

# Northern Adelaide Plains PWA

## T1 aquifer

2015 Groundwater level and salinity status report



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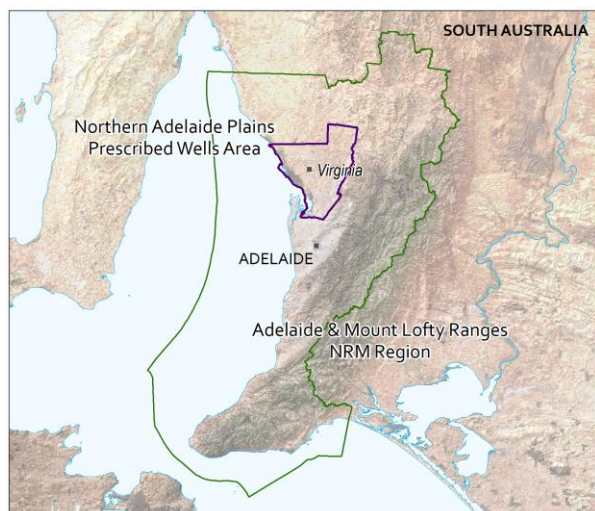
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# 2015 Summary



The Northern Adelaide Plains Prescribed Wells Area (NAP PWA) is located immediately 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 two shallowest Tertiary aquifers (the T1 and T2 aquifers) are the main sources of groundwater, which is used mostly by the horticulture industry. The T1 aquifer and the deeper T2 aquifer are separated by the Munno Para Clay aquitard (i.e. confining layer).

The focus of this report is the T1 aquifer which, within the NAP PWA, consists of several stratigraphic units of varying lithology and thickness: here, the T1 aquifer consists primarily of the Hallett Cove Sandstone, Dry Creek Sand and limestones of the upper Port Willunga Formation. The T1 aquifer is absent in the north-east portion of the PWA.

Groundwater recharge to the T1 aquifer is thought to occur by lateral inflow from the adjacent fractured rock aquifers of the Mount Lofty Ranges, which are located along the eastern boundary of the PWA. Outflows from the groundwater system occur through extraction from irrigation and domestic wells, and discharge to Gulf St Vincent.

Although there is no direct recharge from rainfall to the confined T1 aquifer, there may be an indirect correlation between groundwater pressure levels and rainfall, as periods of below-average rainfall will likely result in increased rates of groundwater extraction, which may lead to declines in groundwater pressure levels. Conversely, groundwater pressure levels may rise after periods of above-average rainfall due to reduced rates of groundwater extraction.

The Smithfield rainfall station (BoM Station 23025) was selected as representative of rainfall throughout the NAP PWA (Fig. 1); 305 mm of rainfall fell in the 2014–15 water-use year, 170 mm less than the long-term average of 475 mm (1900–2015) and the lowest in the past 80 years. Despite the five-year average annual rainfall of 499 mm (2010–11 to 2014–15), which is higher than the long-term average (Figs. 1 and 2), there is a trend of declining rainfall over the past five years (Fig. 2).

The T1 aquifer is the main source of groundwater in the area south of Waterloo Corner and the rate of extraction has been generally stable for the past four irrigation seasons. Metered groundwater extractions totalled 3358 ML<sup>1</sup> in 2014–15, a 6% decrease from the previous water-use year and only 1% less than the five-year average annual extraction (Fig. 3). This rate of extraction represents 13% of the 26 500 ML total allocation volume for all aquifers within the NAP PWA.

Long-term monitoring data show a general decline in groundwater pressure levels between the mid-1980s and mid-1990s followed by a recovery. Over the past five years, groundwater pressure levels have been stable with seasonal fluctuations generally in the range 5–10 m. Near the coast in the south-western corner of the NAP PWA, pumping from the T1 aquifer for industrial purposes has formed a large and long-standing cone of depression that has been stable over the past 20 years (Fig. 4).

In the five years to 2015, just over half of monitoring wells (11 of 21) show declines in groundwater pressure levels at rates ranging from 0.06–0.53 m/y, with a median of 0.13 m/y. These wells appear in three clusters where the most intensive extraction occurs: one north of Milner; one around Waterloo Corner; and one between Salisbury and the coast (Fig. 5). Nine monitoring wells show a rise in groundwater pressure level of between 0.03 and 0.39 m/y (median 0.11 m/y), while the groundwater pressure level in the remaining well was stable.

