Southern Basins PWA

Lincoln Basin

2014 Groundwater level and salinity status report

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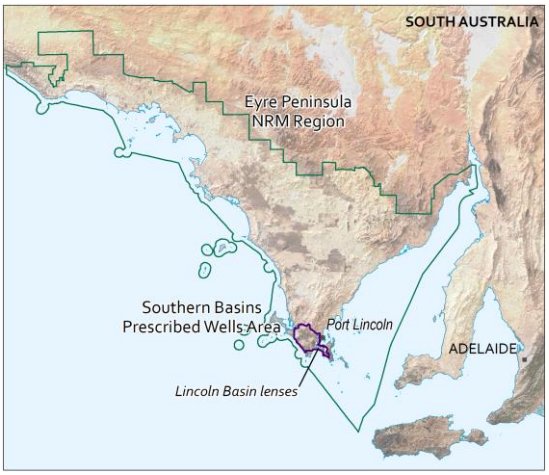
2014 Summary



The Southern Basins Prescribed Wells Area (PWA) is located at the southernmost part of the Eyre Peninsula, between Port Lincoln and Coffin Bay in the Eyre Peninsula 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. The Lincoln Basin is located in the south-east of the Southern Basins PWA.

Within the Southern Basins PWA there are two main sedimentary sequences containing groundwater that overlie basement rocks: the Quaternary limestone aquifer and the underlying Tertiary sands aquifer. The Quaternary limestone aquifer comprises a generally thin veneer of aeolianite sediments of the Bridgewater Formation and is continuous across the PWA. Areas within the Quaternary limestone aquifer defined by salinity of less than 1000 mg/L, such as lenses A, B and C of the Lincoln Basin, are described as fresh groundwater lenses in the current water allocation plan. The main source of recharge to the Quaternary limestone aquifer is the direct infiltration of rainfall, and groundwater flow is predominantly towards the nearest coastline in the Southern Basins PWA.

The condition of the groundwater resources in the Southern Basins PWA is highly dependent on recharge from rainfall, with trends in groundwater levels and salinity primarily climate driven: below-average rainfall results in a reduction in recharge to the aquifers. Below-average summer rainfall can also result in increasing extractions, and these two elements can cause the groundwater levels to fall and salinity to increase. Conversely, increases in rainfall results in increases in recharge, decreases in extractions and groundwater levels may rise and salinity stabilise or decline. Historical rainfall data has indicated that trends of above or below-average rainfall can last for up to 25 years, and that greater recharge responses have been observed when rainfall occurs in high-intensity events.

The Westmere rainfall station (number 18137) is located in the south of the Southern Basins PWA, about 5 km west of Lincoln-B lens, and recorded 491 mm of rain in 2014. This is 83 mm below the long-term (1898–2014) average annual rainfall of 574 mm and about 150 mm less than that recorded in 2013. Well above-average rainfall was recorded in February, May and June, while rainfall was well below-average between August and November (Fig. 1).

Licensed groundwater extractions in the Southern Basins PWA occur predominantly from the Quaternary limestone aquifer. Metered extractions from the Lincoln Basin (lenses A, B and C) totalled 1.6 ML in 2013–14, a 55% decrease from the previous water-use year (Fig. 2). This volume of extraction equates to 0.3% of the total allocation limit of 625 ML for lenses A, B and C of the Lincoln Basin and is 0.03% of the total licensed extractions in the whole PWA.

Long-term groundwater level trends in the Lincoln Basin show a positive correlation to rainfall recorded at the Westmere rainfall station. Since the mid-1980s, groundwater levels trended downwards as rainfall was predominantly below-average. A substantial decrease in groundwater extractions in 2008 and above-average rainfall since 2009 has resulted in a recovery of groundwater levels; however, they are still considerably lower than pre-1980s levels.

