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# PADTHAWAY PWA

## UNCONFINED AQUIFER

Groundwater Level and Salinity Status Report

2013

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Water and Natural Resources

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# 2013 SUMMARY

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The Padthaway Prescribed Wells Area (PWA) is located in the upper South East of South Australia, approximately 250 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 Padthaway 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. The low-lying Padthaway Flat lies to the west, with the Naracoorte Range 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 Padthaway Flat. The Bridgewater Formation also forms the unconfined aquifer in the Naracoorte Range. The Tertiary-aged Gambier Limestone underlies the Bridgewater formation in the ranges but is not typically used as an aquifer. The main source of recharge to the unconfined aquifer is the direct infiltration of rainfall and groundwater generally flows in a south-westerly direction but changes to north-westerly in the south of the PWA.

Groundwater extractions (excluding stock and domestic use) for the Tertiary Limestone aquifer in the Padthaway PWA for 2012-13 totalled 23 144 ML which represents a decrease of 5069 ML (18%) from the previous year (Fig. 1).

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 Marcollat rainfall station (number 26017) is located in the north-west of the PWA and recorded 547 mm of rain in 2013. This is about 24 mm above the long-term average annual rainfall for this station. While February, May, June, July and August recorded rainfall above their long-term monthly average, all other months, with the exception of October, recorded rainfall significantly below their average (Fig. 2). The response of groundwater levels to rainfall varies between the Padthaway Flat and the Naracoorte Range, primarily due to the depth of the watertable. Levels are more responsive to rainfall on the low-lying flat as the watertable is shallow. In the ranges, the watertable is more than 10 m below the ground surface resulting in a delayed response, with a lag time dependent on the depth to the watertable and the permeability of the sediments.

From 1970 to 2004, a gradual rise in groundwater levels of 1–2.5 m has been recorded by observation wells in the Naracoorte Range. This has been followed by a slight decline in levels, with some recovery seen since 2010. Observation wells on the Padthaway Flat reveal a decline in levels between 1970 and 1978, then a gradual rise until 1992–1994 followed by another decline until 2008, with a recovery of levels since 2009.

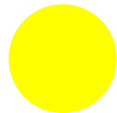
In 2013, the majority (83%) of the 41 observation wells with available data show a rise in the maximum recovered groundwater level when compared to 2012 water level data (Fig 3). The maximum rise observed was 0.83 m and the average rise was 0.39 m. The water level is stable in one observation well and the remaining 15% show a decline in groundwater levels of up to 0.14 m. As the saturated thickness of the unconfined aquifer is generally only 6–14 m, it is important to maintain a sustainable level of groundwater extraction to avoid a long-term decline in aquifer storage. The improvement in groundwater levels during 2013 is likely to be due to the reduced extractions and above-average rainfall.

Groundwater salinity trends in the shallow unconfined aquifer are influenced by rainfall patterns and the efficiency of various irrigation practices and are therefore quite variable. Some observation wells show long-term trends of rising salinity, others declining salinity, while most wells display periods of both.

In 2013, the groundwater salinity measurements ranged from 955 to 7200 mg/L, which is similar to the 2012 reporting period. Of the 35 wells with sufficient data, 43% recorded an increase in salinity when compared to 2012 salinity data, which was a lower proportion compared to the previous status assessment. Nearly 40% of monitored wells recorded salinities of greater than 1500 mg/L (Fig. 4).

The unconfined aquifer of the Padthaway PWA has been assigned a yellow status for 2013:

## 2013 STATUS



“Adverse trends indicating low risk to the resource in the medium term”

This means that observed adverse trends are gradual and if continued, will not lead to a change in the current beneficial uses of the groundwater resource for at least 15 years. The 2013 status for unconfined aquifer of the Padthaway PWA is supported by:

- An increase in groundwater salinity in a significant proportion of observation wells in 2013 when compared to 2012 salinity data

The assessment notes that there has been an overall rise in the maximum recovered groundwater level in 2013 when compared to 2012 water level data.

To view the *Padthaway PWA groundwater level and salinity status report 2011*, which includes background information on hydrogeology, rainfall and groundwater-dependent ecosystems, and descriptions of all status symbols, [visit WaterConnect](#).

For further details about the Padthaway PWA, please see the [Padthaway Water Allocation Plan](#).

