
PADTHAWAY PWA

UNCONFINED AQUIFER

Groundwater Level and Salinity Status Report

2012



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2012 SUMMARY



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.

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 Marcollat rainfall station (number 26017) is located in the north-west of the PWA and recorded 434 mm of rain in 2012. This is about 90 mm below the long-term average annual rainfall for this station. While March, June and August recorded rainfall above their long-term monthly average, all other months, with the exception of July, recorded rainfall significantly below their average (Fig. 1). 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 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 2012, the majority (80%) of observation wells are showing a decline in the maximum recovered groundwater level of up to 0.65 m, with an average of 0.2 m, when compared to 2011 water level data (Fig 2). The saturated thickness of the unconfined aquifer is generally 6–14 m; therefore, if declines of this magnitude were to continue, changes in the current beneficial uses of the groundwater resource are unlikely to occur for at least 15 years. The decline in groundwater levels is likely due to the increase in extractions and below-average rainfall. The remaining 20% of observation wells are showing a rise in groundwater levels of up to 0.7 m.

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 2012, salinity ranged between 960 and 7500 mg/L and 18 of 28 wells (64%) with sufficient data recorded an increase in salinity when compared to 2011 salinity data. Nearly 40% of monitored wells recorded salinity greater than 1500 mg/L (Fig. 3).

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

2012 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 2012 status for unconfined aquifer of the Padthaway 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 groundwater salinity in 2012 when compared to 2011 salinity data.

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

To view descriptions of all status symbols, [click here](#).

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

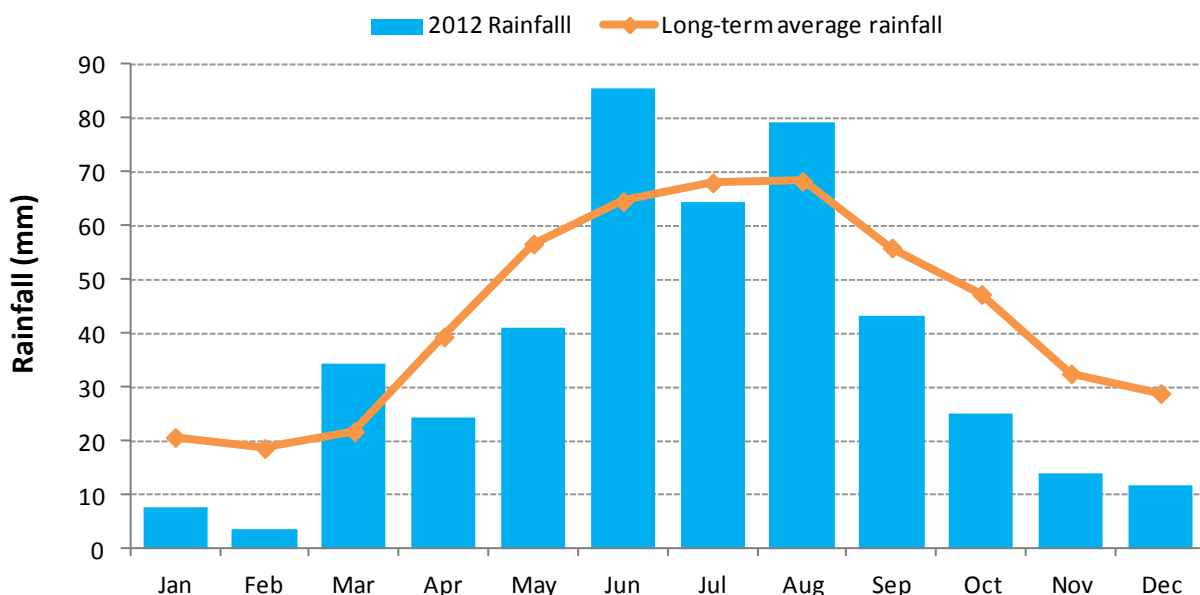


Figure 1. Monthly rainfall (mm) for 2012 and the long-term average monthly rainfall (mm) at the Marcollat rainfall station (number 26017) in the Padthaway Prescribed Wells Area

