Tintinara–Coonalpyn PWA Unconfined aquifer

2016 Groundwater level and salinity status report

Government of South Australia
Department of Environment, Water and Natural Resources

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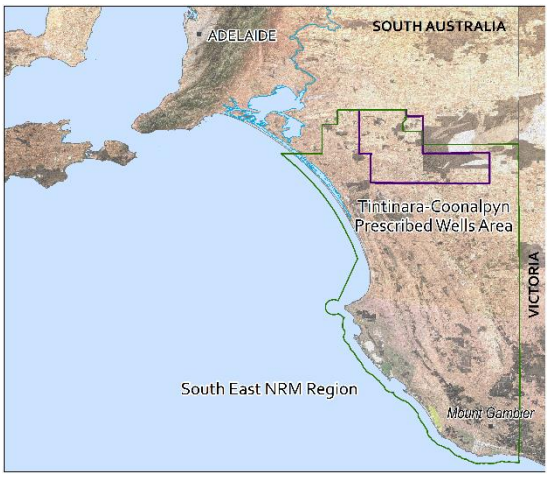
Regional setting



The Tintinara–Coonalpyn Prescribed Wells Area (PWA) is located approximately 175 km south-east of Adelaide, in the (upper) South East Natural Resources Management Region (NRM). It is a regional-scale resource for which groundwater is prescribed under the 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 an unconfined aquifer and a deeper confined Tertiary sand aquifer. The unconfined aquifer comprises sediments of the Murray Basin: various Quaternary and Tertiary limestones, sands and sandstones. The status of the confined groundwater resource is published in a separate report *Prescribed Wells Areas of the South East confined aquifer 2016 Groundwater level and salinity status report*. Please visit the *Water Resource Assessments* page on WaterConnect for more information. The unconfined aquifer of the Tintinara–Coonalpyn PWA is the focus of this report.

On the plains, the Quaternary-aged Padthaway, Coomandook and Bridgewater Formations form the unconfined aquifer. 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 local rainfall and the direction of groundwater flow is generally from east to west.

Trends in groundwater levels and salinity in the Tintinara–Coonalpyn PWA respond to stressors such as variations in climate, vegetation clearance, changes in land use and irrigation drainage. Below-average summer rainfall can result in an increase in irrigation extraction which combined with the recycling of irrigation drainage water, may cause groundwater levels and salinity to increase. Where irrigation is absent, groundwater extraction in the area may result in declining groundwater levels. The clearing of deep-rooted native vegetation and replacing with shallow-rooted pasture and crops typically results in increased recharge and the potential for saline soilwater to be flushed into the groundwater, causing groundwater levels to rise and salinity to increase.

Groundwater levels and salinities on the low-lying plains (Fig. 4) are more responsive to variations in rainfall and extraction, and to the recycling of irrigation drainage water because the depth of the watertable is shallow. In the highlands, the watertable can be greater than 10 m below ground surface resulting in water levels showing a delayed response to variations in rainfall, with a lag time dependent on the depth to the watertable, permeability of the sediments (which is governed by mainly clay content), land use and the type of irrigated crop.

2016 Status

The unconfined aquifer of the Tintinara–Coonalpyn PWA has been assigned a yellow status for2016:

2016 Status

Minor adverse trends have been observed over the past five years

The 2016 status for the unconfined aquifer is based on:

- most monitoring wells (62%) recorded a five-year trend of declining groundwater levels.

Although a yellow status has been assigned to the unconfined aquifer of the Tintinara–Coonalpyn PWA, it is acknowledged that nine wells (28%) show their lowest level on record in 2016.

Rainfall

The Tintinara rainfall station (BoM Station 25514) is located near the centre of the PWA in the township of Tintinara, and recorded 383 mm of rain during the 2015–16 water–use year, which is 68 mm (15%) less than the long-term average annual rainfall of 451 mm (1900–2016), but 30 mm (8%) more than the five-year average of 353 mm (Figs 1 and 2). Trends of declining average annual rainfall are evident when compared to the long term (Fig. 1). In the 2015–16 water-use year, monthly rainfall data show that January, February, March and May recorded above-average rainfall when compared with their respective long-term monthly averages. Notably, April, October and December registered rainfall less than one-third of their respective long-term monthly average rainfall (Fig. 2).

