

# Tintinara–Coonalpyn PWA

## Unconfined aquifer

2015 Groundwater level and salinity status report



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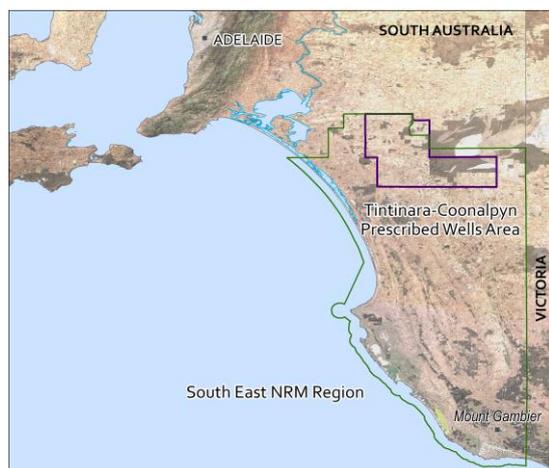
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# 2015 Summary



The Tintinara–Coonalpyn Prescribed Wells Area (PWA) is located in the upper South East of South Australia, approximately 175 km south-east of Adelaide, in the South East NRM Region. It is a regional-scale resource for which groundwater is prescribed under South Australia’s *Natural Resources Management Act 2004*. A water allocation plan provides for the sustainable use of the groundwater resources.

The Tintinara–Coonalpyn PWA is underlain by sediments of the Murray Basin and can be divided topographically into two discrete landforms, each with different hydrogeological characteristics and groundwater management issues. A low-lying plain lies to the west, with the highlands located to the east. Both landforms are underlain by two aquifer systems—an unconfined aquifer comprising various Quaternary and Tertiary limestones, sands and sandstones, and an underlying confined Tertiary sand aquifer. The

Quaternary-aged Padthaway, Coomandook and Bridgewater Formations form the unconfined aquifer on the plain. In the highlands, the Tertiary-aged Murray Group limestone forms the unconfined aquifer. The main source of recharge to the unconfined aquifer is the direct infiltration of rainfall and groundwater flows from east to west.

Trends in groundwater levels and salinity in the Tintinara–Coonalpyn PWA are driven by a number of interconnected factors such as climate, vegetation clearance, land use and irrigation drainage. Below-average summer rainfall can result in an increase in irrigation extraction and the recycling of irrigation drainage water, and combined can cause groundwater levels and salinity to increase. Where no irrigation is occurring, groundwater extraction in the area can result in declining groundwater levels. The clearing of deep-rooted native vegetation and replacing it with shallow-rooted pasture and crops typically results in increased recharge and the potential for saline soilwater to be displaced into the groundwater, causing rising groundwater levels and salinity. Groundwater level and salinity trends on the low-lying plain are more responsive to variations in rainfall and extraction, and the recycling of irrigation drainage water as the watertable is shallow. In the highlands the watertable can be more than 10 m below the surface resulting in a delayed response, with a lag time dependent on the depth to the watertable, permeability of the sediments (predominantly clay content), land use change and the type of crop irrigated.

The Tintinara rainfall station (BoM Station 25514) is located near the centre of the PWA in the township of Tintinara, and recorded 271 mm of rain in 2014–15, 180 mm less than the long-term average annual rainfall of 451 mm (1900–2015) and 111 mm less than the five-year average of 382 mm (Figs. 1 and 2). With exception to the 2013–14 water-use year, annual rainfall has declined over the past five years (Fig. 2). Long-term seasonal rainfall patterns generally record higher rainfall during the winter months and lower rainfall over summer. This pattern can be seen in Figure 2, with notable seasonal variations including the unusually wet spring–summer of 2010–11 and dry spring–summer–autumn of 2012–13. The 2014–15 water-use year has been particularly dry, with seven months recording less than half their long-term monthly-average rainfall.

Groundwater extractions (excluding stock and domestic use) for the unconfined aquifer totalled 38 840 ML<sup>1</sup> in 2014–15, an increase of 47% from the previous water-use year and 61% of the total allocation volume for the Tintinara–Coonalpyn PWA (Fig. 3). Extraction has increased every year over the past five water-use years, presumably in response to the decline in rainfall (Fig. 2).

