

Peake, Roby and Sherlock PWA

Confined aquifer

2014 Groundwater level and salinity status report



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

Department of Environment, Water and Natural Resources
25 Grenfell Street, Adelaide
GPO Box 1047, Adelaide SA 5001

Telephone	National	(08) 8463 6946
	International	+61 8 8463 6946
Fax	National	(08) 8463 6999
	International	+61 8 8463 6999
Website	www.environment.sa.gov.au	

Disclaimer

The Department of Environment, Water and Natural Resources and its employees do not warrant or make any representation regarding the use, or results of the use, of the information contained herein as regards to its correctness, accuracy, reliability, currency or otherwise. The Department of Environment, Water and Natural Resources and its employees expressly disclaims all liability or responsibility to any person using the information or advice. Information contained in this document is correct at the time of writing.



This work is licensed under the Creative Commons Attribution 4.0 International License.

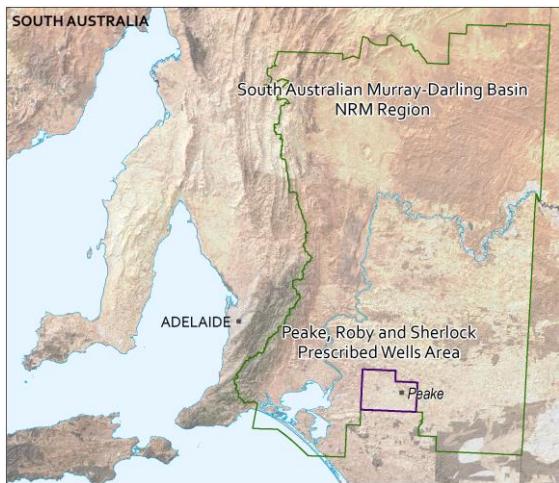
To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

© Crown in right of the State of South Australia, through the Department of Environment, Water and Natural Resources 2015

ISBN 978-1-922255-84-6

This document is available online at www.waterconnect.sa.gov.au/Systems/GSR/Pages.

2014 Summary



The Peake, Roby and Sherlock Prescribed Wells Area (PWA) is located about 120 km south-east of Adelaide in the South Australian Murray-Darling Basin NRM Region. It is underlain by sedimentary aquifers of the Murray Basin and is a local-scale groundwater resource with a small number of irrigators. Groundwater is prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan provides for the sustainable management of the groundwater resources.

The Peake, Roby and Sherlock PWA has two distinct aquifers—an unconfined aquifer and a confined aquifer. Almost all licensed groundwater extractions in the PWA are from the confined aquifer and as such, it is the focus of this report.

The confined aquifer comprises the Buccleuch Group and Renmark Group formations. The Buccleuch Group consists of a consolidated bryozoal limestone or 'coral' that lies at a depth of 90–100 m below the ground and varies in thickness from 5–25 m. This coral layer begins to merge laterally with the Renmark Group in the eastern area of the PWA. The Renmark Group is made up of interbedded sands and clays and there are very few bores which extract from this aquifer in the PWA. As the Buccleuch and Renmark Group aquifers are confined, they are not recharged by local rainfall. The primary recharge source is the lateral inflow of groundwater into the Peake, Roby and Sherlock PWA from south-western Victoria.

Despite being a confined aquifer that does not receive direct recharge from rainfall, the intensity and timing of rainfall and subsequent extraction practices can have an effect on groundwater levels and salinity in the aquifer. For example, if the region experienced above-average rainfall during typically dry summer months, this could result in less groundwater being extracted from the confined aquifer for irrigation purposes and therefore increases in groundwater levels and stable or improving salinity. Conversely, decreases in rainfall can result in increases in irrigation extractions and groundwater levels may fall and salinity rise.

Data from the Peake rainfall station (number 25513) was chosen for the analysis of rainfall in 2014 (Fig. 1). The long-term monthly average rainfall is graphed in orange against the total monthly rainfall recorded. Rainfall in 2014 totalled 315 mm, compared to a long-term (1889–2014) annual average rainfall of 389 mm. The monthly rainfall data indicate that in 2014, there was above-average rainfall for the first half of the year, while rainfall between August and December was considerably below average. Rainfall has little direct correlation on groundwater levels in the confined aquifer; however, there can be an indirect correlation with lower rainfall resulting in increased groundwater pumping, which in turn may lead to a decline in groundwater levels.

