelaide and Mt Lofty Ranges [website](#).

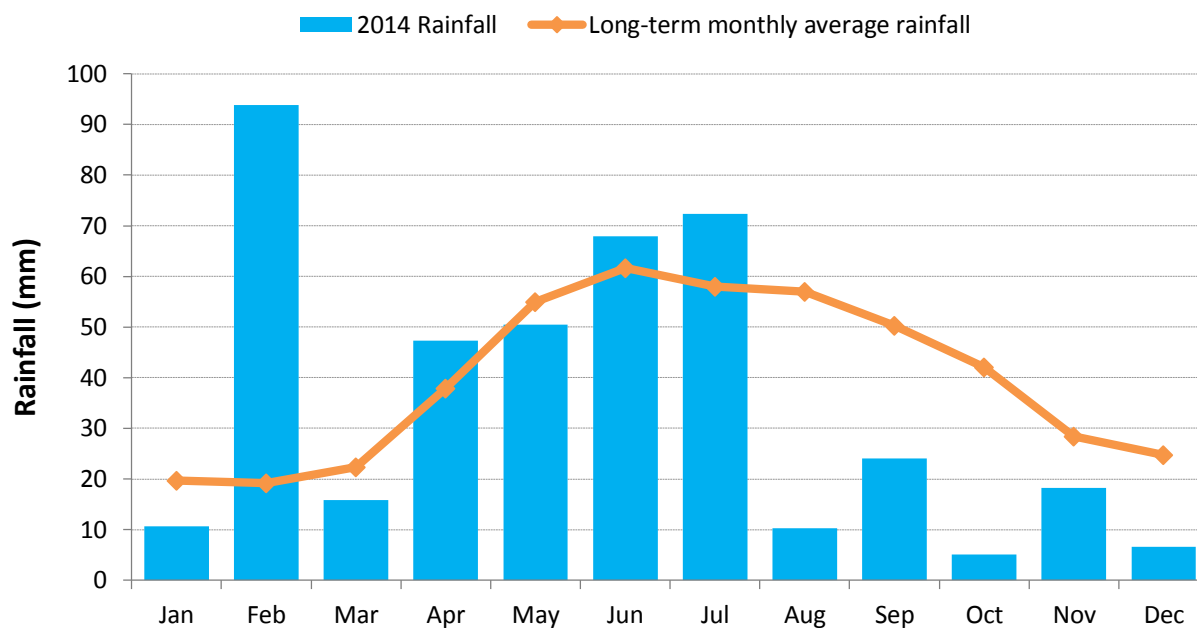


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Smithfield rainfall station² (number 23025) in the Northern Adelaide Plains Prescribed Wells Area