### Padthaway PWA: Unconfined aquifer annual groundwater extraction

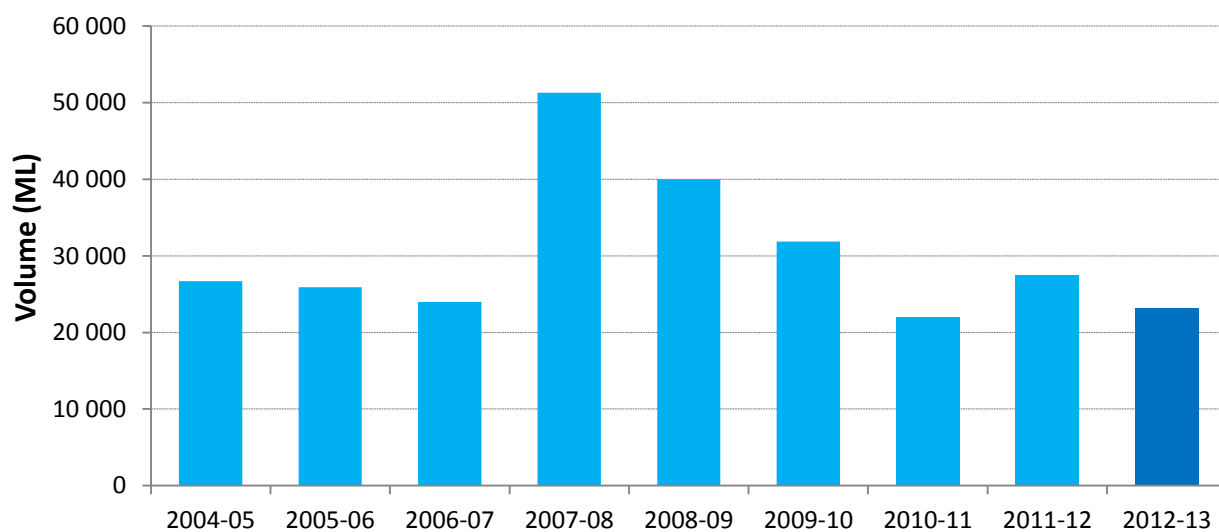


Figure 1. Historical licensed groundwater use for the Padthaway PWA

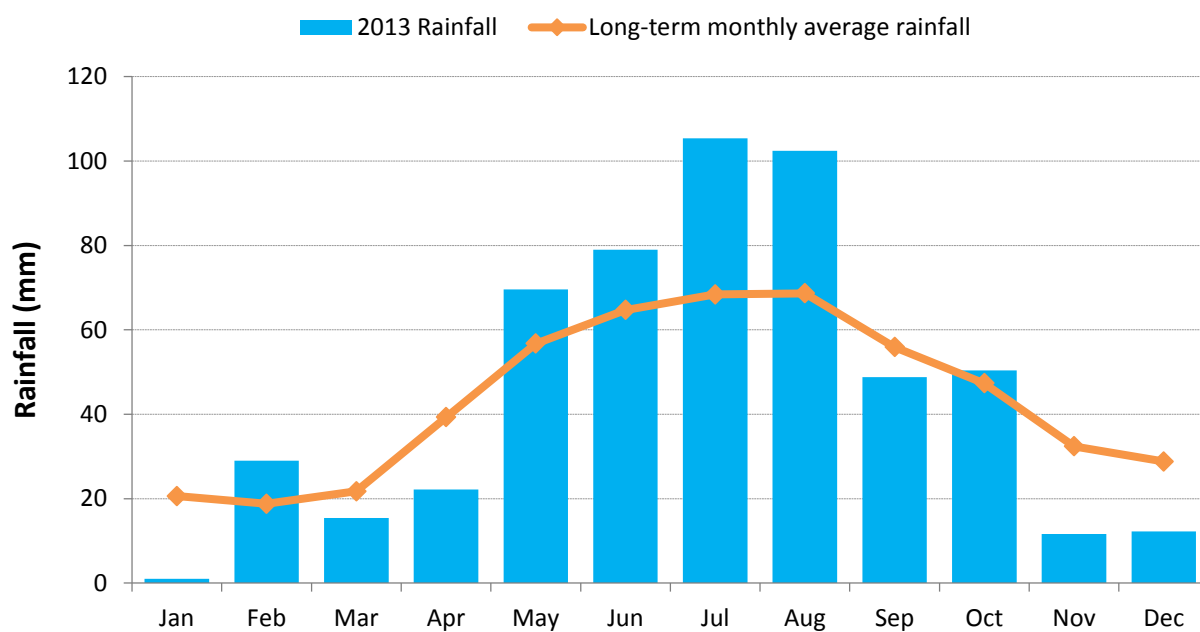


Figure 2. Monthly rainfall (mm) for 2013 and the long-term average monthly rainfall (mm) at the Marcollat rainfall station (number 26017) in the Padthaway PWA

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).