Long-term declines in groundwater levels have been observed across the PWA since 2000. In the five years to 2015, 73% of wells with data available for trend analysis recorded a declining groundwater level trend. Of these wells, 17% recorded their lowest groundwater level on record in 2015. Declines ranged between 0.02 and 0.36 m/y across the whole PWA. The remaining 27% of wells recorded a trend of stable or increasing groundwater levels, ranging between 0.02 and 0.20 m/y.

The widespread clearance of native vegetation across the PWA has resulted in increases in salinity as salt, which was previously stored in the root zone of the native vegetation, is flushed down into the unconfined aquifer. Beneath the highlands where the

<sup>1</sup> The licensed groundwater extraction 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 approximately three per cent of South East annual water use reports had not been submitted at that time. As such, the total licensed groundwater extraction may be higher than the volume presented in this report.

depth to the watertable is 40–50 m and the clay content in the soil profile is higher, the impacts of clearing have yet to reach the watertable and no salinity rises have been observed.

In 2015, groundwater salinity ranged between 1900 and 3700 mg/L, though note the limited data availability (Fig. 5). In the five years to 2015, three monitoring wells recorded a trend of stable salinity, though for two of these wells the trend was calculated from 2012 to 2015 due to a lack of data (Fig. 6).

To determine the status of the unconfined aquifer for 2015, the trends in groundwater level and salinity over the past five years (2011 to 2015, inclusive) were analysed, 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 a detailed explanation of the new method of status assessment.

The unconfined aquifer of the Tintinara–Coonalpyn 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 unconfined aquifer is based on:

- most monitoring wells (73%) recording a five-year declining groundwater level trend with 17% of these wells at their lowest level on record in 2015.

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

To view the *Tintinara–Coonalpyn PWA groundwater level and salinity status report 2011*, 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 wells within the Tintinara–Coonalpyn PWA, please visit [Groundwater Data](#) on WaterConnect.

For further details about the Tintinara–Coonalpyn PWA, please see the *Water Allocation Plan for the Tintinara–Coonalpyn PWA* on the Natural Resource South East [website](#).