In 2014, despite very limited groundwater extractions, 25 of 27 monitoring wells recorded a small decline in the maximum recovered groundwater level (the highest annual groundwater elevation, usually recorded at the end of winter) when compared with 2013 water level data. The largest declines occurred in the area north of lens B (Fig. 3) and ranged between 0.03 to 0.17 m, with a median decline of 0.06 m. One well recorded no change and one well recorded a 0.36 m rise in the maximum level. The declines may be due to less recharge occurring because of less rainfall received compared with 2013. This also follows a significant rise in groundwater levels during 2013 as a result of the above-average rainfall and a significant reduction in groundwater extraction in 2012–13. The maximum recovered groundwater levels in 2014 continue the longer-term stable or rising trends observed since 2009–10.

Groundwater salinity in and around lens A of the Lincoln Basin rose steadily by up to 570 mg/L between 1959 and 2008 and has been relatively stable since 2008. The salinity of the Quaternary limestone aquifer in and around lens B has also risen over time, with some observation wells recording occasional up-coning of saline groundwater due to low groundwater elevations and higher extraction rates. Groundwater salinity in and around lens C is currently less than 800 mg/L and has been relatively stable since 2008.

In 2014, salinities measured at 20 observation wells ranged between 565 and 6850 mg/L, with those above 1500 mg/L outside the known extent of the Lincoln lenses (Fig. 4). Of the nine wells with data for both 2013 and 2014 available for comparison, six wells recorded up to 8% decrease in salinity. One well recorded no change and two wells showed an increase of 2 and 24% in salinity compared with 2013 measurements, with the greatest increase of 24% measured at FLN042. This observation well is located south of lens C, and is outside the known extent of any freshwater lens.

The Lincoln Basin of the Southern Basins PWA 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 status have been observed over the 12-month reporting period. If these conditions were to continue, they are unlikely to negatively impact the beneficial use of the resource (e.g. drinking water, irrigation or stock watering) for at least 15 years.

The 2014 status for the Lincoln Basin is supported by:

- most wells recording a decline in the maximum recovered groundwater level when compared with 2013 data.

To view descriptions for all status symbols, please visit WaterConnect.

To view the *Southern Basins Prescribed Wells Area Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, location of rainfall stations and relevant groundwater-dependent ecosystems, please visit the *Water Resource Assessments* page on WaterConnect.

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

For further details about the Southern Basins Prescribed Wells Area, please see the *Water Allocation Plan for the Southern Basins Prescribed Wells Area* on the Natural Resources Eyre Peninsula website.