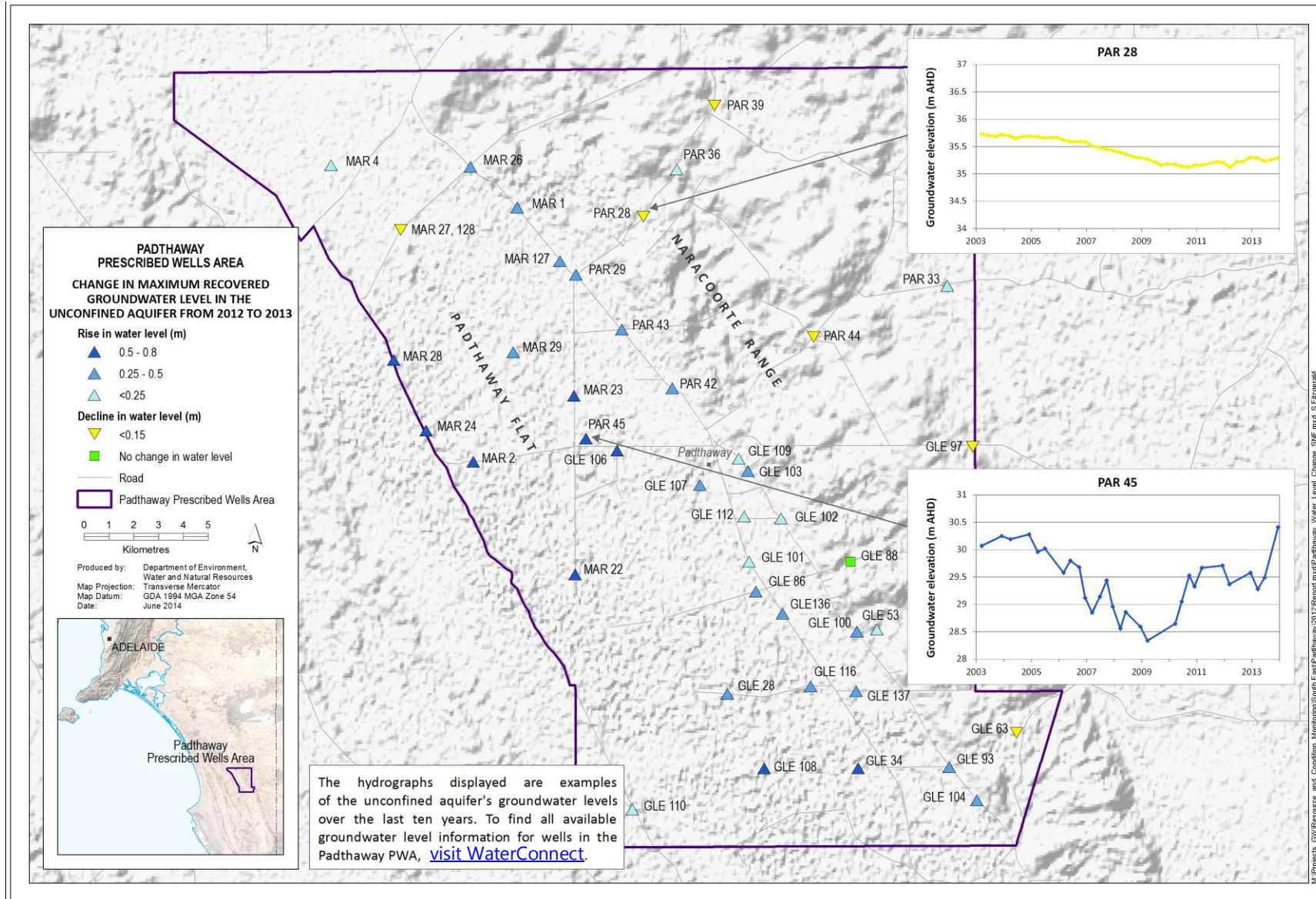


Figure 3. Overall changes in maximum recovered groundwater levels in the unconfined aquifer of the Padthaway PWA from 2012 to 2013