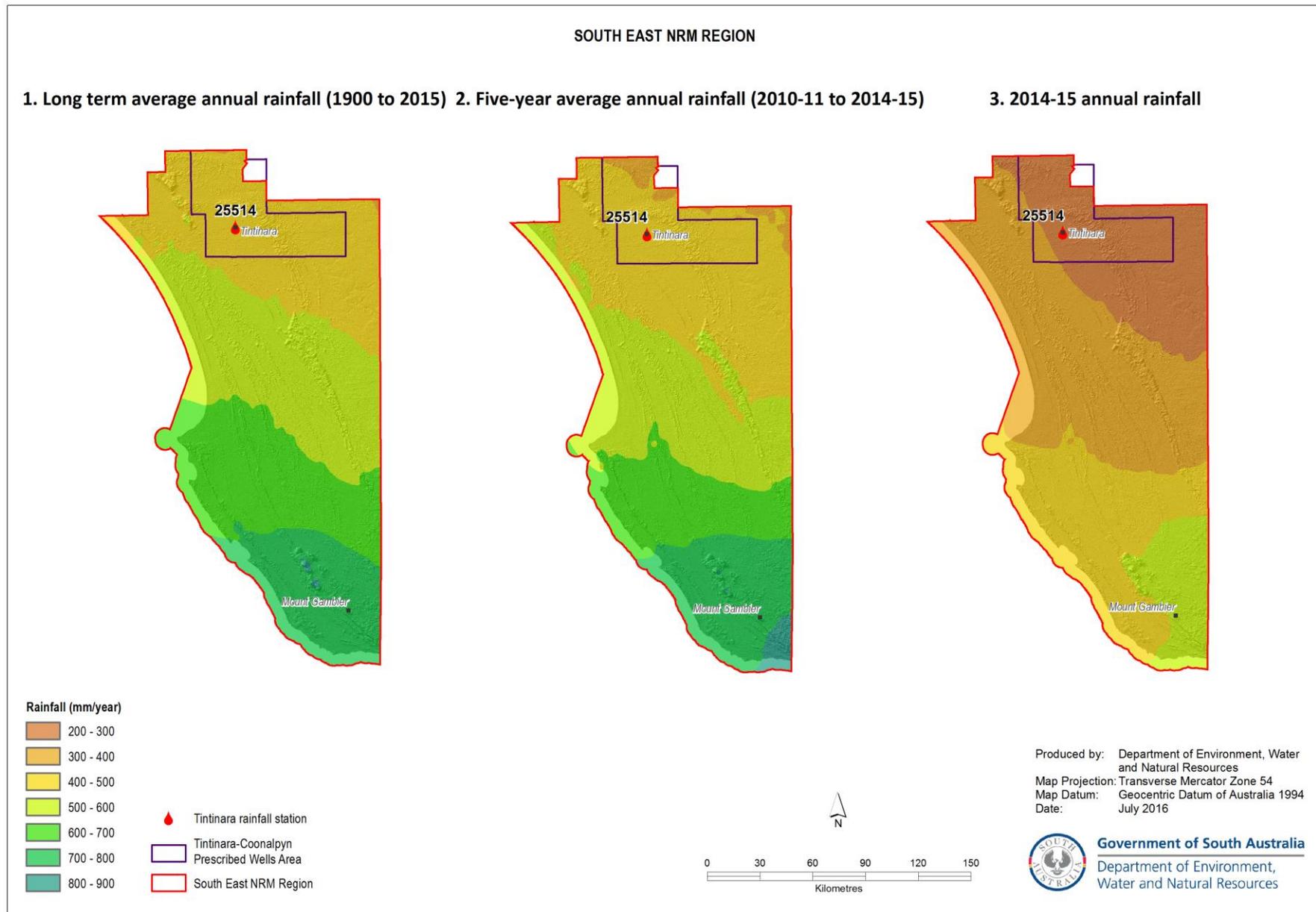


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2014–15 water-use year in the South East NRM Region<sup>2</sup>

<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).