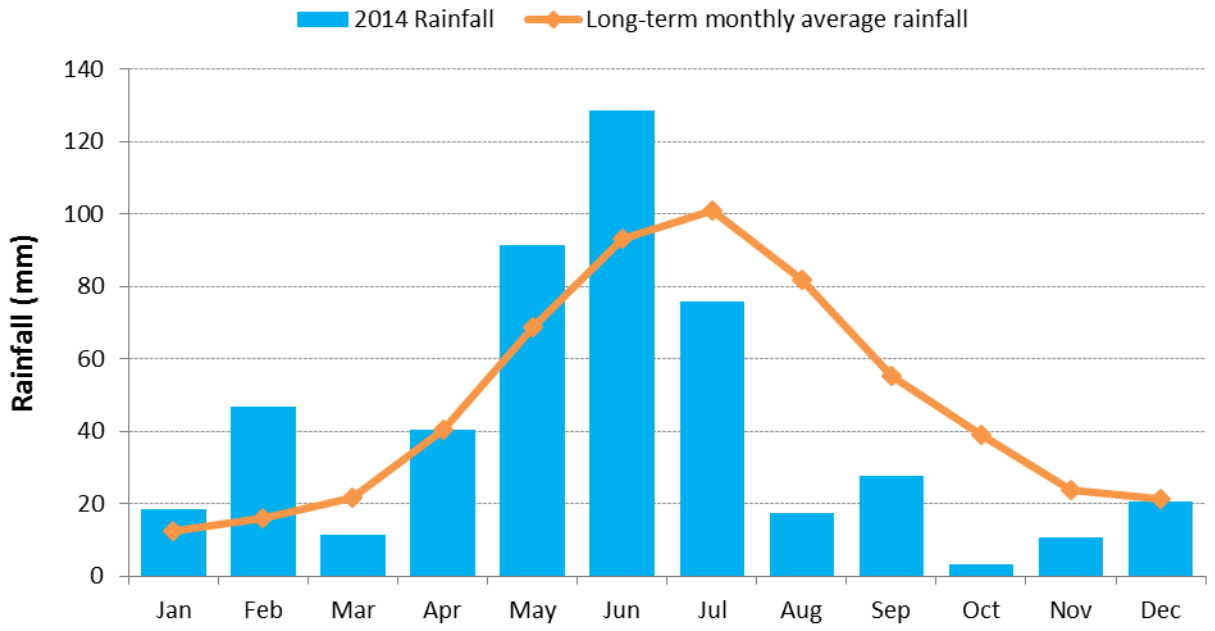


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Westmere rainfall station[1] (number 18137) in the Southern Basins Prescribed Wells Area

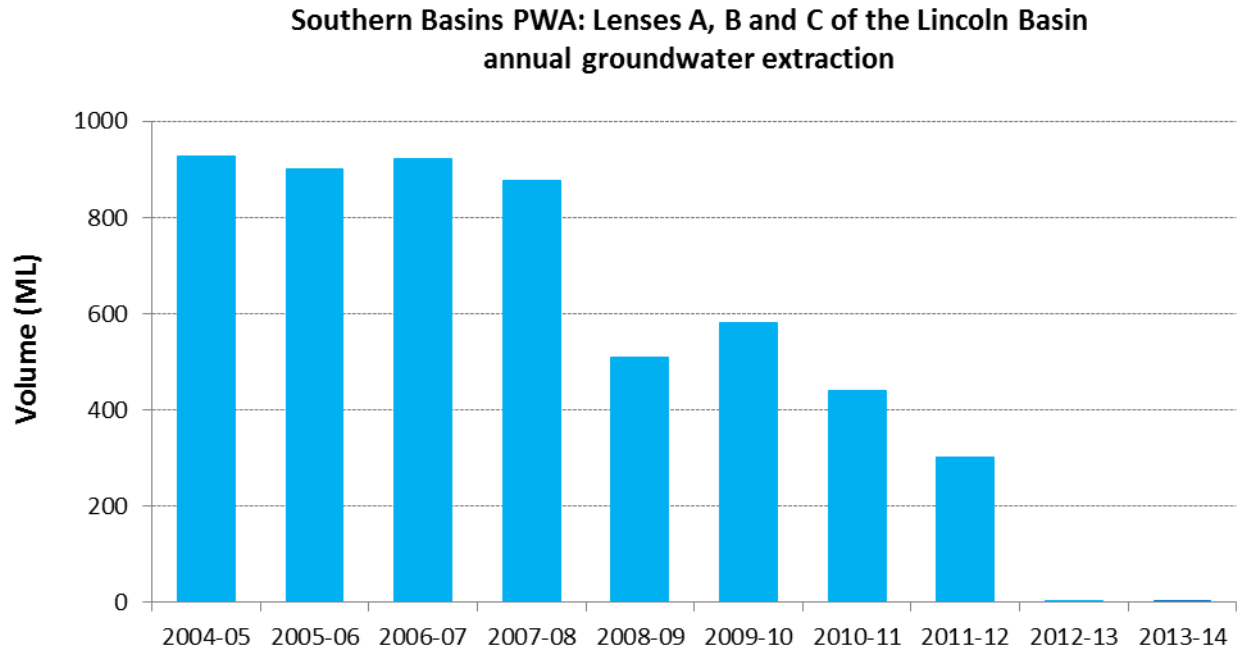


Figure 2. Historical licensed groundwater use for the Lincoln Basin of the Southern Basins Prescribed Wells Area

