

Northern Adelaide Plains PWA

T2 aquifer

2015 Groundwater level and salinity status report



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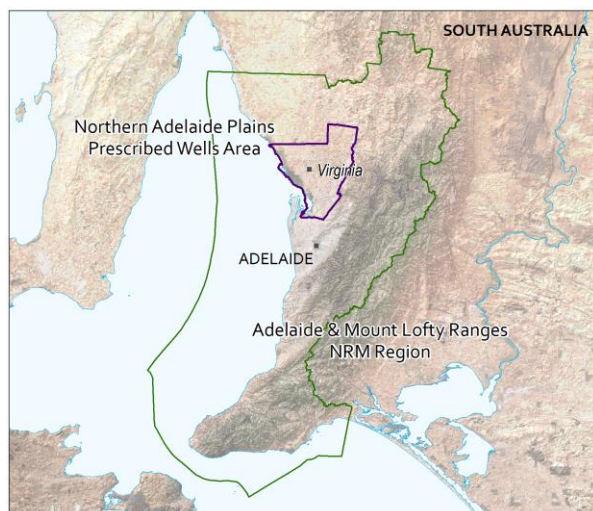
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2015 Summary



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 deeper T2 aquifer, which is separated from the T1 aquifer by the Munno Para Clay aquitard (i.e. confining layer), is the focus of this report. It occurs ubiquitously across the NAP PWA and consists of well-cemented limestones of the lower Port Willunga Formation.

The main source of recharge to the aquifer is thought to be lateral throughflow from the Mount Lofty Ranges, which lie to the east of the NAP PWA. Rainfall recharge to the fractured rock aquifers in the ranges flows towards the coast and likely recharges the sedimentary aquifers beneath the Adelaide plains by lateral flow across the Eden–Burnside and Para Faults.

Although there is no direct recharge from incident rainfall to the confined T2 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. Though the five-year average annual rainfall of 499 mm (2010–11 to 2014–15) is higher than the long-term average, there is a declining trend in rainfall over the past five years (Fig. 2).

Groundwater extraction within NAP PWA occurs primarily from the T2 aquifer. In 2014–15, metered groundwater extractions totalled 8504 ML¹, which is a 2% decrease from the previous water-use year and only 1% more than the five-year average annual extraction (Fig. 3). This volume of extraction equates to 32% of the 26 500 ML total allocation volume for all aquifers within the NAP PWA and is a departure from the negative correlation between rainfall and groundwater extraction observed in previous years (Figs. 2 and 3). This may be attributed to the cessation of extraction by Penrice and significant rainfall in January reducing the need for summer irrigation.

Extractions from the T2 aquifer have created a long-standing cone of depression centred on Virginia, where intensive irrigation occurs (Fig. 4). After a minor rise in groundwater pressure levels from 2002 to 2005, below-average rainfall from 2006 to 2008 likely led to an increase in rates of extraction and the subtle declining trend in groundwater pressure levels. Since 2008, groundwater pressure levels have either stabilised or risen. This may be due to above-average rainfall between 2008 and 2011 and the marked decrease in industrial extraction from the Osborne area.

In the five years to 2015, 50% of groundwater monitoring wells show a rising trend in the range of 0.03–0.57 m/y, (median of 0.11 m/y), while 16% of monitoring wells recorded stable pressure levels (Fig. 5). The remaining 34% of monitoring wells show falling trends of between 0.02 and 0.67 m/y; most of these wells are located along the Gawler River (Fig. 5).

Between 1960 and 1980, the salinity of the T2 aquifer was stable. Between 2000–06, salinities generally increased, particularly in the north of the PWA, but in the past ten years, salinities have been stable.

Each year, irrigators in the NAP PWA are required to submit a salinity sample from their wells to the Department of Environment, Water and Natural Resources for analysis. The results from the irrigators' wells have been included in this report along with measurements from the department's salinity monitoring network. In 2015, salinities range between 590 and 8900 mg/L, with 80%

¹ The licensed groundwater extraction volume 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.

of the 277 wells showing salinities of less than 1500 mg/L (Fig. 6). These wells are primarily located around the Virginia area and along the Gawler River, with salinities generally higher to the north and south of these areas.