Most groundwater within the T1 aquifer is good quality with salinity of less than 1500 mg/L; however, salinities of nearly 3500 mg/L have been measured in some areas (Fig. 6).

<sup>1</sup>The licensed groundwater use for the 2014–15 water-use year is based on the best data available as of March 2016 and may be subject to change, as some extraction volumes are in the process of being verified.

In the five years to 2015, nine of 13 salinity monitoring wells show stable salinities, while two wells show a decreasing trend of 45 and 115 mg/L/y (Fig. 7). The two remaining salinity monitoring wells, which are located in the Waterloo Corner area, show a rising trend of 25 and 49 mg/L/y.

To determine the status of the T1 aquifer for 2015, the trends in groundwater pressure level and salinity over the past five years (2011 to 2015, inclusive) were analysed. This is a new approach, in contrast to the year-to-year assessments that have been used in past *Groundwater level and salinity status reports*. Please visit the [Frequently Asked Questions](#) on the *Water Resource Assessments* page on WaterConnect for more detail on the current method of evaluating the status of groundwater resources.

The T1 aquifer of the Northern Adelaide Plains PWA has been assigned a yellow status for 2015:

## 2015 Status



Minor adverse trends have been observed over the past five years

The 2015 status for the T1 aquifer is based on:

- just over half (52%) of monitoring wells show a five-year trend of declining groundwater pressure levels in areas where the highest rates of extraction occur.

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

To download groundwater level and salinity data from monitoring wells within the Northern Adelaide Plains PWA, please visit the *Groundwater Data* page under the Data Systems tab 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](#).