Water use

Groundwater extractions (excluding stock and domestic use) from the unconfined aquifer totalled 40 588 ML[1] in 2015–16, which is 4% greater than the previous water-use year and 38% higher than the five-year average. This volume represents 64% of the total allocation volume for the Tintinara–Coonalpyn PWA (Fig. 3).

Groundwater levels

In the five years to 2016, 20 of 32 monitoring wells (62%) show a trend of declining groundwater levels, at rates ranging from 0.02 to 0.16 m/y. Nine of these wells (28%) recorded their lowest level in 2016 (Fig. 4), and these are located in areas of intensive irrigation immediately east and south-east of Tintinara. A further eight wells show stable groundwater levels while the remaining four wells show a trend of rising groundwater levels, at a median rate of 0.2 m/y.

Groundwater salinity

Over large areas of the PWA, and particularly in the Plains, localised hotspots of increasing salinity have been observed in areas of intensive groundwater irrigation. This process has also been observed in areas where native vegetation has been cleared and salt, which was previously stored in thee shallow root zone, is flushed by rainfall through to the unconfined aquifer.

However, in the Highlands, where the depth to the watertable is 40–50 m and the clay content in the soil profile is higher, the mobilised salt has not yet reached the watertable and increases in groundwater salinity have not been detected.

In 2016, groundwater salinities range between 1250 and 3700 mg/L and five of monitoring wells (83%) show salinties greater than 1500 mg/L (Fig. 5). In the five years to 2016, five monitoring wells have sufficent data to enable an analysis of five-year trends and these wells show stable salinities (Fig. 6).

[1]The licensed groundwater use for the 2015–16 water-use year is based on the best data available as of April 2017 and may be subject to change, as some extraction volumes are in the process of being verified.

More information

To determine the status of the Titinara–Coonalpyn PWA unconfined aquifer for 2016, the trends in groundwater level and salinity over the past five years (2012 to 2016, 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.

To view descriptions for all status symbols, please visit 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 Resources South East website.