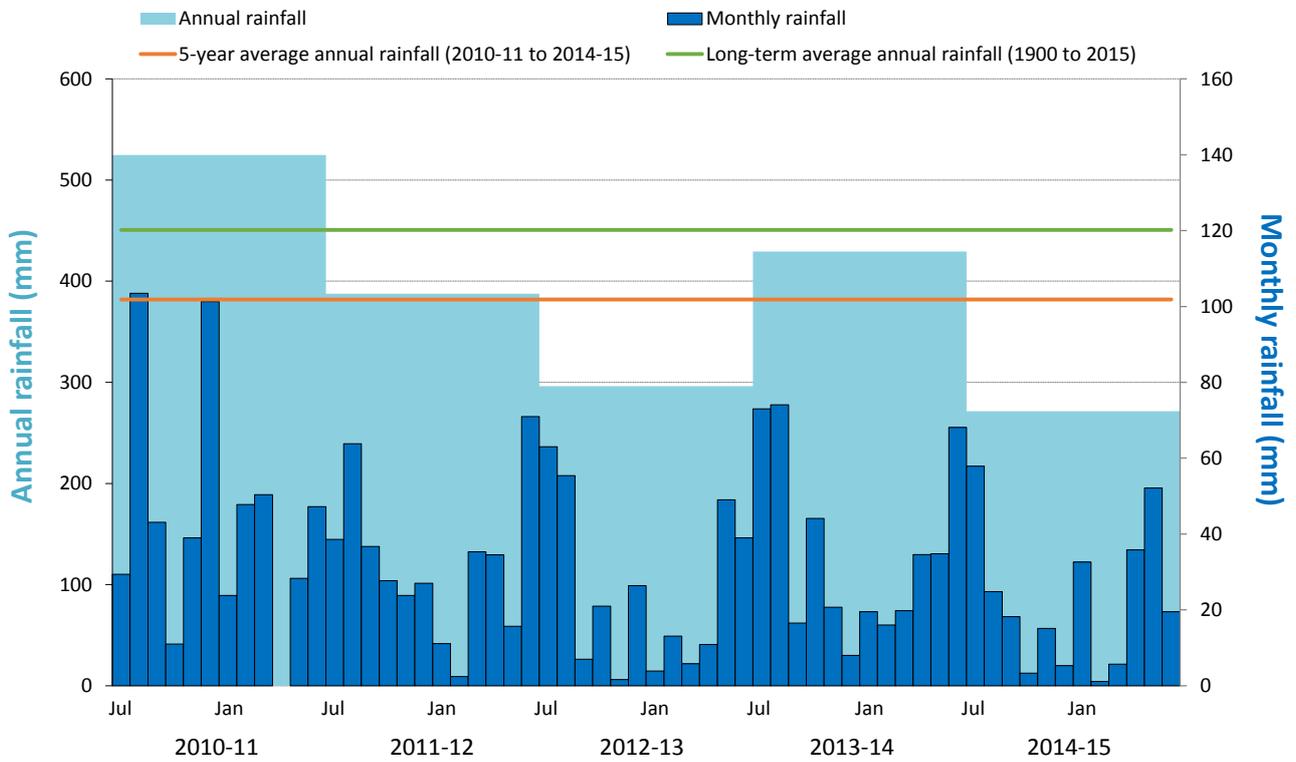


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Tintinara (BoM Station 25514)<sup>3</sup>

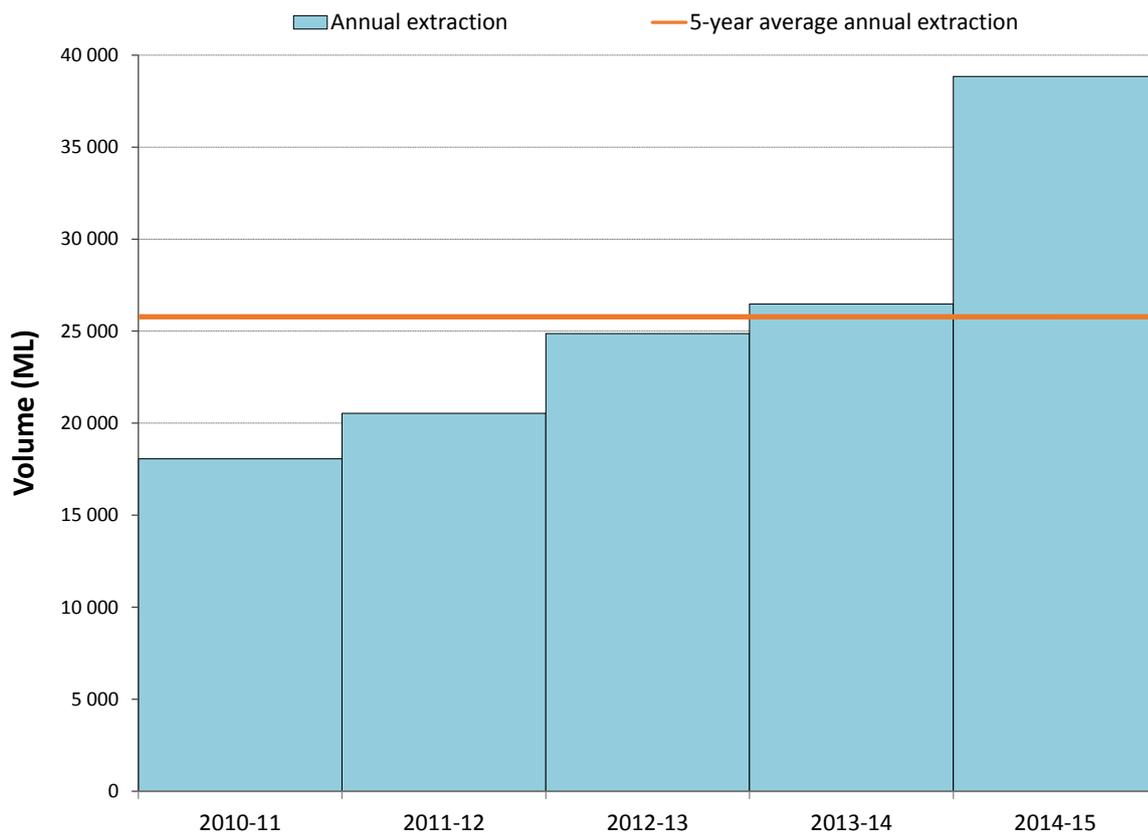


Figure 3. Licensed groundwater extraction volumes<sup>4</sup> for the past five water-use years, from the unconfined aquifer in the Tintinara–Coonalpyn Prescribed Wells Area

<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).