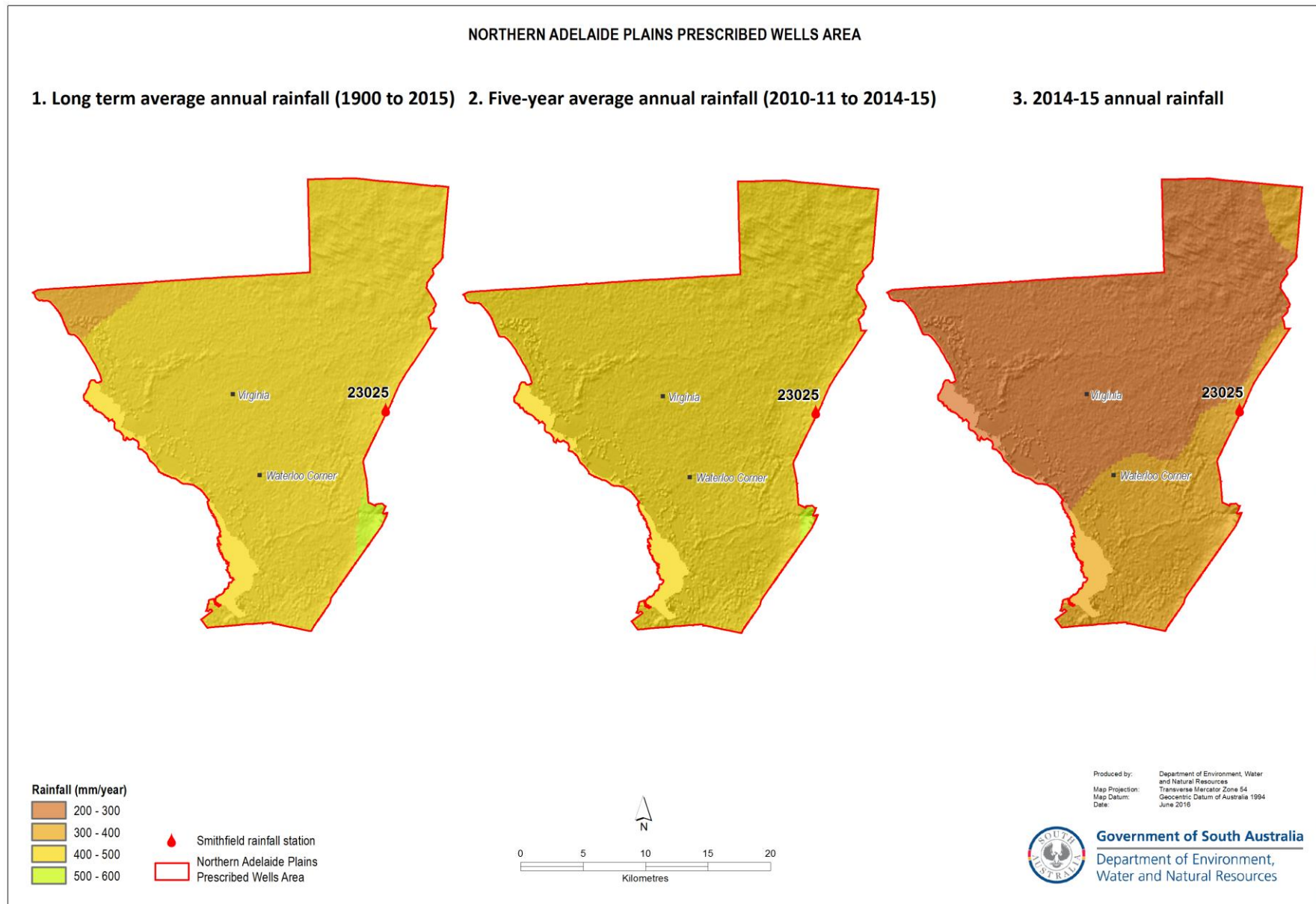


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year recorded at Smithfield (BoM Station 23025)<sup>2</sup>

<sup>2</sup> 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](http://www.longpaddock.qld.gov.au/silo).