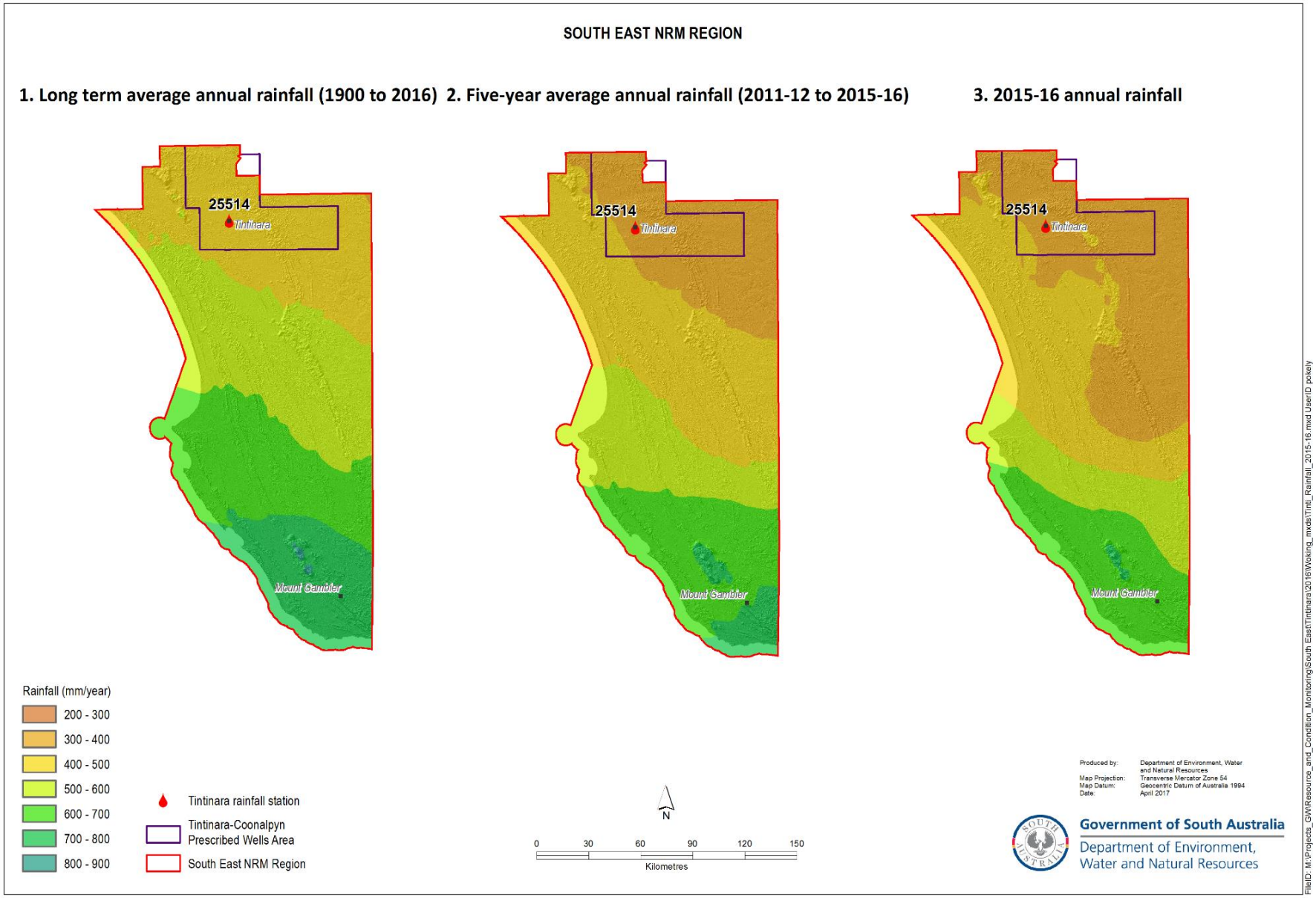


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2015–16 water-use year in the South East NRM Region[2]