In the five years to 2015, 78% of wells recorded stable salinity, while 12% of wells show a decreasing trend (Fig. 7). The remaining 10% of wells show a rising trend.

To determine the status of the T2 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 T2 aquifer of the Northern Adelaide Plains PWA has been assigned a green status for 2015:

2015 Status



Positive trends have been observed over the past five years

The 2015 status for the T2 aquifer is based on:

- two thirds of monitoring wells (66%) show a five-year trend of stable or rising groundwater pressure levels
- most monitoring wells (90%) show a five-year trend of stable or decreasing salinity.

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 view or download groundwater level and salinity data from monitoring 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](#).

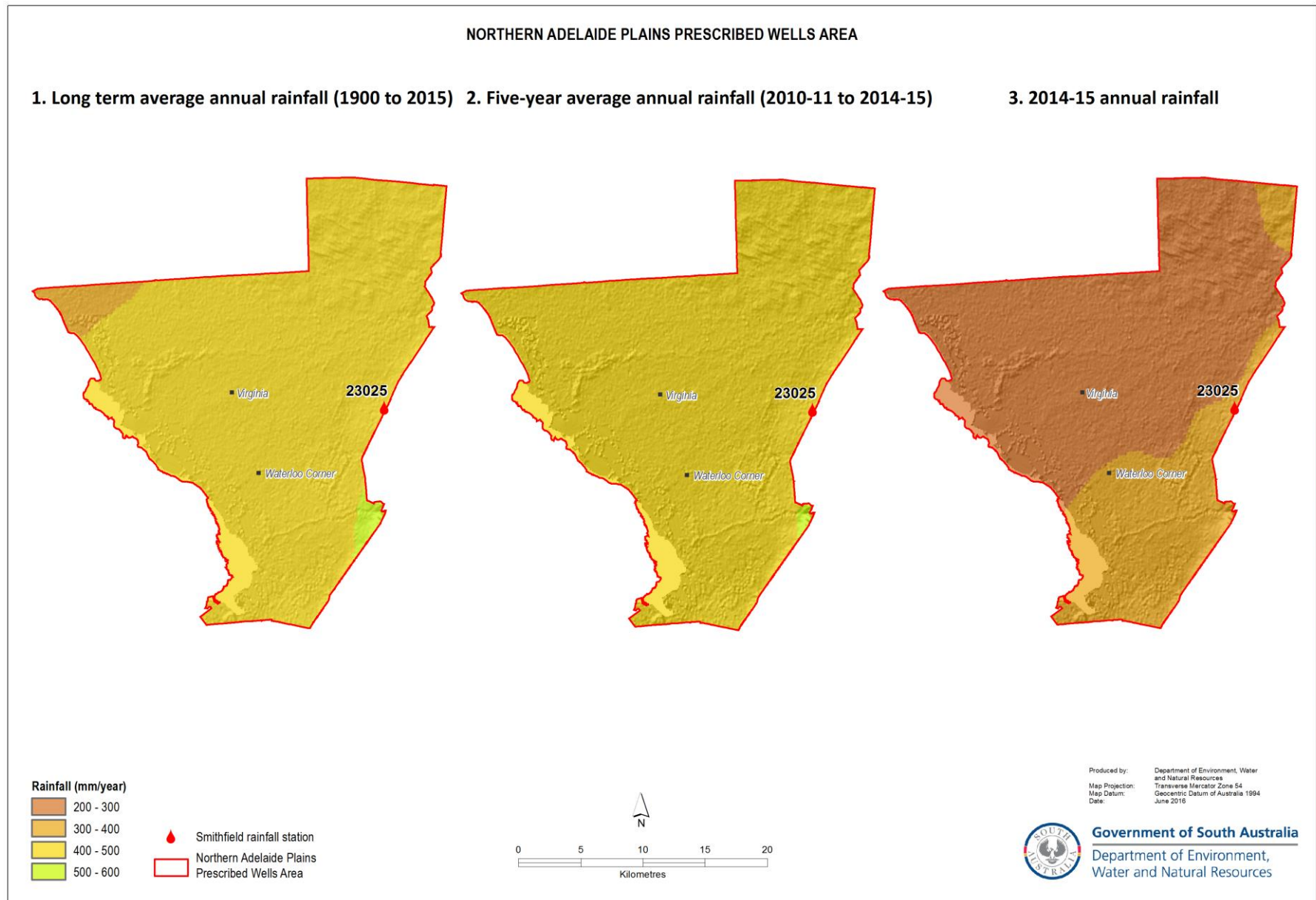


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year recorded at Smithfield (BoM Station 23025)²

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.

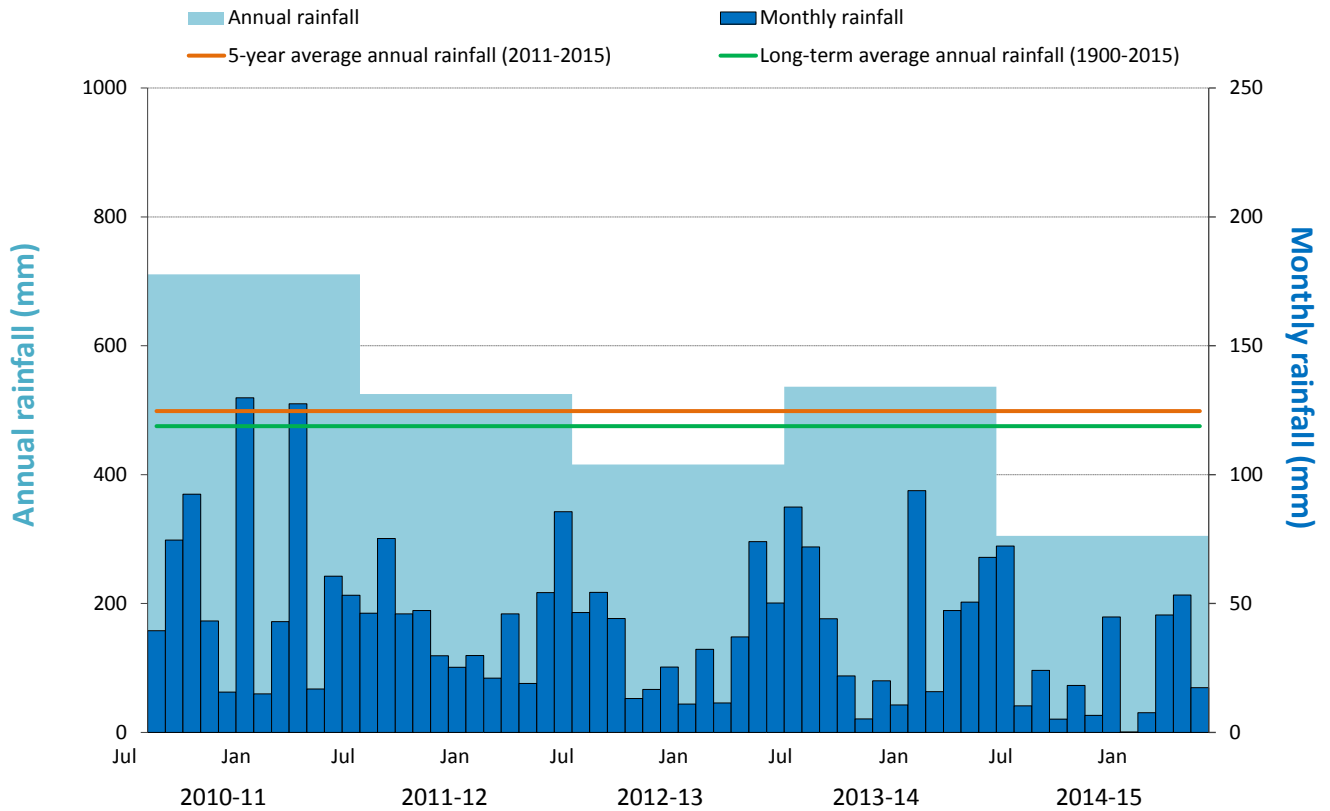


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Smithfield (BoM Station 23025)³