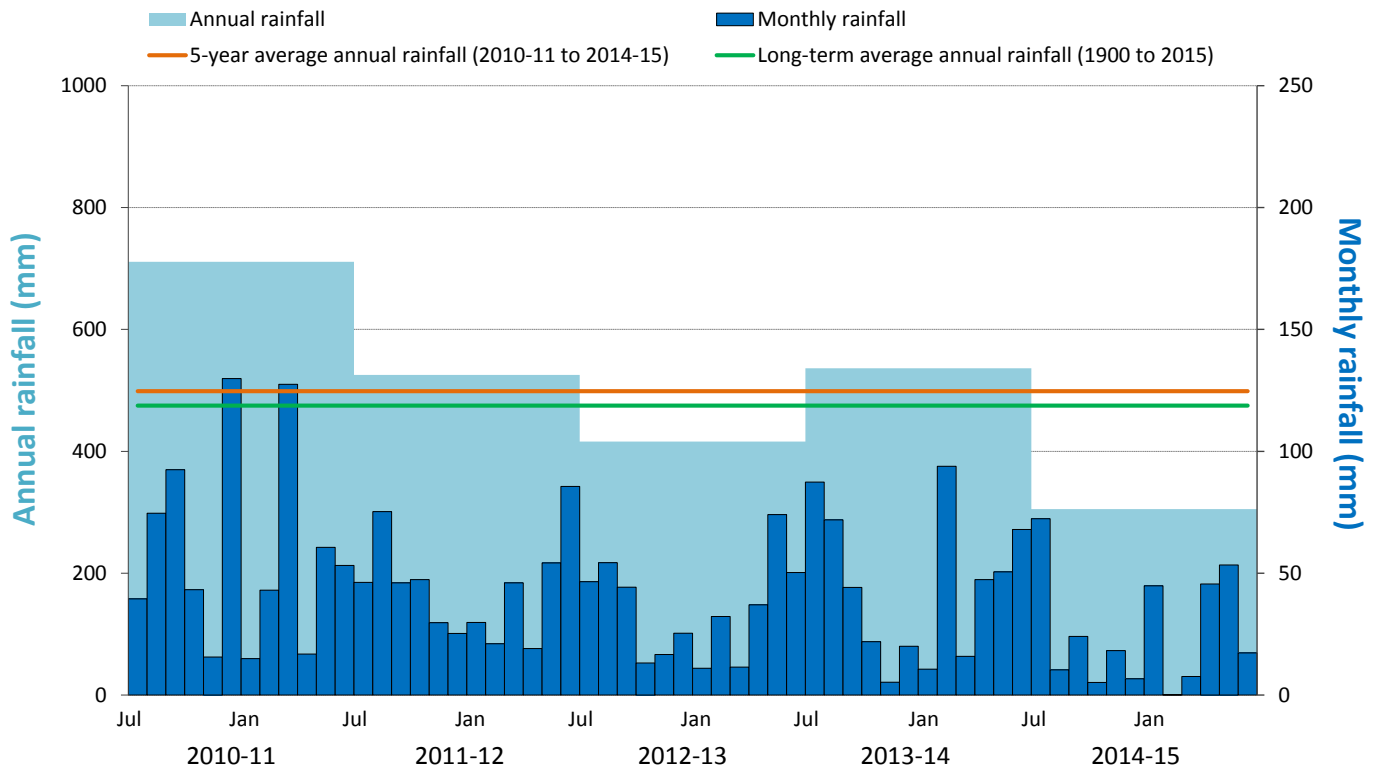


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Smithfield (BoM Station 23025)<sup>3</sup>

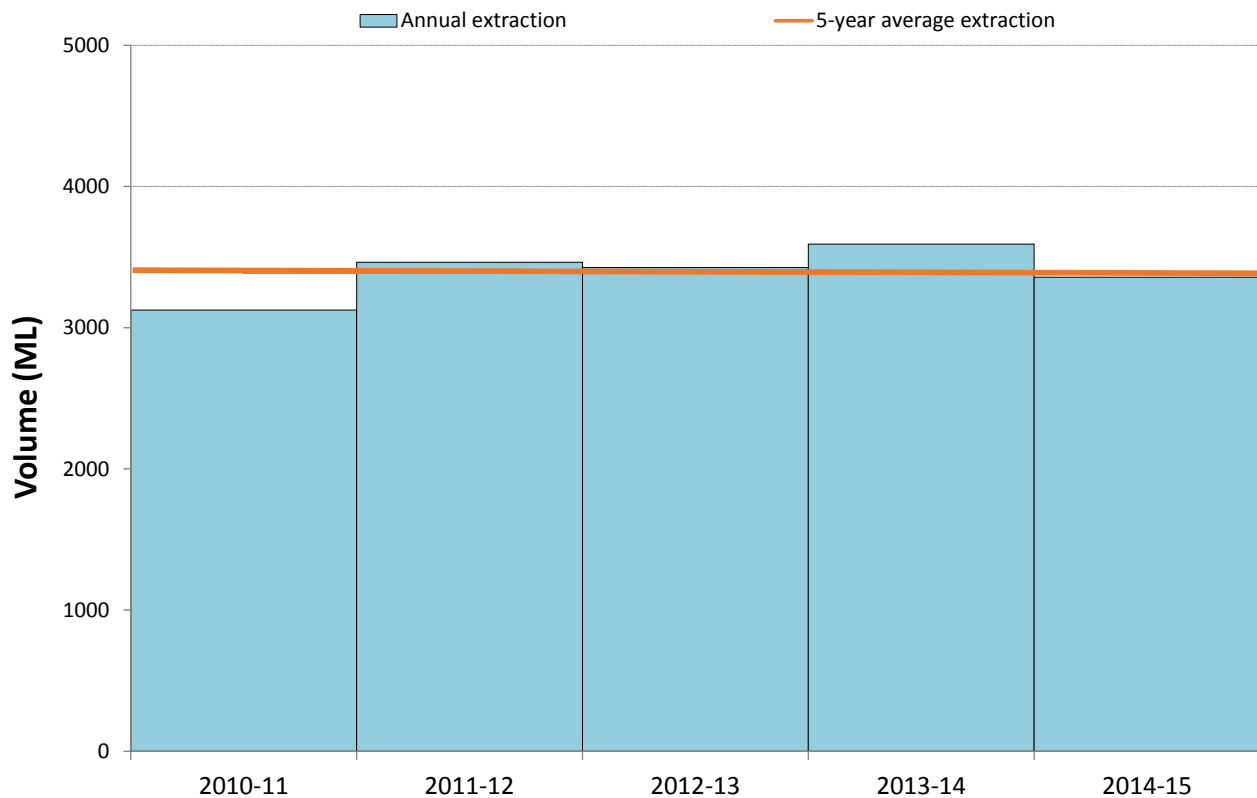


Figure 3. Licensed groundwater extraction volumes<sup>4</sup> for the past five water-use years, for the T1 aquifer in the Northern Adelaide Plains Prescribed Wells Area

<sup>3</sup> 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](http://www.longpaddock.qld.gov.au/silo).