[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

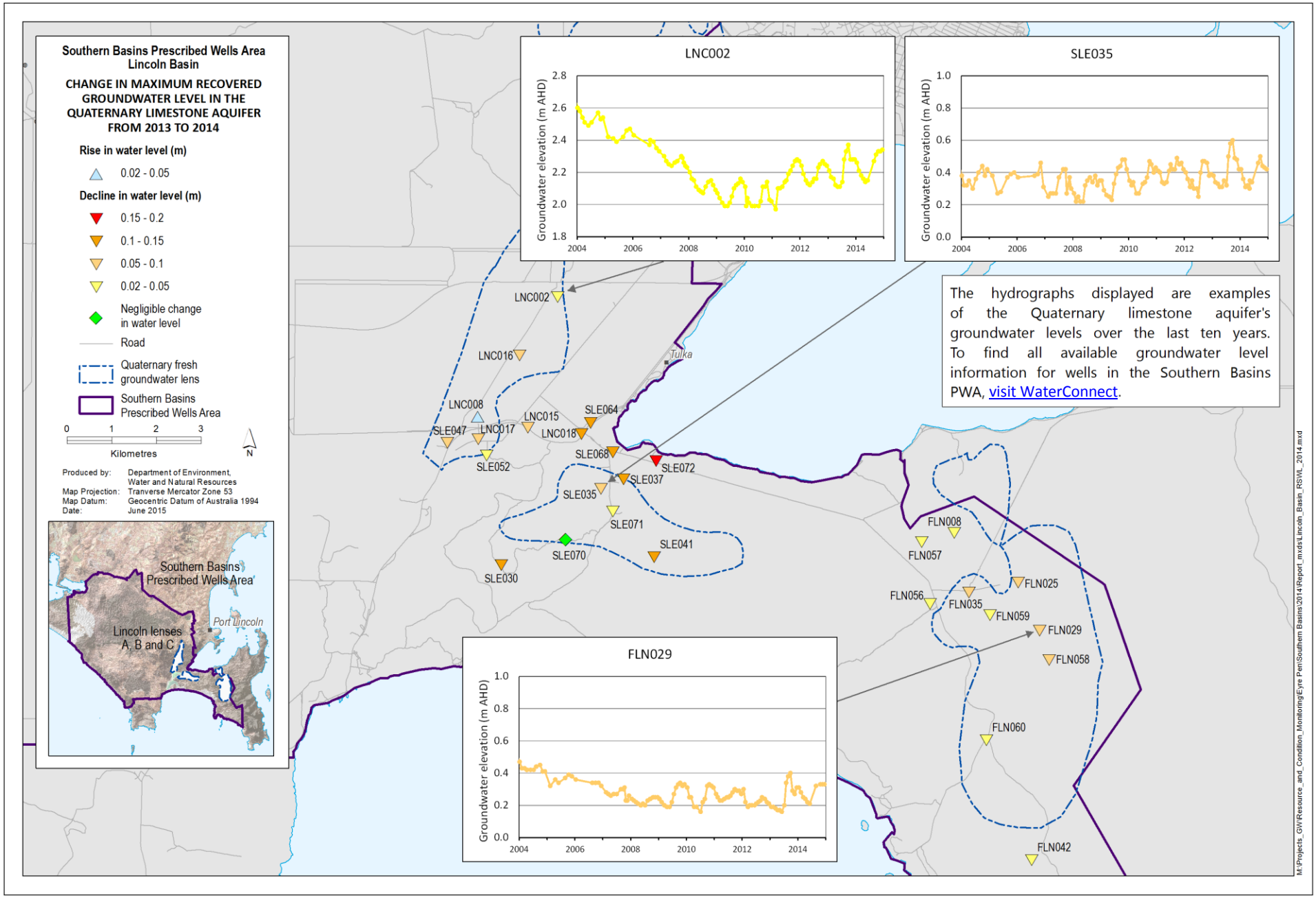


Figure 3. Overall changes in maximum groundwater levels in the Lincoln Basin of the Southern Basins Prescribed Wells Area from 2013 to 2014