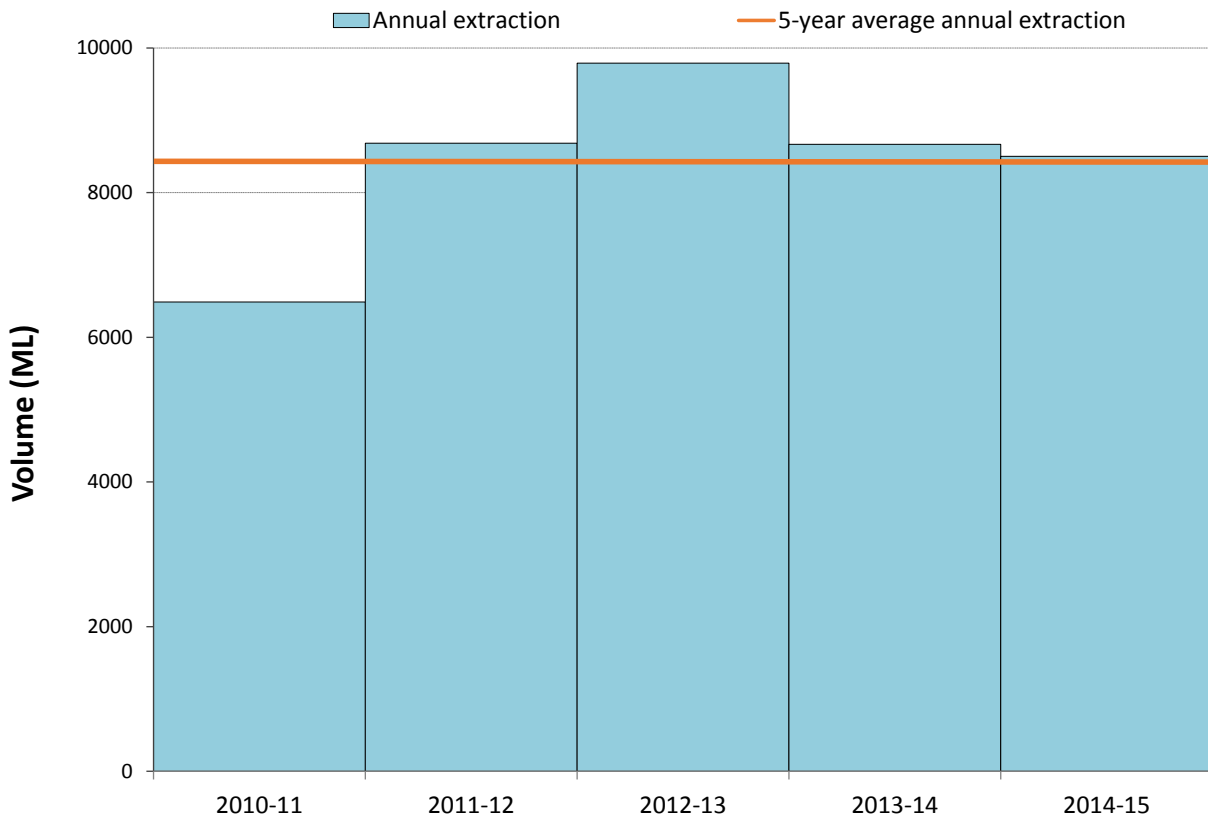


Figure 3. Licensed groundwater extraction volumes⁴ for the past five water-use years, for the T2 aquifer of the Northern Adelaide Plains Prescribed Wells Area

³ 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.

⁴ The licensed groundwater extraction volume 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.