<sup>4</sup> The licensed groundwater use for the 2014–15 water-use year is based on the best data available as of March 2016 and may be subject to change, as some extraction volumes are in the process of being verified.

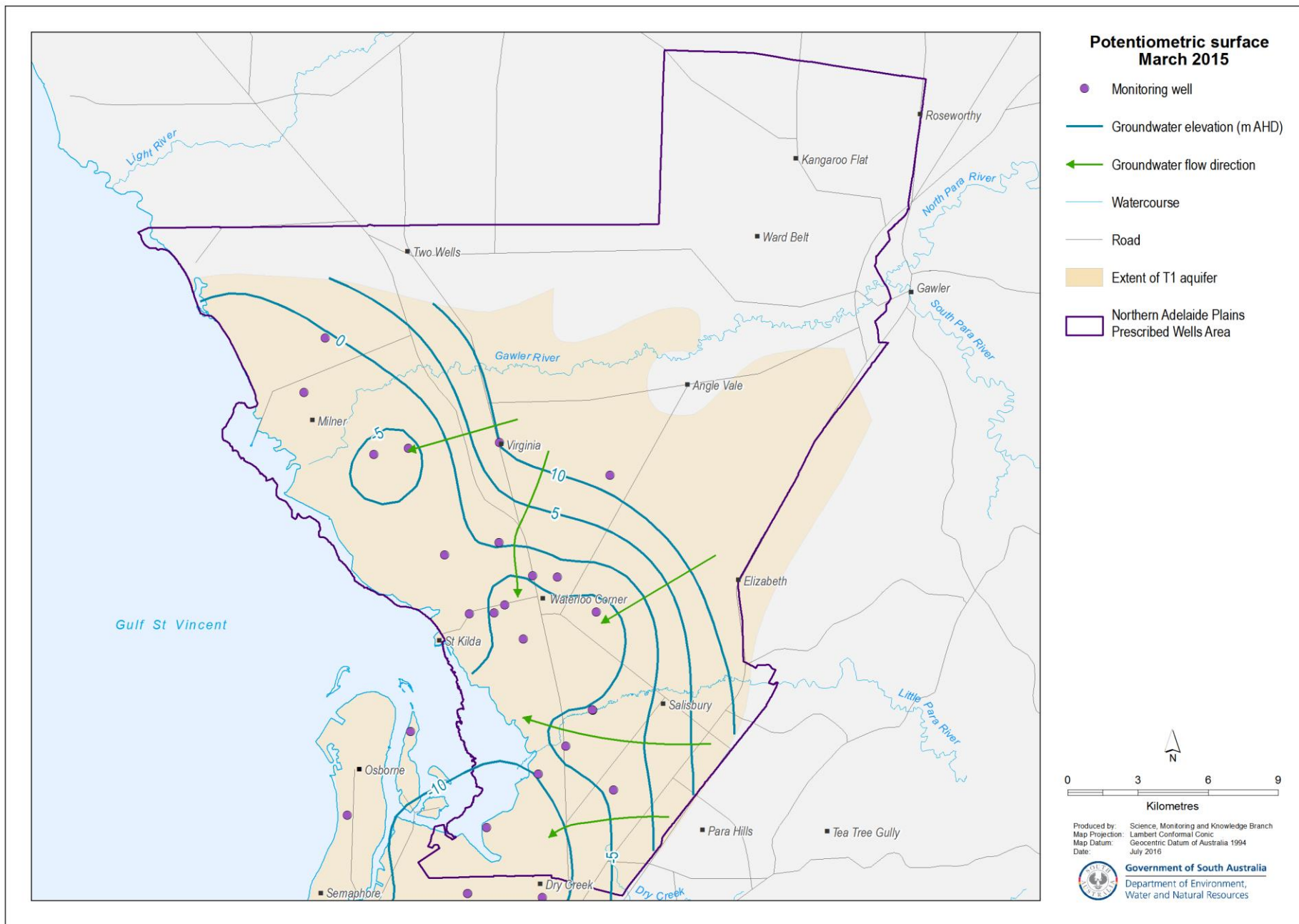


Figure 4. Potentiometric surface and direction of groundwater flow in the T1 aquifer (Northern Adelaide Plains Prescribed Wells Area) in March 2015

