TATIARA PWA

UNCONFINED AQUIFER

Groundwater Level and Salinity Status Report

2012

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Department of Environment,
Water and Natural Resources

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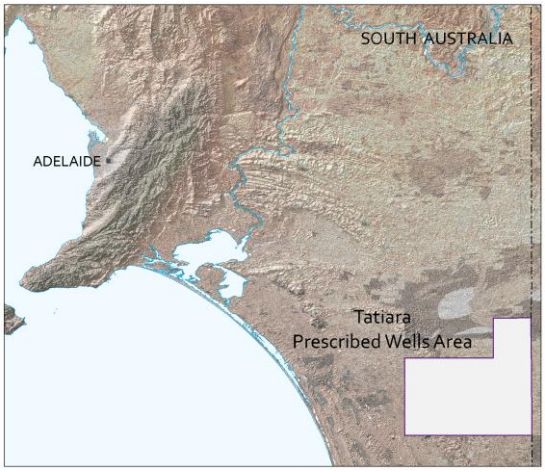
2012 SUMMARY



The Tatiara Prescribed Wells Area (PWA) is located in the upper South East of South Australia, approximately 200 km south-east of Adelaide. 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 Tatiara PWA is underlain by sediments of the Murray Basin and can be divided topographically into two discrete landforms, each with different hydrogeological characteristics and different groundwater management issues. A low-lying coastal plain lies to the west, with the highlands located to the east. Both regions are underlain by two aquifer systems—an unconfined aquifer comprising various Quaternary and Tertiary limestones and an underlying confined Tertiary sand aquifer. The Quaternary-aged Padthaway, Coomandook and Bridgewater Formations form the unconfined aquifer on the coastal 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.

Verified metered groundwater extraction volumes for the 2011–12 water-use year were not available at the time of writing so are not included in this report.

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 Keith rainfall station (number 25507) is located in the township of Keith and recorded 377 mm of rain in 2012. This is 90 mm less than the long-term average annual rainfall for this station. The month of May received rainfall significantly above its long-term monthly average, but January, February, April and September through to November recorded significantly below-average rainfall (Fig. 1). The response of groundwater levels of the unconfined aquifer to rainfall varies between the coastal plain and the highlands primarily due to the depth of the watertable. The shallow watertable on the low-lying coastal plain is strongly influenced by the timing and magnitude of rainfall events. In the highlands the watertable is more than 10 m below the surface resulting in a delayed response, with a lag time dependent on the depth to the watertable and the permeability of the sediments.

Observation wells on the coastal plain display a consistent long-term trend of declining groundwater levels that corresponds with a prolonged period of below-average rainfall since 1996. Above-average rainfall from 2009 to 2011 appears to have resulted in a stabilisation of groundwater levels. The widespread clearance of native vegetation in the highlands resulted in increased recharge rates and subsequent rise in groundwater levels. This long-term trend of rising levels persisted for several years after the prolonged period of below-average rainfall commenced in the mid-1990s. The majority of observation wells display stable or declining water levels since the mid-2000s in a delayed response to the below-average rainfall.

In 2012, the majority (82%) of observation wells recorded a decline in the maximum recovered groundwater elevation of up to 1.1 m when compared to 2011 data (Fig. 2). The decline in groundwater levels is likely due to the increase in extractions and below-average rainfall. Thirteen wells recorded a rise of up to 0.5 m and groundwater levels remained stable in two wells.

Groundwater salinity trends in irrigation wells in the unconfined aquifer are quite variable. Many wells display a long-term trend of rising salinity due to the recycling of irrigation water to the shallow unconfined aquifer. However, some wells on the eastern margin of the coastal plain reveal trends of stabilising or declining salinity since the late 1990s. The widespread clearance of native

vegetation across the highlands has resulted in increased recharge rates and the flushing of salt, which was previously stored in the root zone of the native vegetation, down to the watertable. This process is occurring independent of any irrigation activity, although drainage from irrigated areas will accelerate the process locally. Decreasing salinities recorded in a number of observation wells over the last 10 years may indicate that in areas of lower topography near the boundary with the coastal plain, the salt in the unsaturated zone has almost been completely flushed out and lower-salinity water is now recharging the aquifer. This freshening of the groundwater following a salinity increase is well documented in the Padthaway PWA to the south.