Padthaway PWA

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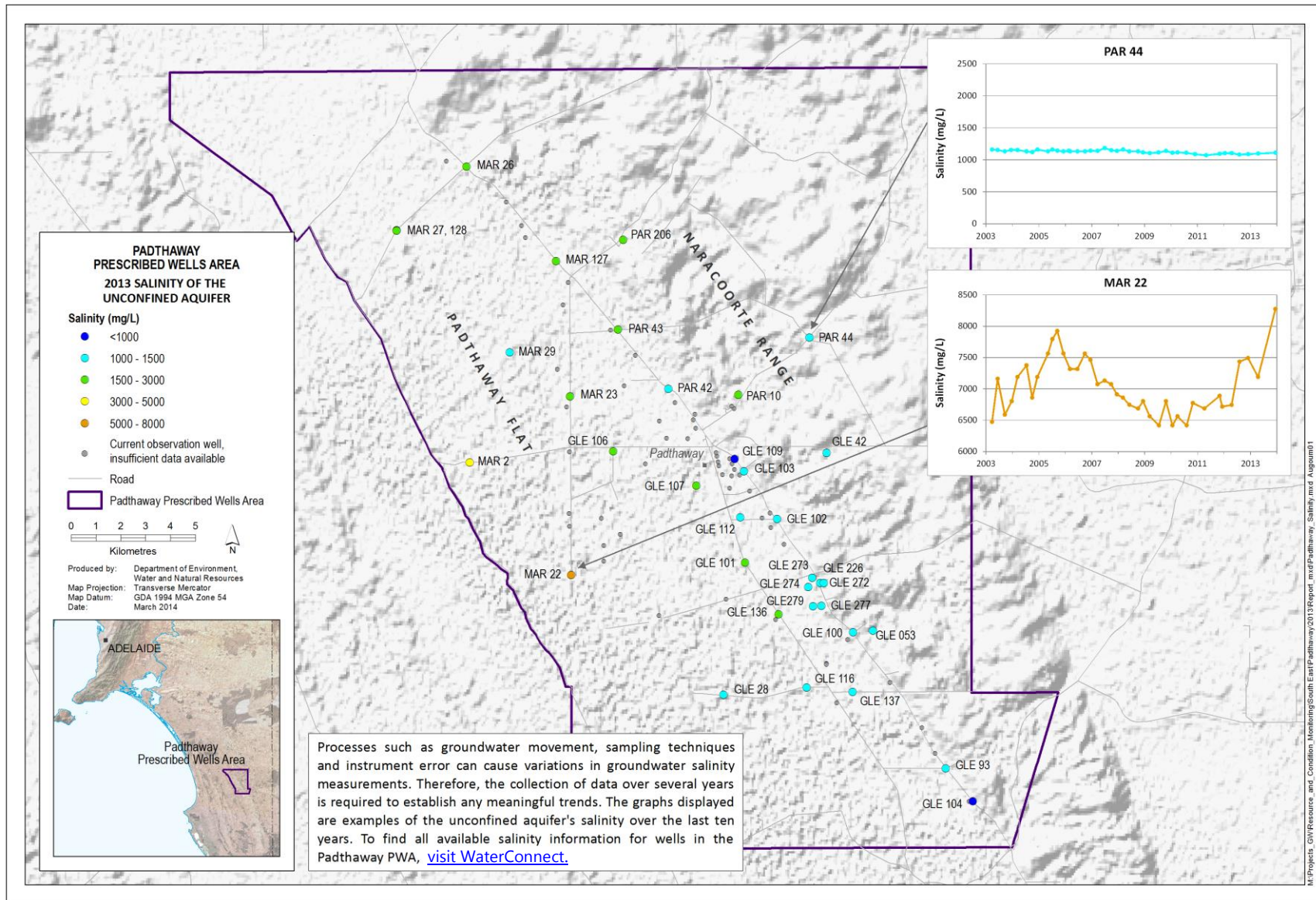


Figure 4. Groundwater salinity of the unconfined aquifer in the Padthaway PWA for 2013

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