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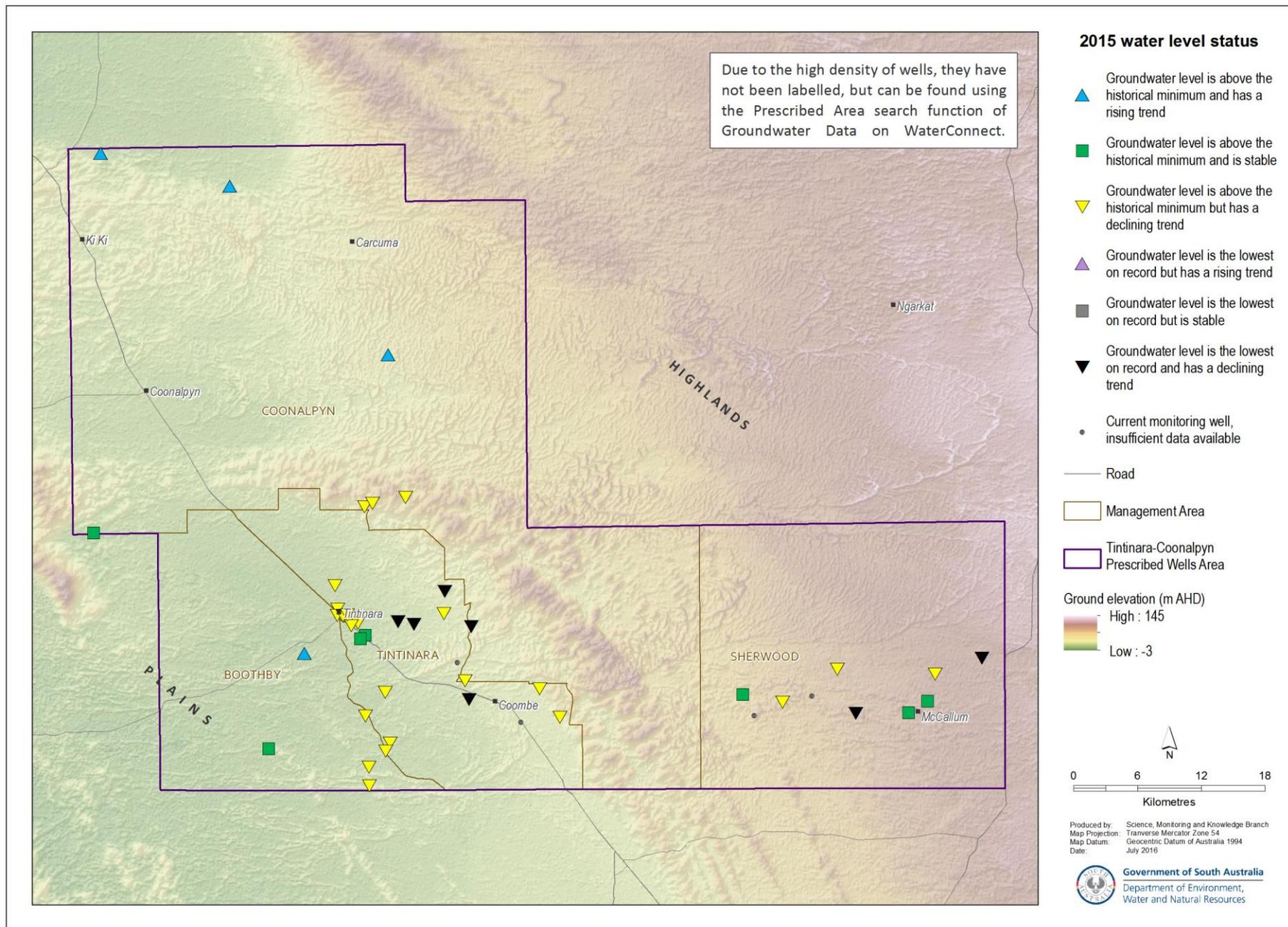