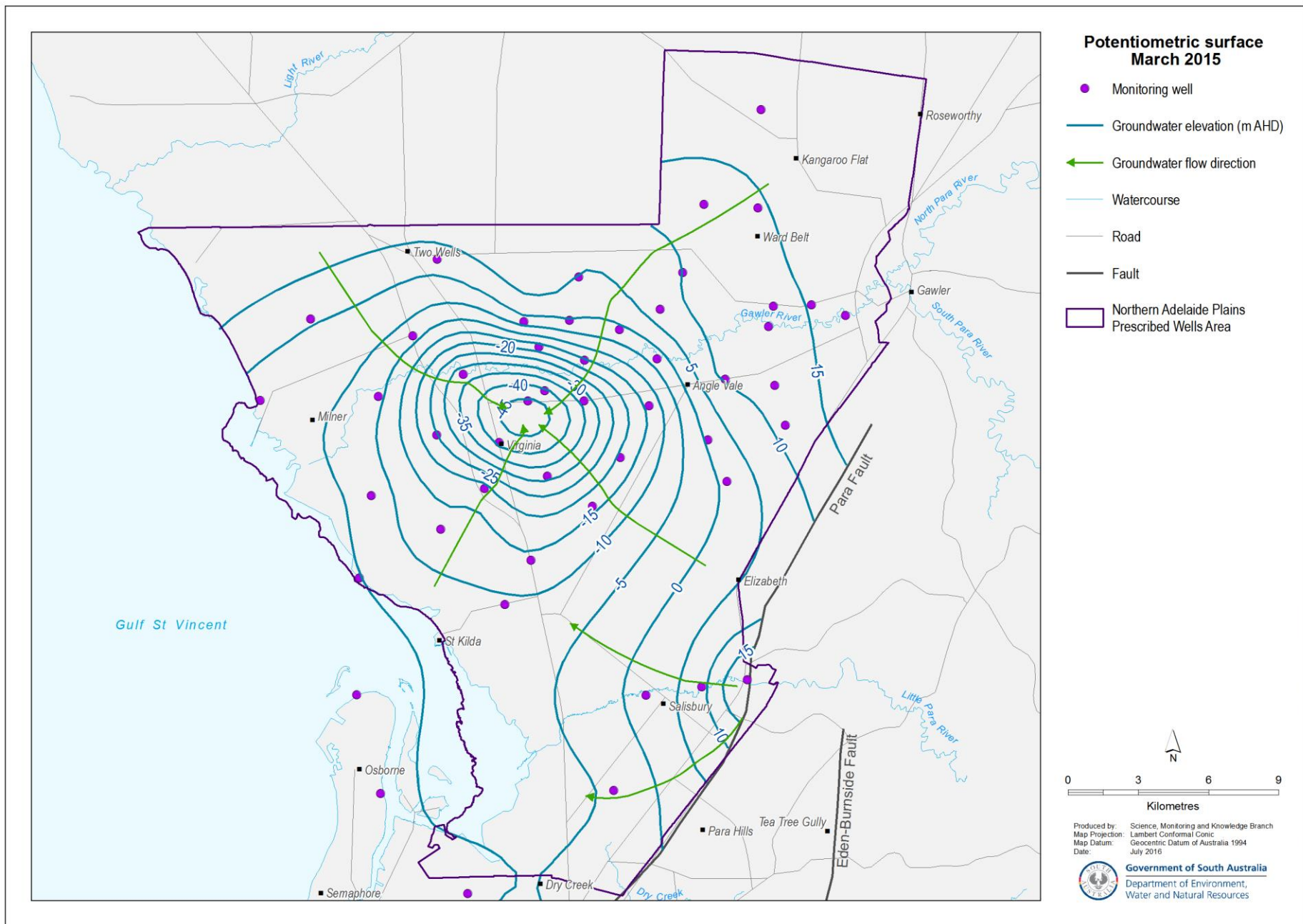


Figure 4. Potentiometric surface and direction of groundwater flow in the T2 aquifer (Northern Adelaide Plains Prescribed Wells Area) in March 2015