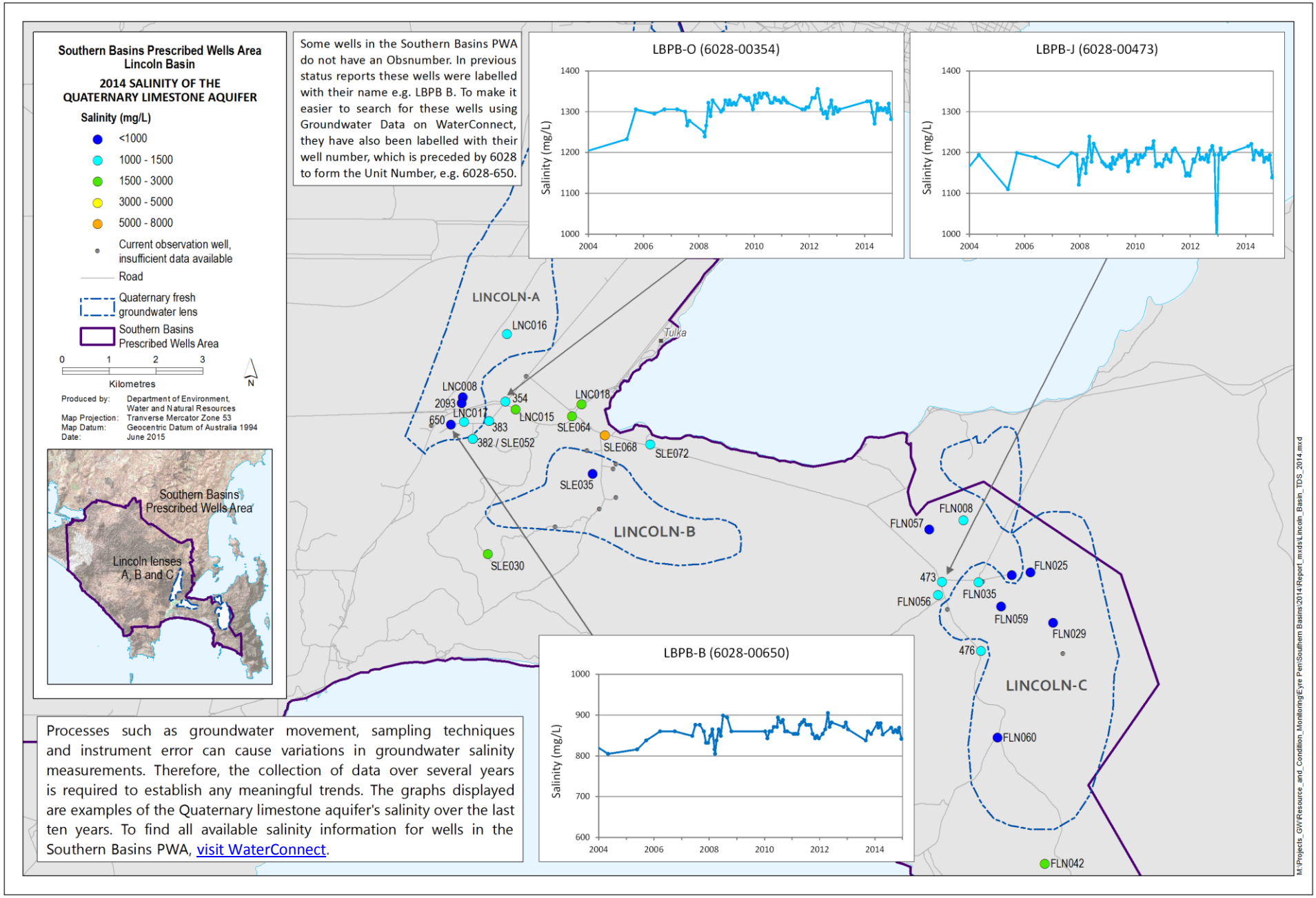


Figure 4. Groundwater salinity of the Lincoln Basin in the Southern Basins Prescribed Wells Area for 2014