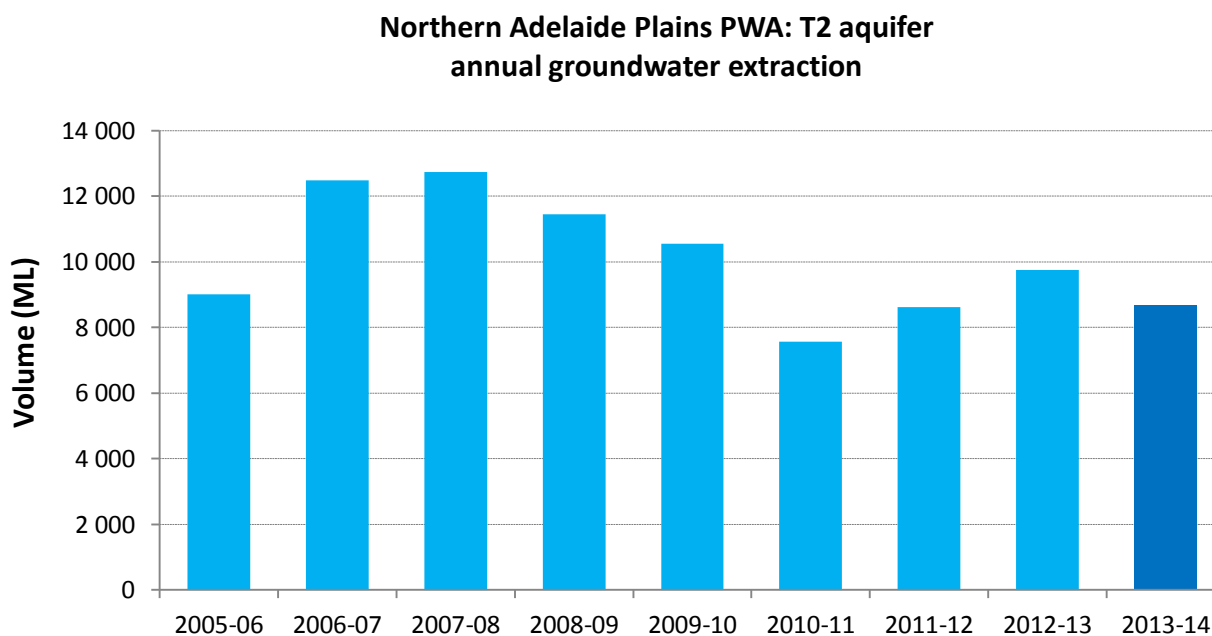


Figure 2. Historical licensed groundwater use for the T2 aquifer of the Northern Adelaide Plains Prescribed Wells Area

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.

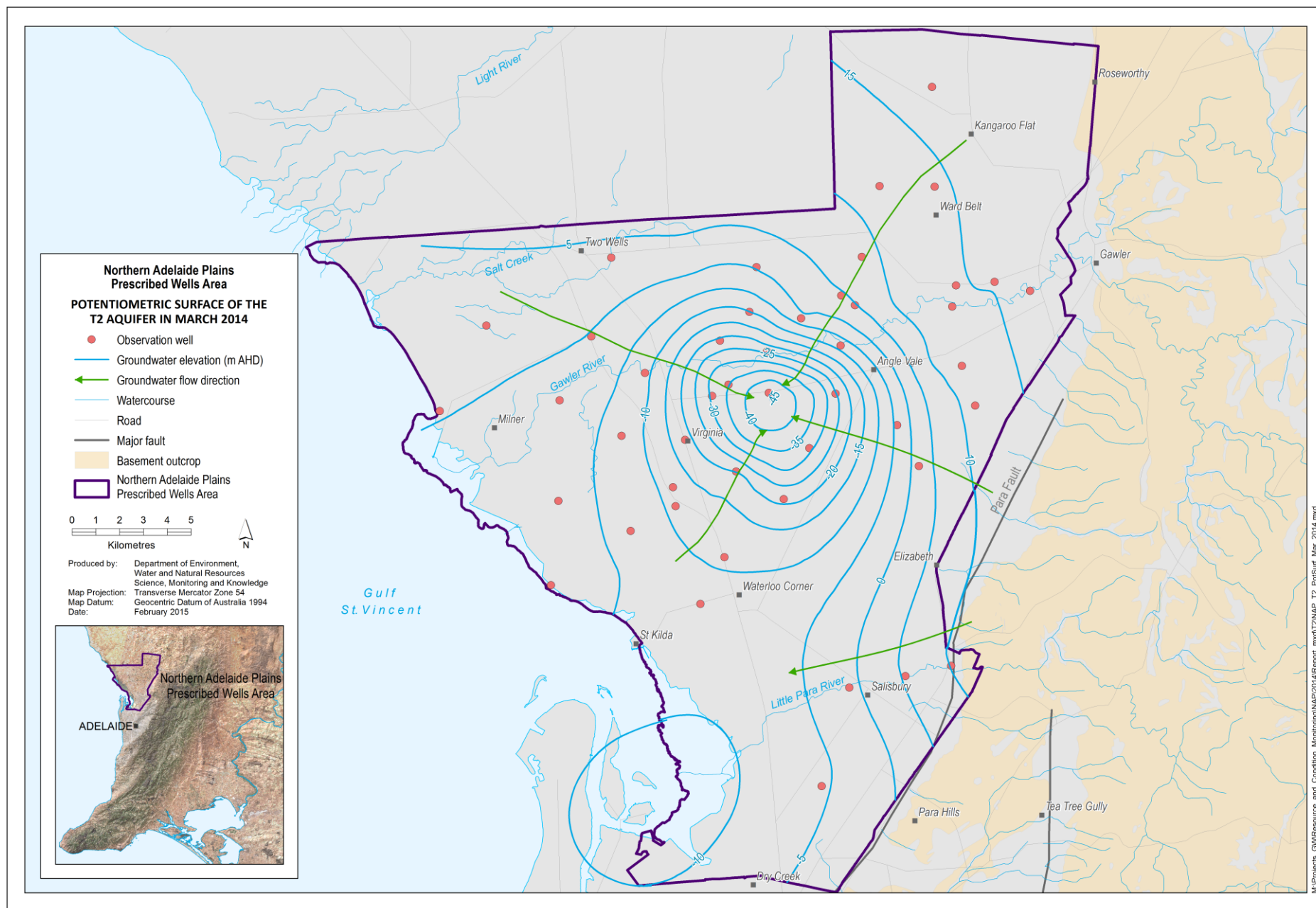


Figure 3. Potentiometric surface and direction of groundwater flow in T2 aquifer of the Northern Adelaide Plains Prescribed Wells Area in March 2014