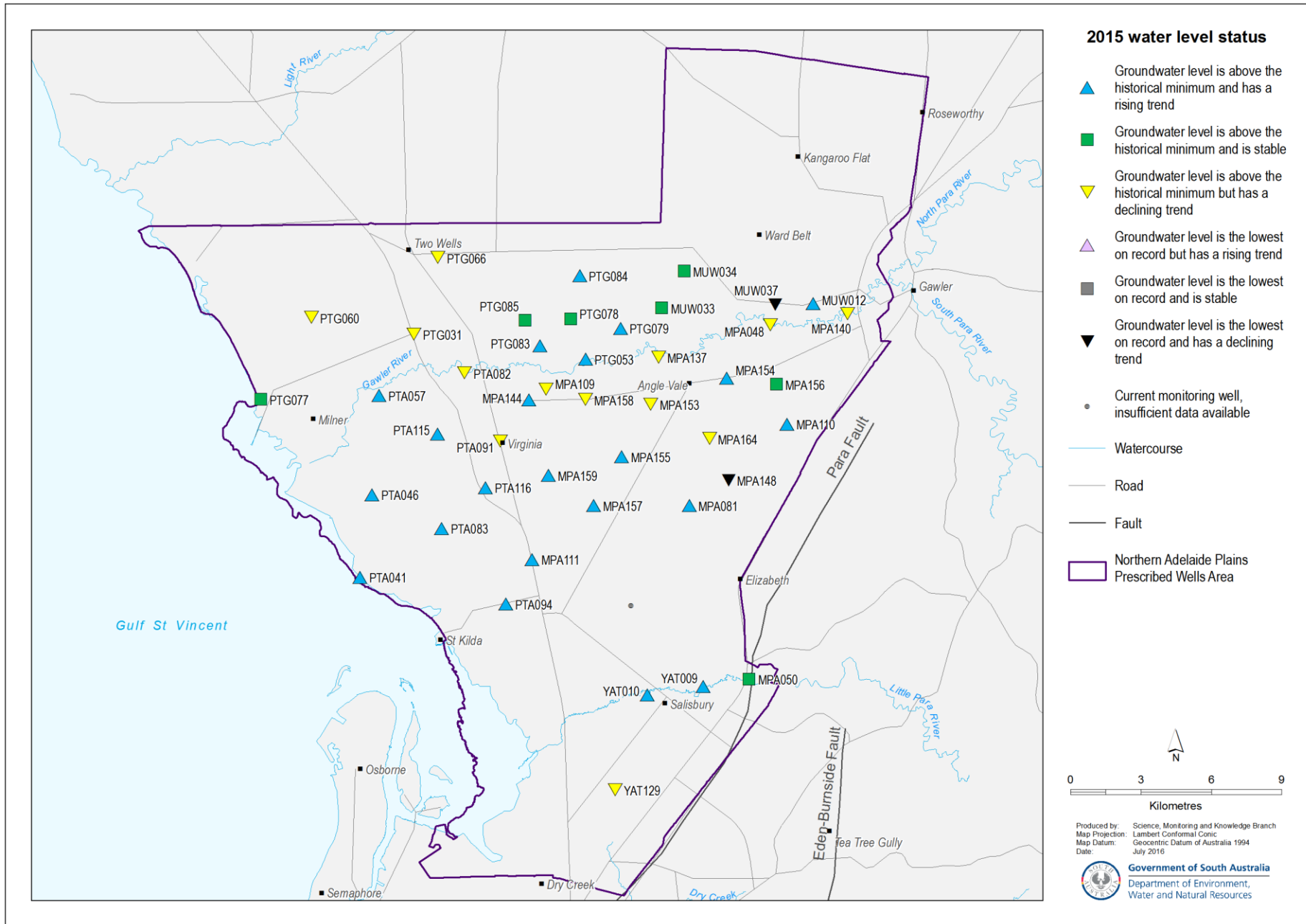


Figure 5. 2015 status of the groundwater pressure levels in the T2 aquifer (Northern Adelaide Plains Prescribed Wells Area) based on the 5-year trend from 2011 to 2015

