

# Prescribed Wells Areas of the South East

## Confined aquifer

2014 Groundwater level and salinity status report



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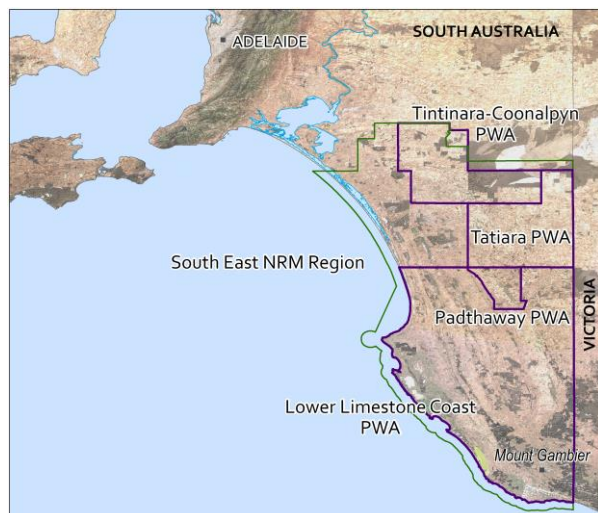
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ISBN 978-1-922255-70-9

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# 2014 Summary



There are four prescribed wells areas in the South East NRM Region of South Australia—Tintinara–Coonalpyn, Tatiara, Padthaway and Lower Limestone Coast. Groundwater in these areas is prescribed under South Australia’s *Natural Resources Management Act 2004*. Water allocation plans for each prescribed wells area (PWA) provide for the sustainable use of the groundwater resources.

The prescribed wells areas of the South East are underlain by sediments of the Murray and Gambier Basins that form two aquifer systems: an unconfined aquifer comprising various Quaternary and Tertiary limestones and an underlying Tertiary confined sand aquifer. In the Tintinara–Coonalpyn PWA, the confined aquifer consists of Murray Basin sediments: the Buccleuch Formation on the coastal plain and the Renmark Group in the highlands. The confined aquifer primarily consists of the Renmark Group across the Tatiara PWA as the Buccleuch

Formation is relatively thin. In the Lower Limestone Coast PWA, the confined aquifer is comprised of the Dilwyn Formation of the Gambier Basin, the equivalent of the Renmark Group in the Murray Basin. The Dilwyn Formation is generally thin or absent in the Padthaway PWA.

Groundwater in the confined aquifer flows from the topographic high of the Dundas Plateau in Victoria. From there, the groundwater flows radially westward and southward to the coast and northward to the Murray River. Artesian conditions exist in the west, particularly in the Kingston wellfields and in the south along the coastal areas.

Despite being a confined aquifer that does not receive direct recharge from local rainfall, the intensity and timing of local rainfall and subsequent extraction practices can have an effect on groundwater levels and salinity in the confined aquifer. For example, if the South East experienced above-average rainfall during typically dry summer months, this could result in less groundwater being extracted from the confined aquifer for irrigation purposes and therefore smaller declines in groundwater levels and stable or improving salinity. Conversely, below-average summer rainfall can result in increased irrigation extractions, which can cause the groundwater levels to fall and salinity to increase.

Analysis of climatic trends in the South East has revealed a general drying trend since the early 1950s. This is reflected in most groundwater hydrographs and a strong relationship has been demonstrated between decreases in average annual rainfall and declining water levels measured in observation wells for both the confined and unconfined aquifers over the last 40 years.

The Mount Gambier Aero rainfall station (number 26021) is located about 8 km north of Mount Gambier and recorded 635 mm of rain in 2014. This is 86 mm less than the long-term average annual rainfall for this station and 100 mm less than the 2013 rainfall. The months of May and June received rainfall significantly above its long-term monthly average; January, March and April recorded about the long-term monthly average rainfall and rainfall was well below the average for the rest of the months (Fig. 1).

The Keith rainfall station (number 25507) is located in the township of Keith and recorded 291 mm of rain in 2014. This is nearly 174 mm less than the long-term average annual rainfall for this station and just over 100 mm less than the 2013 rainfall. The month of June received rainfall well above the long-term monthly average, April was at average and the remaining months experienced below-average rainfall, some considerably so (Fig. 2).

Licensed groundwater extractions (excluding stock and domestic use) in 2013–14 from the Tertiary confined sand aquifer in the South East PWAs totalled 16 626 ML<sup>1</sup>, a decrease of 12% (2312 ML) from the previous water-use year (Fig. 3).