In 2012, salinity ranged between 1000 and 10 000 mg/L and 33 of 44 wells (75%) with sufficient data recorded an increase in salinity when compared to 2011 salinity data. Around 52% (24 wells) of observation wells recorded groundwater salinity of less than 3000 mg/L (Fig. 3). The 30% that recorded groundwater salinity exceeding 5000 mg/L are found on the coastal plain. This is likely due to the recycling of irrigation drainage water where the aquifer is shallow.

The unconfined aquifer of the Tatiara PWA has been assigned a yellow status for 2012:

2012 STATUS

"Gradual adverse trends, indicating low risk to the resource in the medium term"

This means that gradual adverse trends in the resource status have been observed over the reporting period. Continuation of these trends is unlikely to negatively impact the beneficial use of the resource for at least 15 years. The 2012 status for unconfined aquifer of the Tatiara PWA is supported by:

- an overall decline in the maximum recovered groundwater level in 2012 when compared to 2011 water level data
- an overall increase in salinity in 2012 when compared to 2011 salinity data.

To view the *Tatiara PWA groundwater level and salinity status report 2011*, which includes background information on hydrogeology, rainfall and relevant groundwater dependent ecosystems, visit WaterConnect.

To view descriptions of all status symbols, click here.

For further details about the Tatiara PWA, please see the Tatiara Water Allocation Plan.

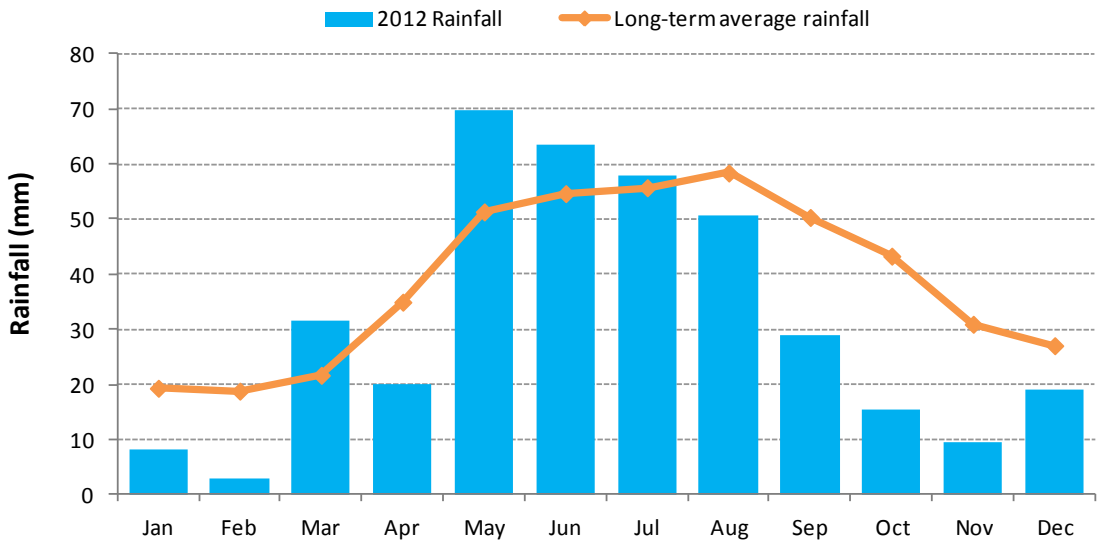


Figure 1. Monthly rainfall (mm) for 2012 and the long-term average monthly rainfall (mm) at the Keith rainfall station (number 25507) in the Tatiara Prescribed Wells Area