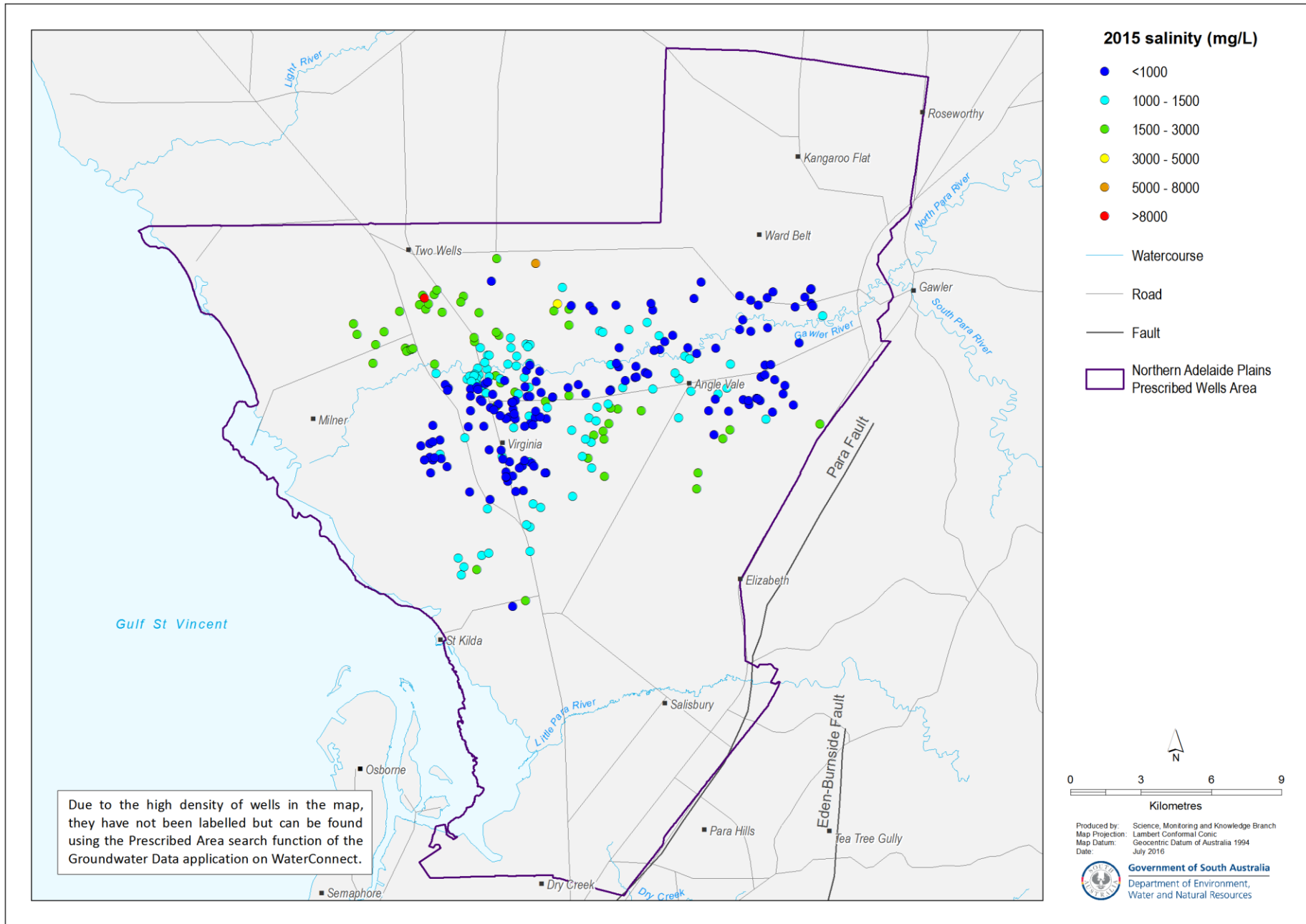


Figure 6. 2015 groundwater salinities of T2 aquifer (Northern Adelaide Plains Prescribed Wells Area)