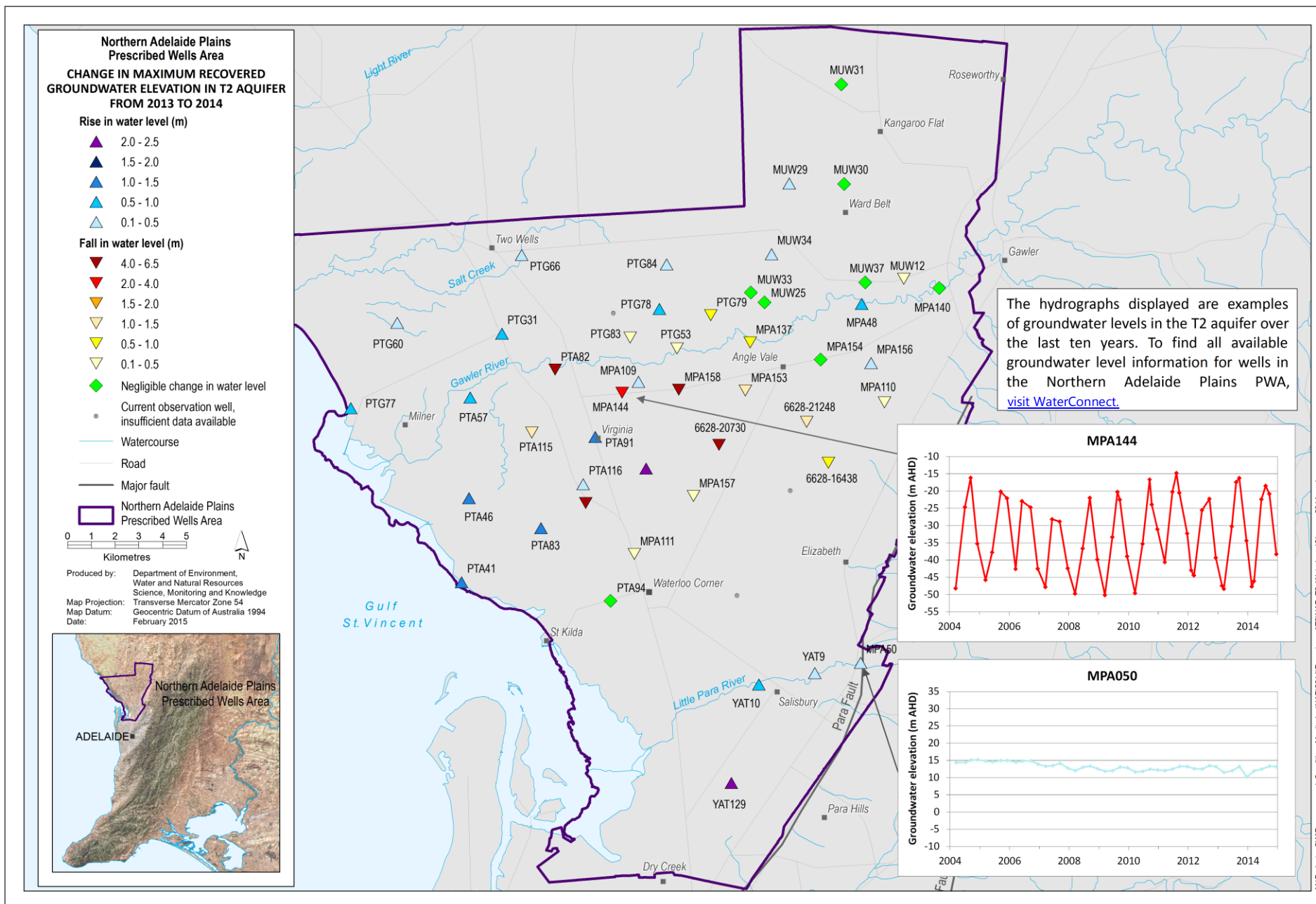


Figure 4. Overall changes in maximum recovered groundwater levels in the T2 aquifer of the Northern Adelaide Plains Prescribed Wells Area from 2013 to 2014