Figure 4. 2015 status of groundwater levels in the unconfined aquifer (Tintinara–Coonalpyn Prescribed Wells Area) based on the five-year trend from 2011 to 2015

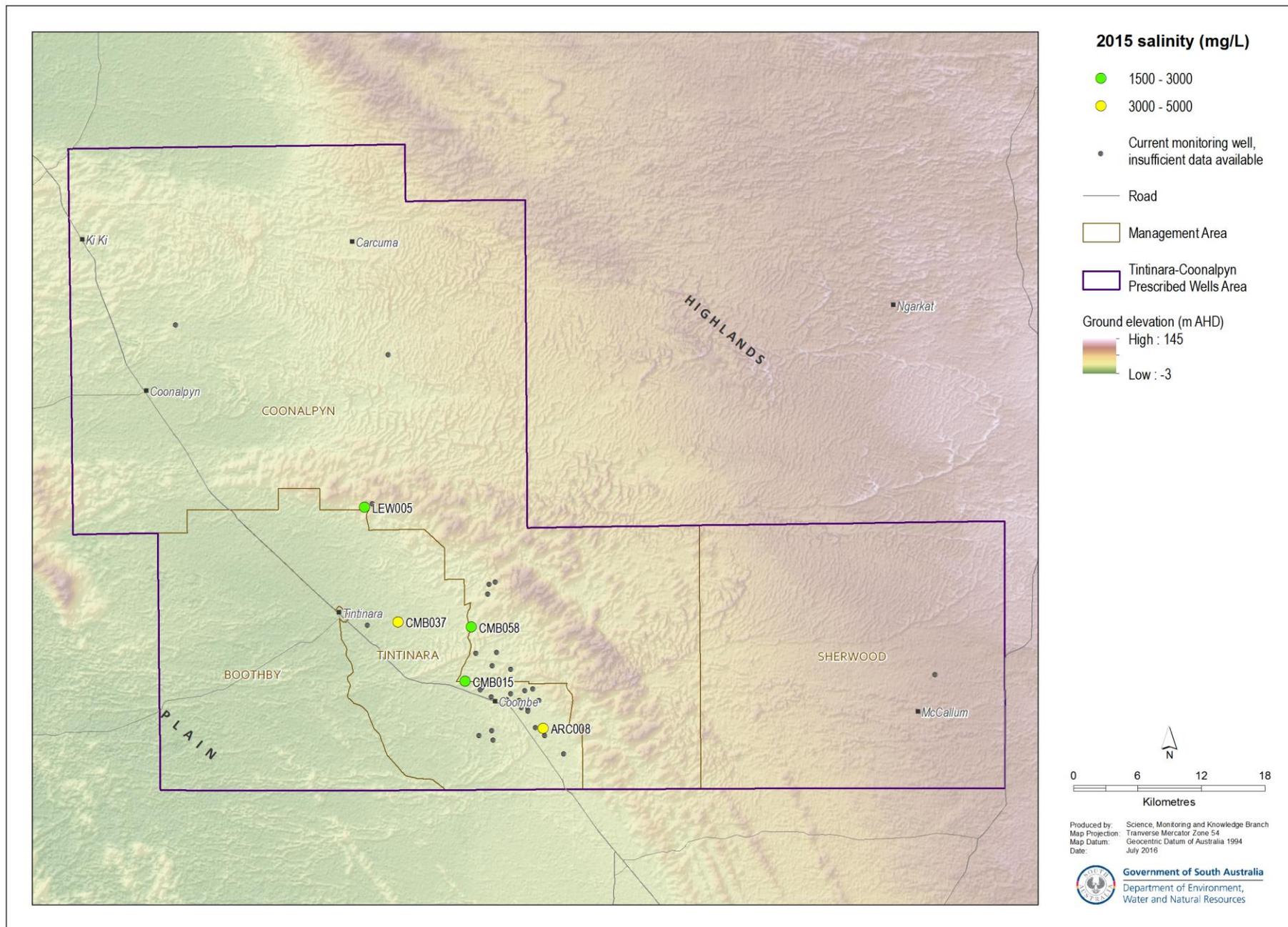


Figure 5. 2015 groundwater salinity of the unconfined aquifer (Tintinara–Coonalpyn Prescribed Wells Area)