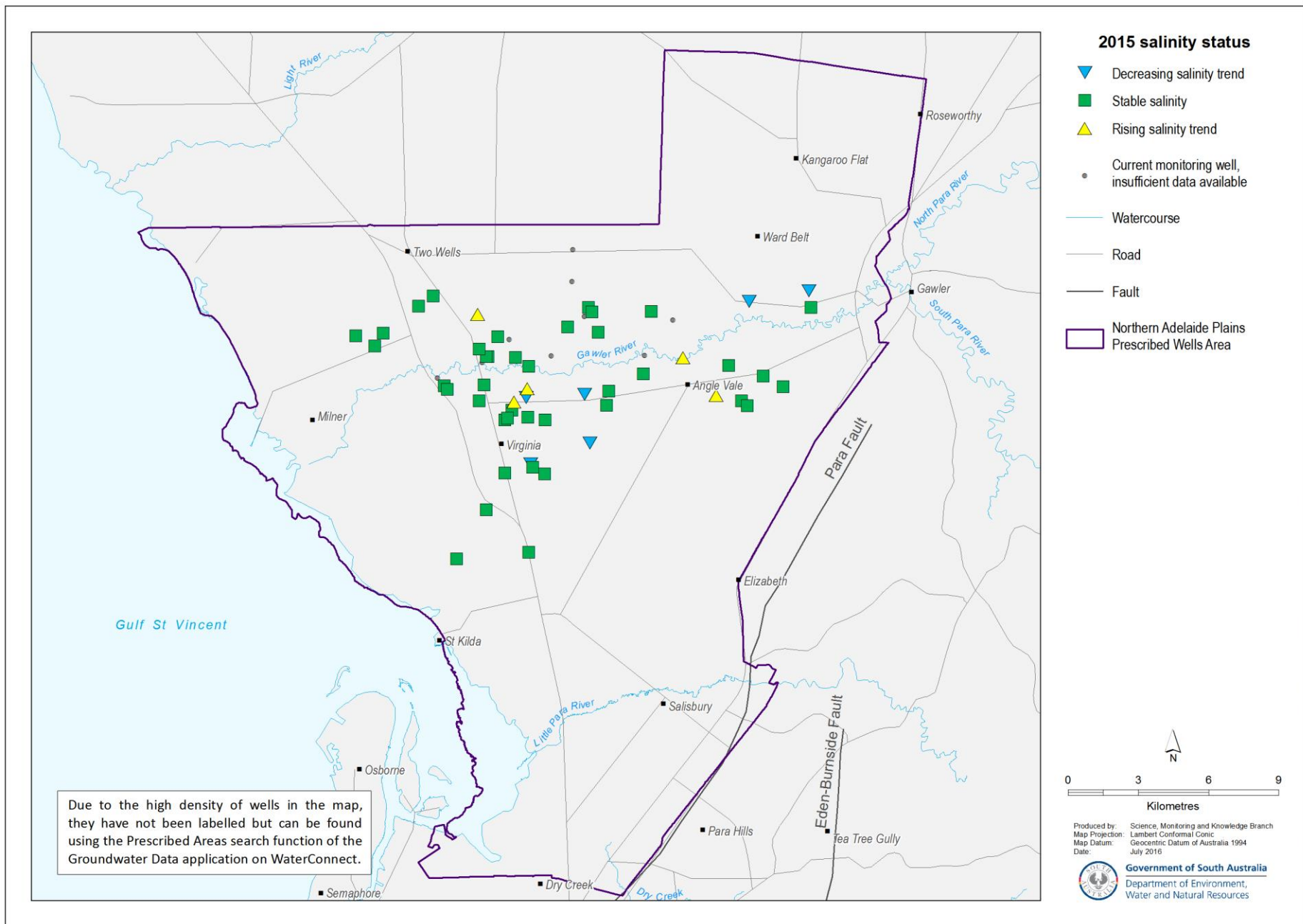


Figure 7. 2015 status of the groundwater salinities in the T2 aquifer (Northern Adelaide Plains Prescribed Wells Area) based on the 5-year trend from 2011 to 2015