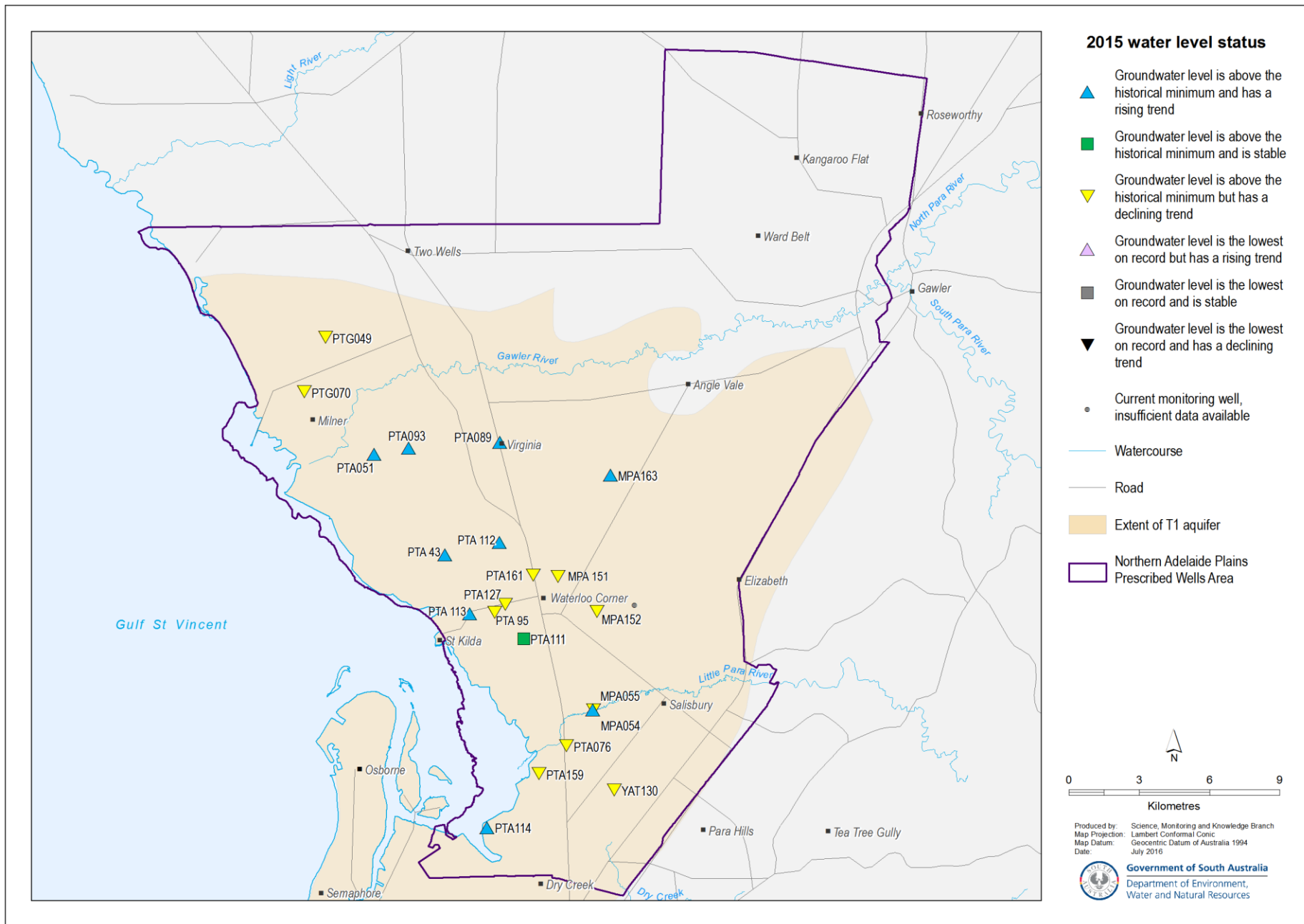


Figure 5. 2015 status of the groundwater pressure levels in the T1 aquifer (Northern Adelaide Plains Prescribed Wells Area) based on the 5-year trend from 2011 to 2015