[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

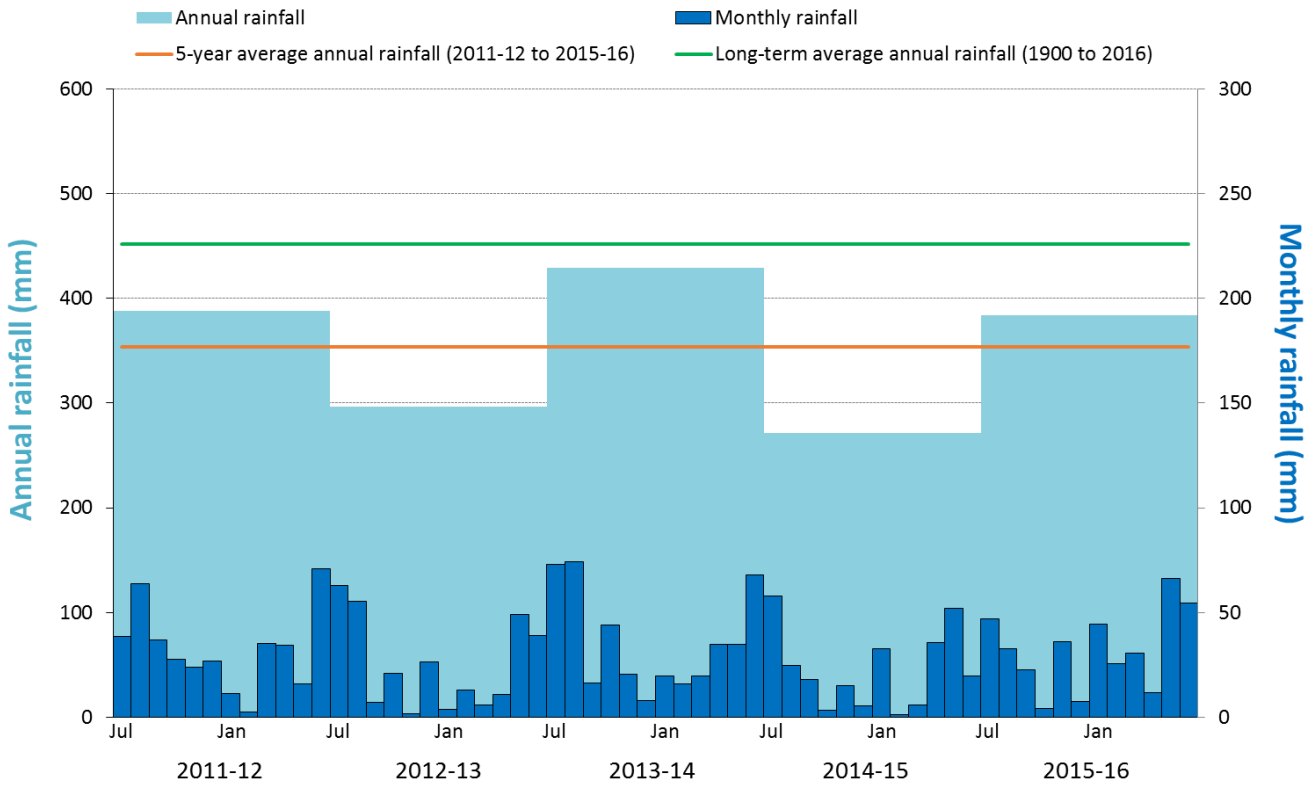


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Tintinara (BoM Station 25514)[3]

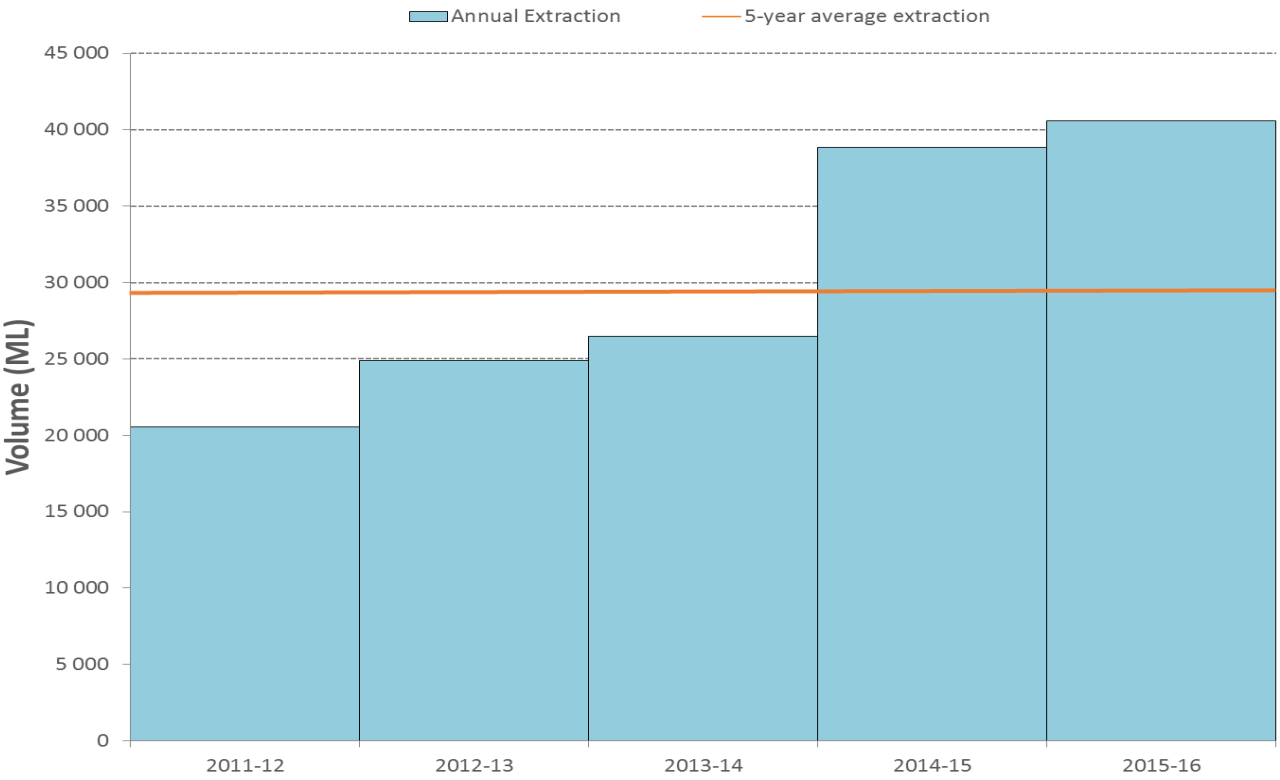


Figure 3. Licensed groundwater extraction volumes[4] for the past five water-use years, from the unconfined aquifer (Tintinara–Coonalpyn PWA)

[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 use for the 2015–16 water-use year is based on the best data available as of April 2017 and may be subject to change, as some extraction volumes are in the process of being verified.