<sup>1</sup> The licensed groundwater use for the 2013–14 water-use year is based on the best data available as of June 2015 and will be subject to change, as approximately ten percent of South East annual water use reports had not been submitted at the time of printing. As such, the total licensed groundwater use will be higher than the volume presented in this report.

Long-term observations of the confined aquifer indicate that the groundwater elevation is declining at variable rates. The decline in the groundwater elevation has been highest in the Tintinara–Coonalpyn area and the Kingston artesian wellfield. Some areas have shown signs of recovery, particularly the Kingston artesian wellfields.

In 2014, of the 113 observation wells with sufficient data, just over half (55%) recorded a decline in the maximum recovered groundwater elevation when compared to 2013 data (Fig. 4). Declines ranged from 0.1 to 3.0 m, median of 0.5 m, with the largest declines occurring predominantly around Tintinara and to the south-east of Kingston. Thirty percent of wells recorded a negligible change in the groundwater elevation, where the rise or decline was less than 0.1 m. The remaining 15% of wells displayed an increase, ranging from 0.12–1.13 m, with a median of 0.24 m. Rises were scattered across the region.

The change in the confined potentiometric level could be attributed to the hydrostatic loading and unloading effect from water level changes in the overlying unconfined aquifer (through variations of the amount of the recharge) and possibly leakage between the confined and unconfined aquifers where the confining layer is thin. Increased or decreased extraction from the confined aquifer, can also contribute to the change in water levels.

Observation wells indicate no major changes in the groundwater salinity of the confined aquifer have occurred over the long term.

In 2014, salinity continues to be stable, with 90% of observation wells with sufficient data recording a change in salinity of less than 5% and 100% recording a change of less than 7%. The salinity concentration ranged between 600 and 4000 mg/L, with 88% of the 34 monitored wells recording salinity of less than 1500 mg/L (Fig. 5). The majority of wells with salinity greater than 1500 mg/L are found west of Tintinara and in the north-west of the Tatiara PWA.

The confined aquifer of the prescribed wells areas of the South East has been assigned a yellow status for 2014:

## 2014 Status



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

This means that minor adverse changes in the resource 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 (such as drinking water, irrigation or stock watering) for at least 15 years.

The 2014 status for the confined aquifer of the prescribed wells areas of the South East is supported by:

- an overall minor decline in the maximum recovered groundwater elevation in 2014 when compared with 2013 data.

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

To view the 2011 groundwater level and salinity status reports for the Tintinara–Coonalpyn, Tatiara, Lower Limestone Coast and Padthaway PWAs, which include background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, please visit the [Water Resources](#) page on WaterConnect website.

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

For further details about the prescribed wells areas of the South East, please see the relevant water allocation plans on the Natural Resources South East [website](#).