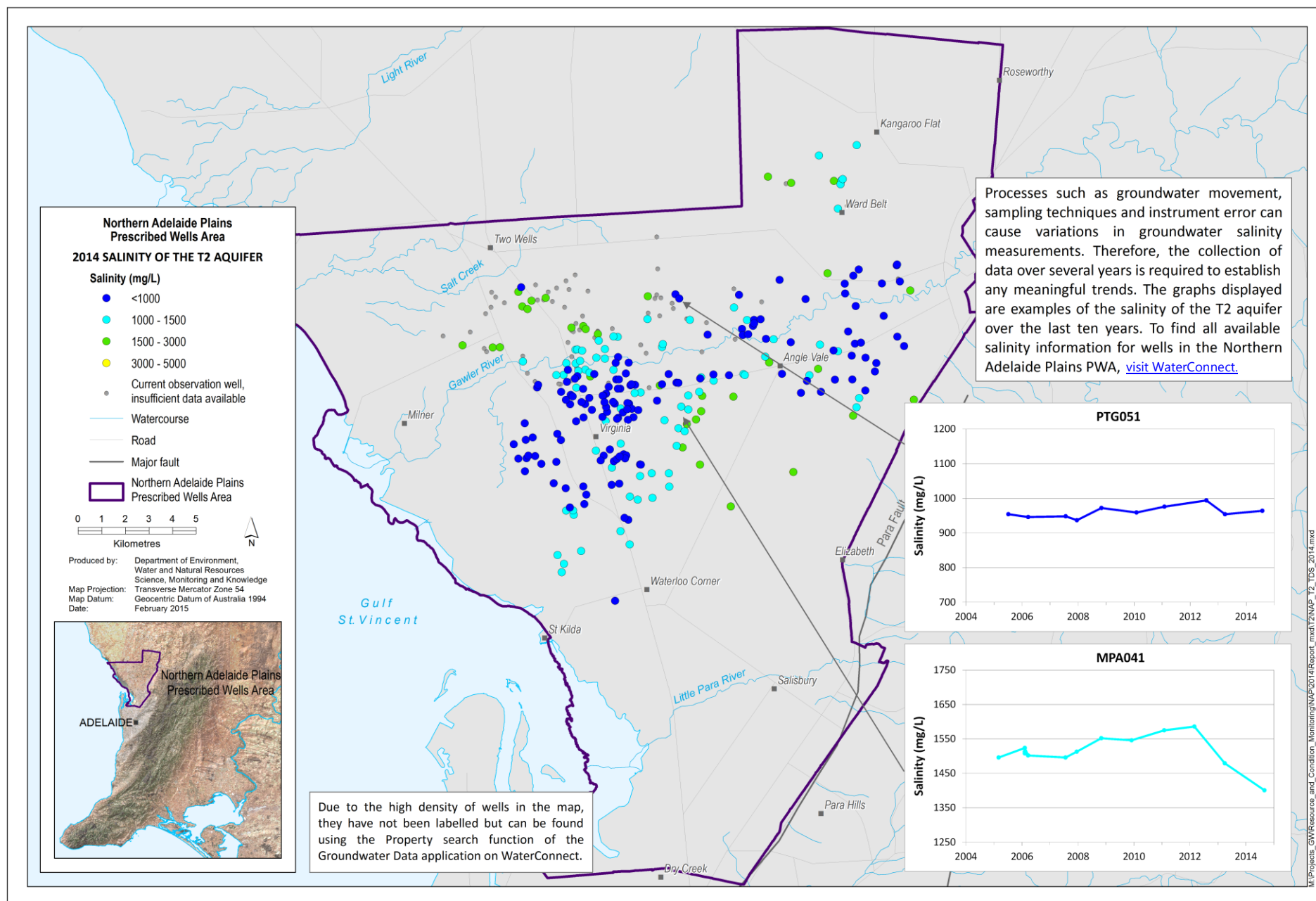


Figure 5. Groundwater salinity of the T2 aquifer of the Northern Adelaide Plains Prescribed Wells Area for 2014