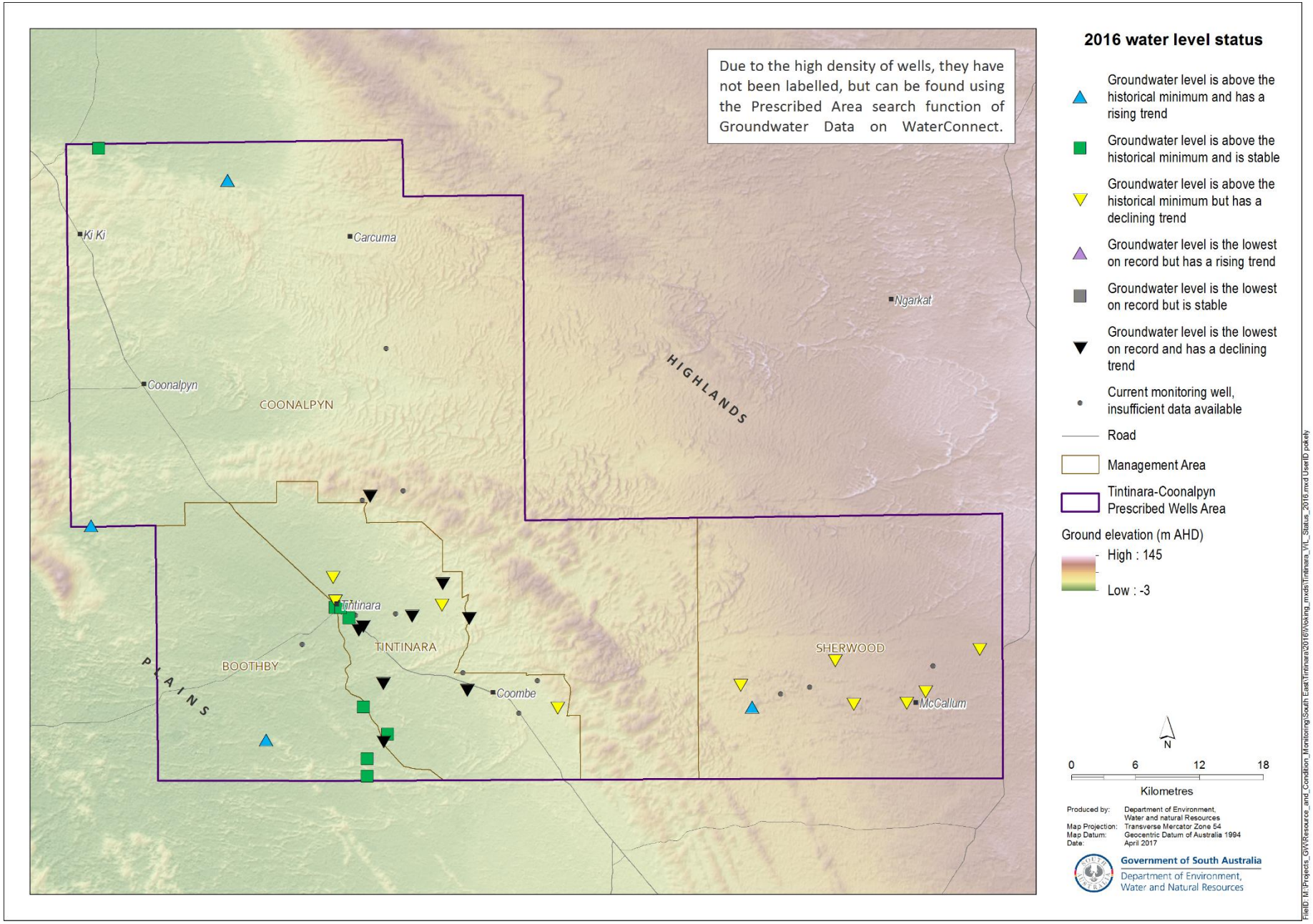


Figure 4. 2016 status of groundwater levels in the unconfined aquifer (Tintinara–Coonalpyn PWA), based on five-year trend from 2012 to 2016