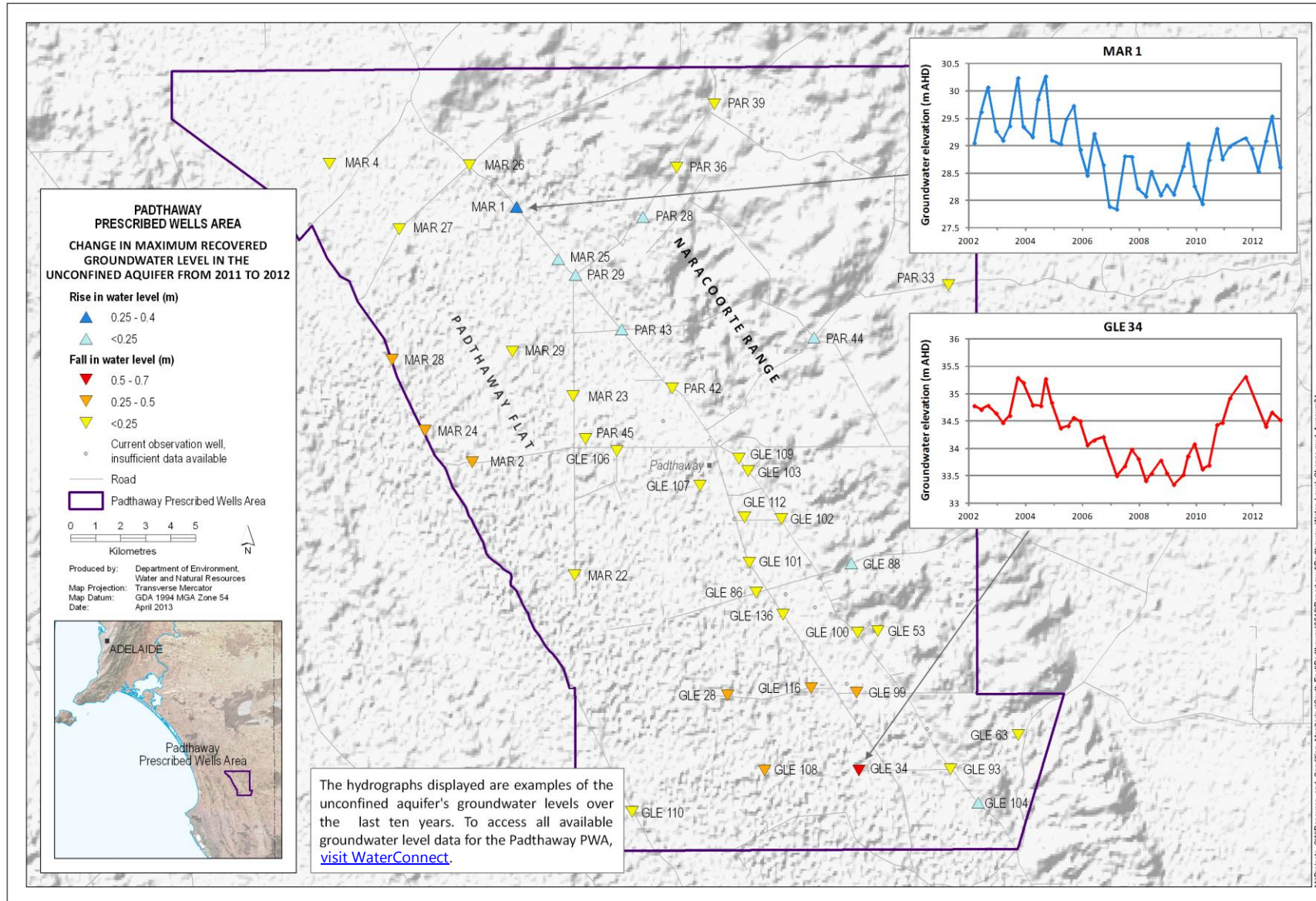


Figure 2. Overall changes in maximum groundwater levels in the unconfined aquifer of the Padthaway Prescribed Wells Area from 2011 to 2012