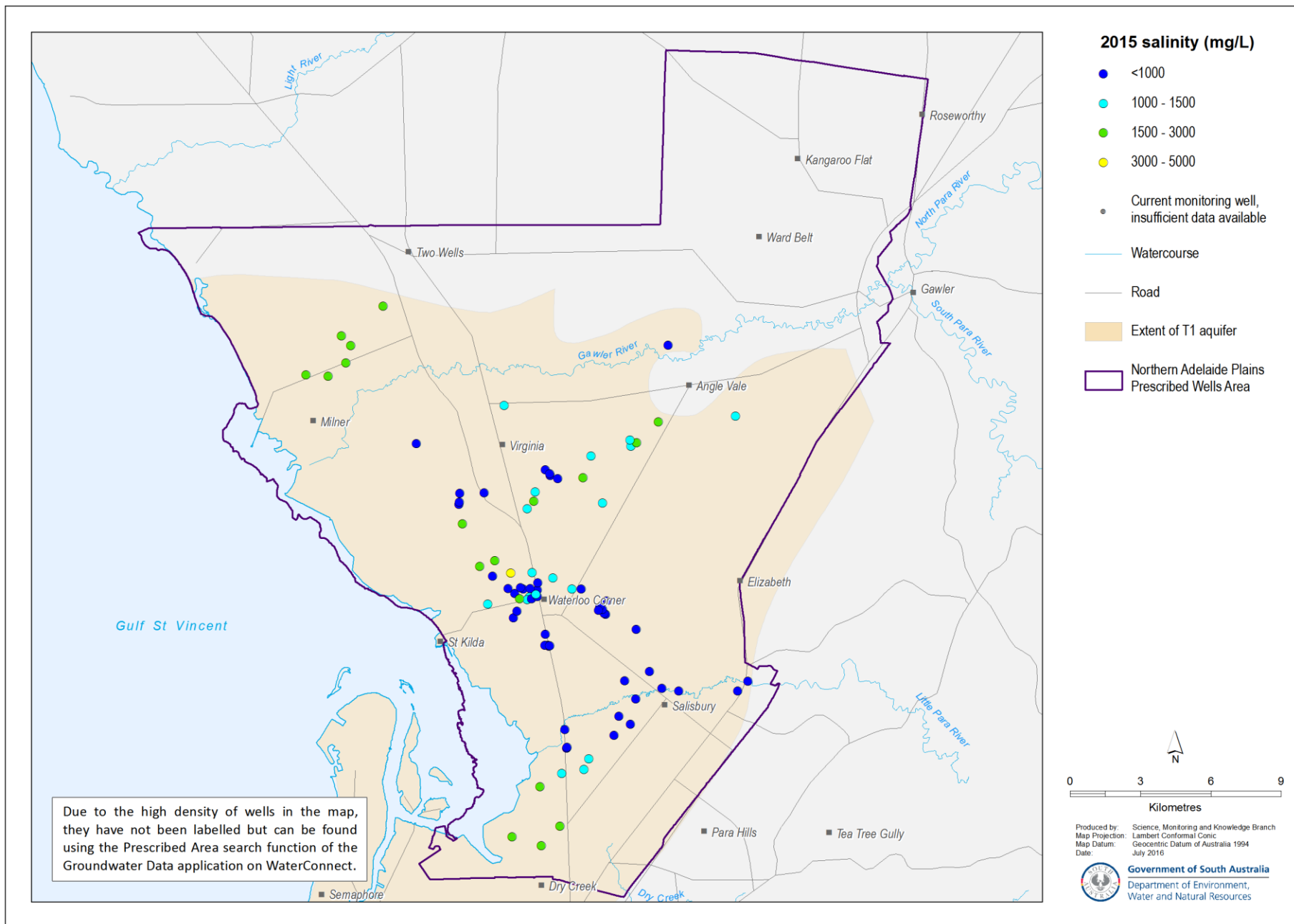


Figure 6. 2015 groundwater salinity of the T1 aquifer (Northern Adelaide Plains Prescribed Wells Area)