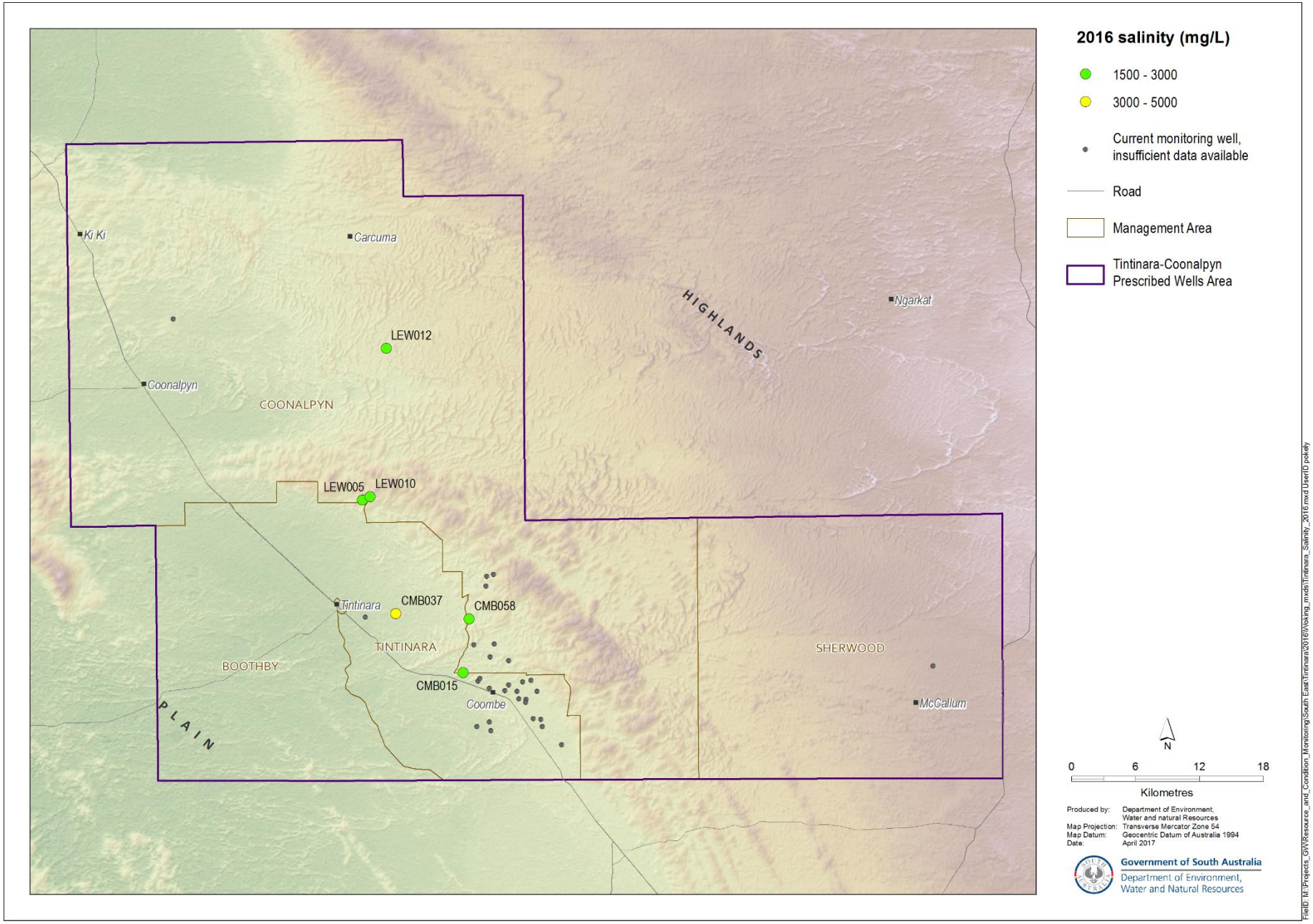


Figure 5. 2016 groundwater salinity of the unconfined aquifer (Tintinara–Coonalpyn PWA)