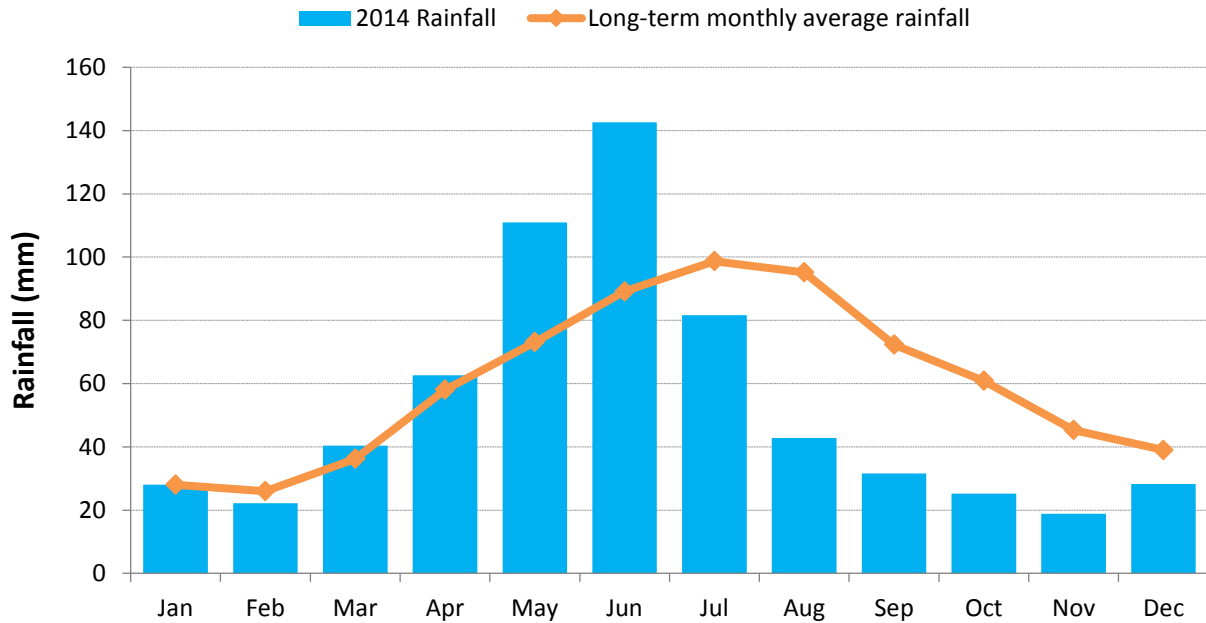


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Mt Gambier Aero rainfall station (number 26021)<sup>2</sup> in the prescribed wells areas of the South East

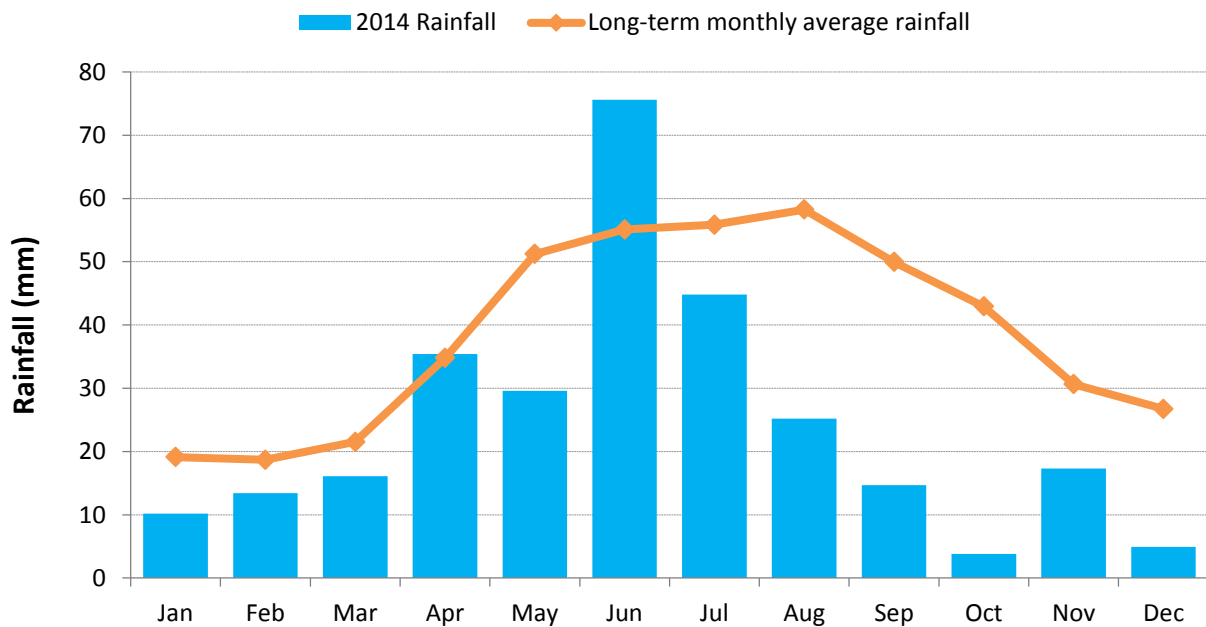


Figure 2. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Keith rainfall station (number 25507)<sup>1</sup> in the prescribed wells areas of the South East

<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).