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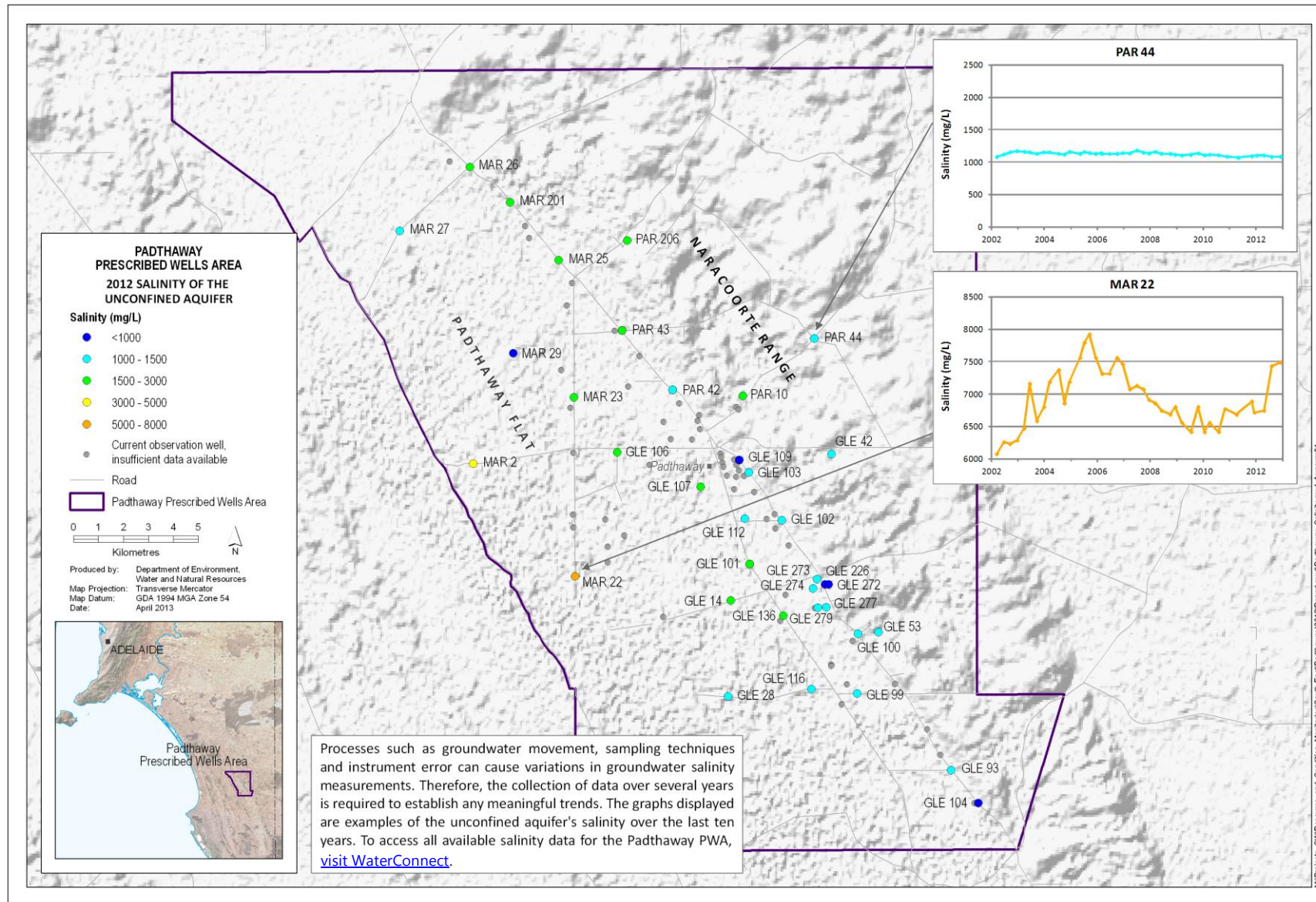


Figure 3. Groundwater salinity of the unconfined aquifer in the Padthaway Prescribed Wells Area for 2012

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