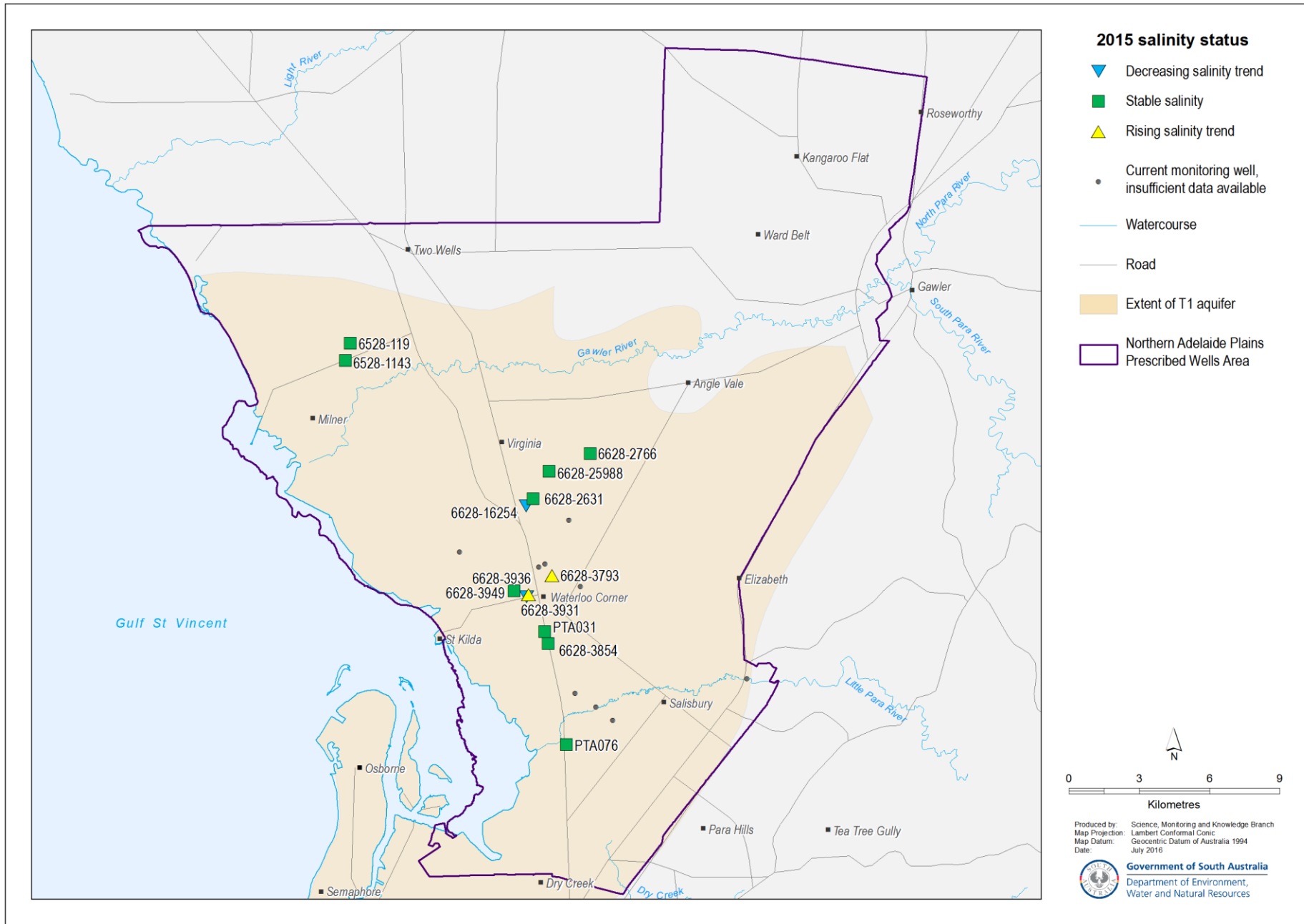


Figure 7. 2015 status of the groundwater salinities in the T1 aquifer (Northern Adelaide Plains Prescribed Wells Area) based on the 5-year trend from 2011 to 2015