### Confined aquifer of the South East prescribed areas annual groundwater extraction

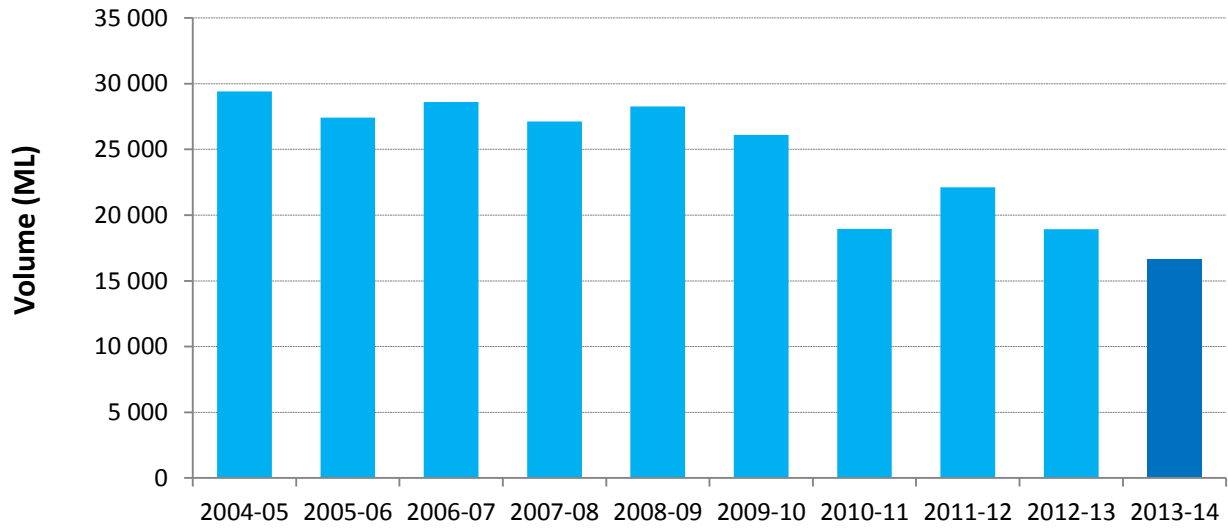


Figure 3. Historical licensed groundwater use for the confined aquifer of the prescribed wells areas of the South East

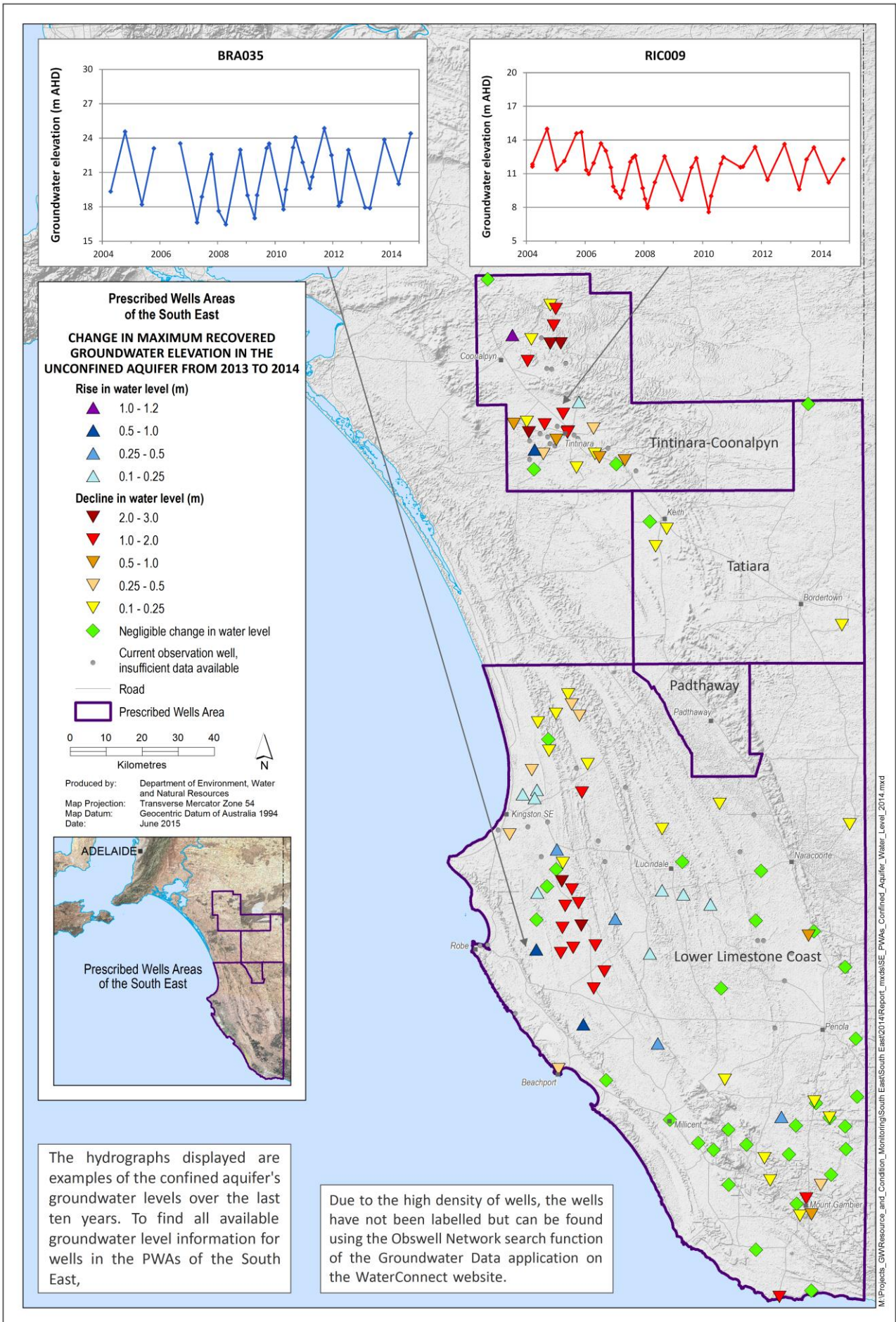


Figure 4. Overall changes in maximum groundwater levels in the confined aquifer of the prescribed wells areas of the South East from 2013 to 2014