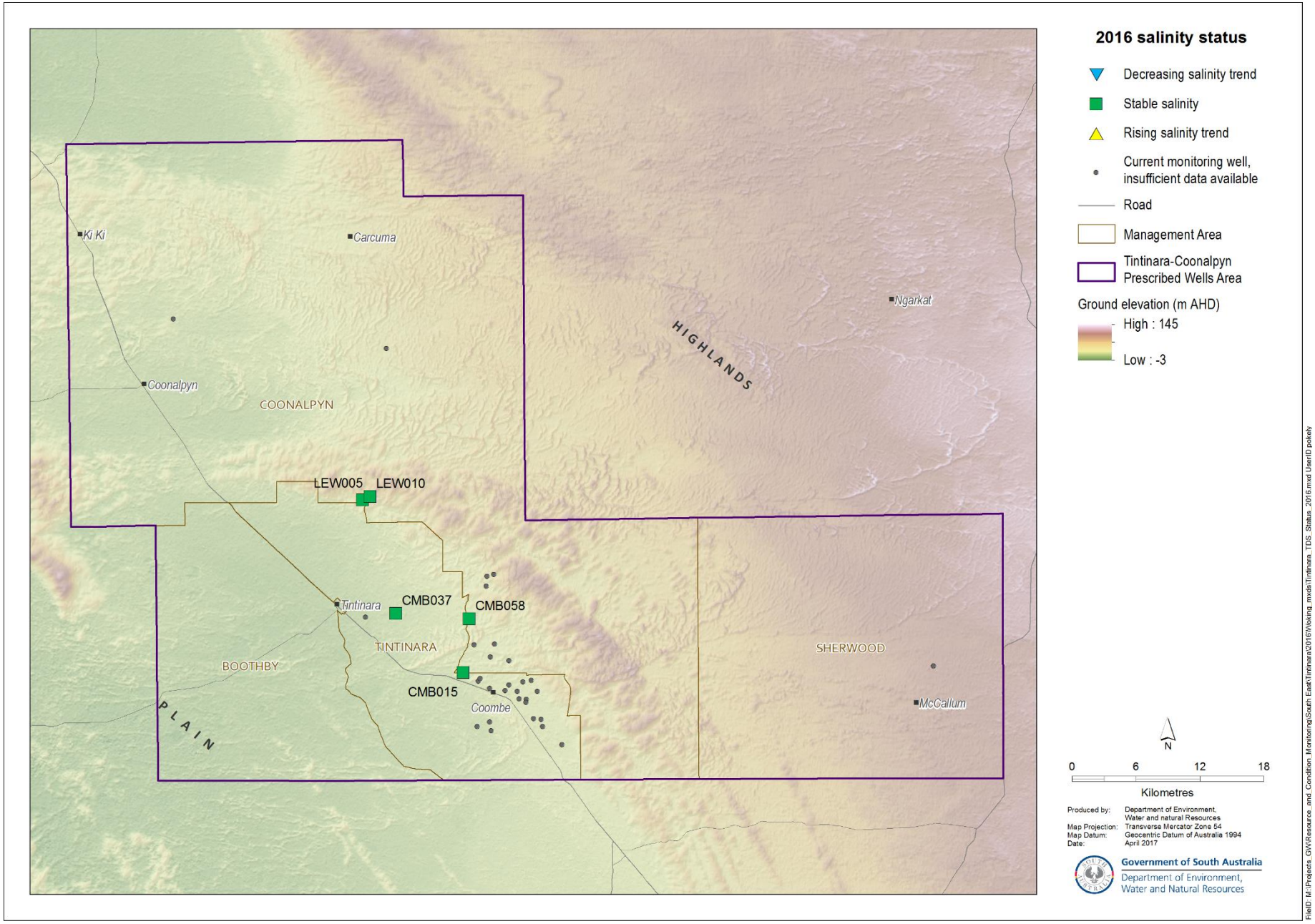


Figure 6. 2016 status of groundwater salinity in the unconfined aquifer (Tintinara–Coonalpyn PWA), based on five-year trend from 2012 to 2016

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