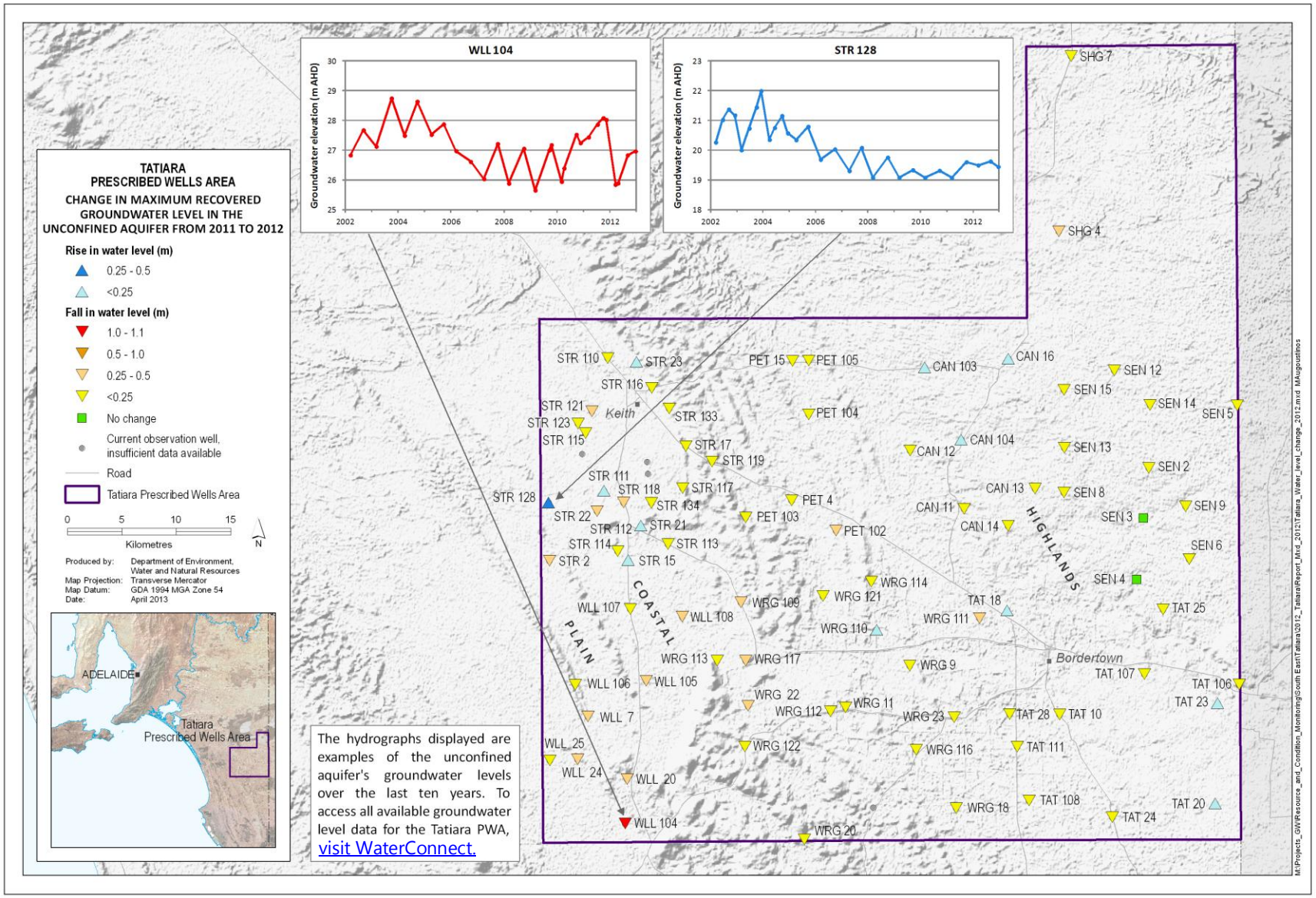


Figure 2. Overall changes in maximum groundwater levels in the unconfined aquifer of the Tatiara Prescribed Wells Area from 2011 to 2012