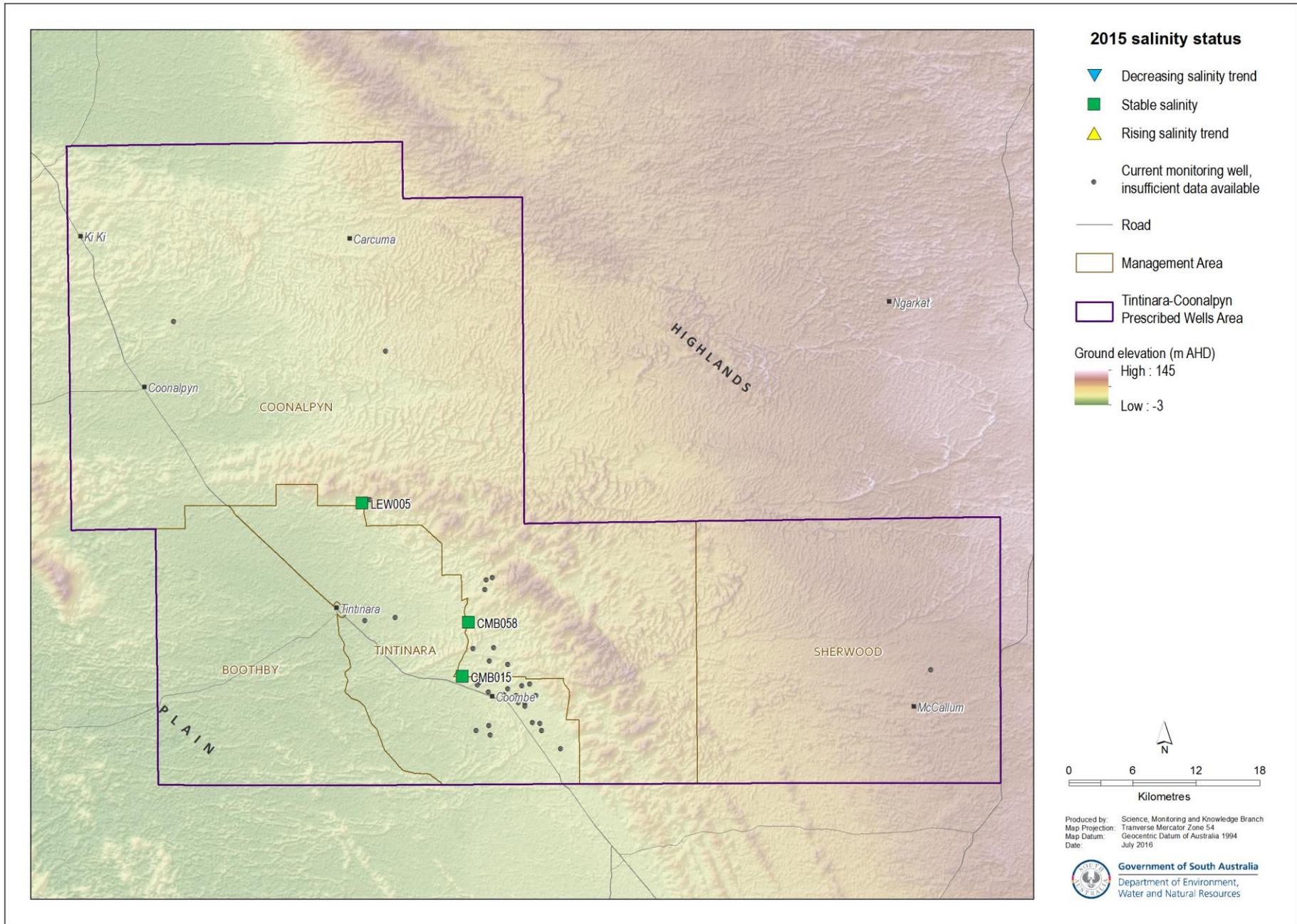


Figure 6. 2015 status of groundwater salinity in the unconfined aquifer (Tintinara–Coonalpyn Prescribed Wells Area) based on the five-year trend from 2011 to 2015