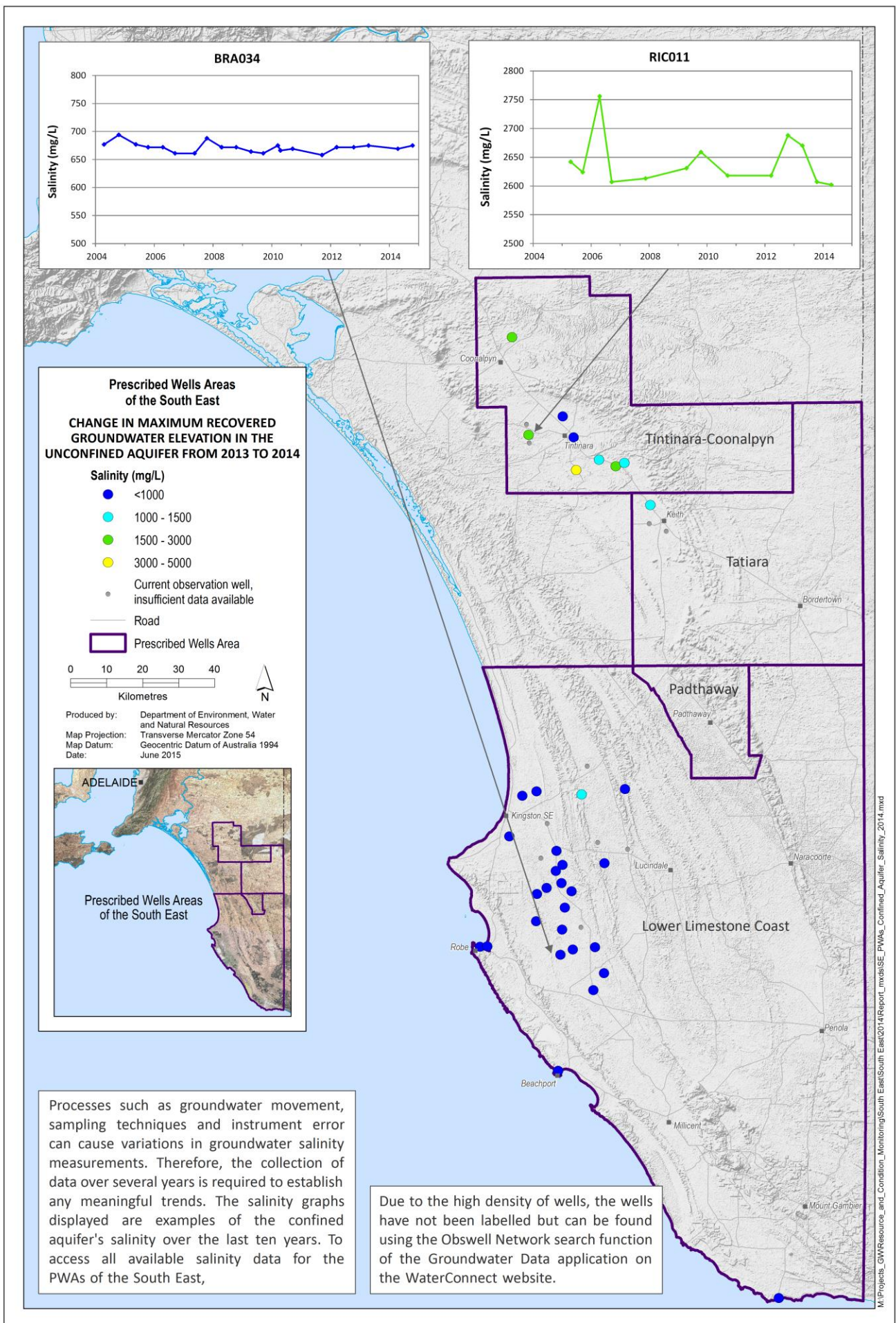


Figure 5. Groundwater salinity of the confined aquifer of the prescribed wells areas of the South East for 2014