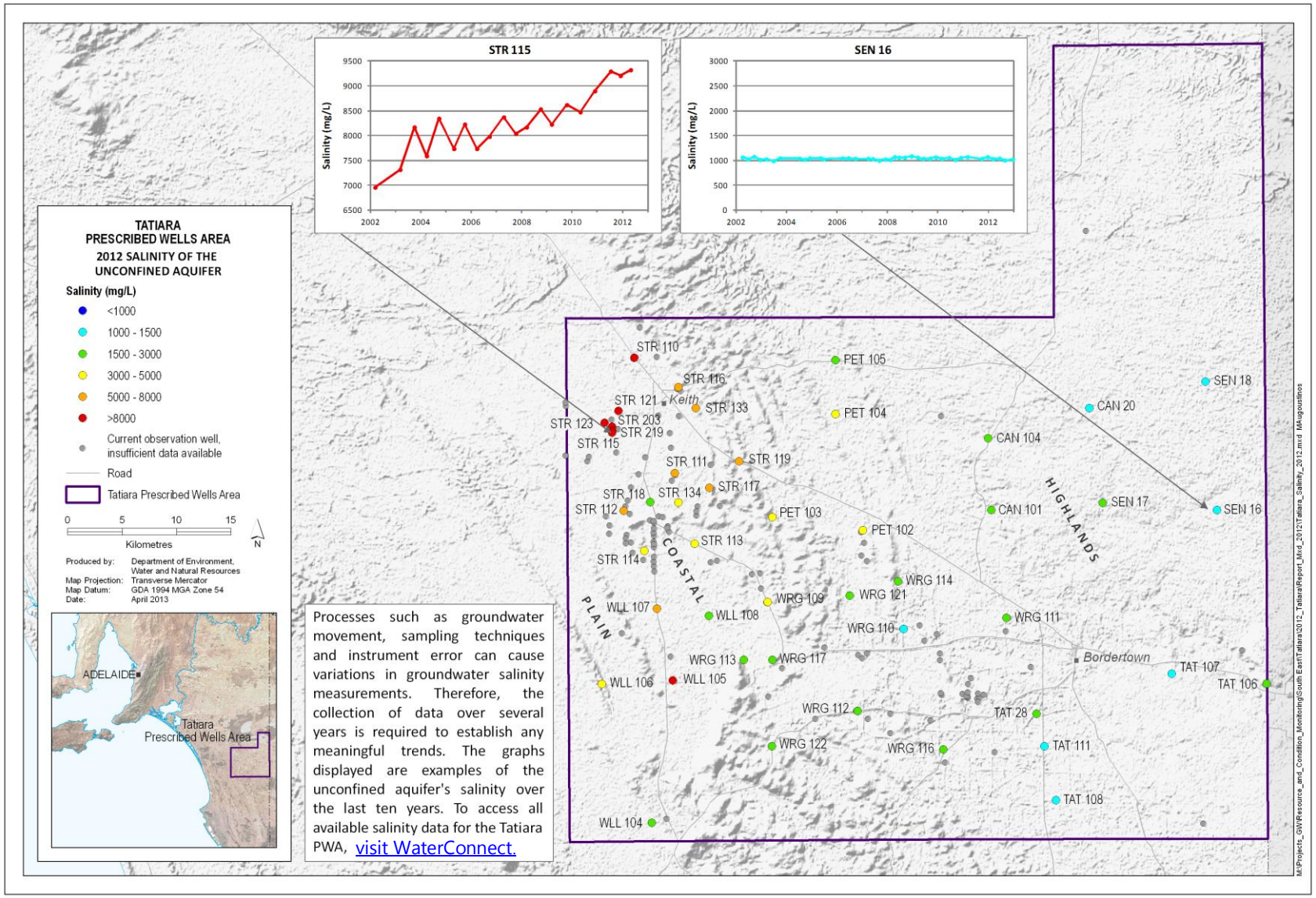


Figure 3. Groundwater salinity of the unconfined aquifer in the Tatiara Prescribed Wells Area for 2012