Metered groundwater extractions from the confined aquifer (primarily from the Buccleuch Group) of the Peake, Roby and Sherlock PWA totalled 733 ML in the 2013–14 water-use year, which represents a 47% decrease from the previous water-use year (Fig. 2). This significant reduction is due to one major irrigator extracting considerably less water during the year. The volume of extraction from the confined aquifer during 2013–14 equates to 34% of the total allocation limit of 2168 ML for the Peake, Roby and Sherlock PWA.

Considerable seasonal variations in pressure levels of the confined aquifer have been observed since large-scale irrigation practices commenced in 2004. The degree of drawdown decreases with distance from the areas of irrigation. Groundwater levels declined from 2004 to 2010 and appeared to rise or stabilise from 2011, reflecting reduced rates of extraction.

Of 22 observation wells in the Peake, Roby and Sherlock PWA, 12 wells had sufficient data to determine the changes in recovered water levels from 2013 to 2014 (Fig. 3). Rises in the maximum recovered groundwater level ranging up to 0.64 m, with a median of 0.18 m, were recorded in four observation wells, with declines ranging from 0.17 m to 0.32 m being recorded in three observation wells. Negligible change was recorded in five observation wells, where the change in maximum recovered water level between 2013 and 2014 was less than 0.1 m. The median change in groundwater levels from 2013 to 2014 was a rise of 0.04 m.

Rising salinity in the western portion of the confined aquifer is identified as the greatest risk resulting from irrigation extraction. The aquifer is highly saline to the west, and lowered water levels in the Peake area arising from groundwater extraction may lead to saline groundwater being gradually mobilised towards the east. Salinity since 2010 is generally increasing.

Salinity levels were measured in 13 wells in 2014, with salinities varying from below 1500 mg/L west of Peake to over 4000 mg/L in the western areas south of Sherlock (Fig. 4). In the 11 observation wells with sufficient data for comparison between 2013 and 2014; increases in salinity ranging up to 4% were recorded, with a median 3% increase.

The Water Allocation Plan for the Peake, Roby and Sherlock Prescribed Wells Area (the WAP) has identified resource condition limits for the confined aquifer. These limits are designed to give early warning of unfavourable trends in water levels and salinity that may affect other users of the resource. Due to a change in the monitoring procedure in the Peake, Roby and Sherlock PWA during 2014, water level readings were collected less frequently than during previous years.

Water levels: As stated in the WAP, the rolling three-year average of the annual maximum drawdown and recovery levels, measured in at least 50% of designated observation wells, should not fall below the maximum drawdown or recovery thresholds. The rolling three-year average maximum recovery water levels, referring to the highest level of recovery during the non-irrigation season (usually in August), are above the thresholds in all designated observation wells (Fig. 5). This indicates that the resource condition limits have not been reached or exceeded. Similarly, the rolling three-year average maximum drawdown water levels recorded during the irrigation season (usually Feb–March) are also above the drawdown thresholds in all designated wells (Fig. 6). Observation wells RBY014, RBY017 and SHK004 do not have maximum drawdown data from February to March 2014 for comparison and rely on the average of the previous two years data.

Salinity: As stated in the WAP, the rolling three-year average of the maximum groundwater salinity, measured in at least 50% of the designated observation wells, should not rise by more than 5% from the baseline salinity threshold. All designated wells have recorded an average change in salinity of less than 5% (Fig. 7). Observation well RBY017 has only two years of salinity data to allow the calculation to be made at this time.

The confined aquifer of the Peake, Roby and Sherlock PWA has been assigned a green status for 2014:

2014 Status



"No adverse changes, indicating negligible risk to the resource"

This means that the groundwater status was observed to be stable (i.e. no significant change) or improving over the reporting period. Continuation of these changes favours a very low likelihood of negative impacts on beneficial uses of the resource (e.g. drinking water, irrigation or stock watering). The 2014 status for the confined aquifer is supported by:

- negligible change in groundwater levels in 2014 when compared to 2013 groundwater levels
- groundwater salinity within the baseline salinity threshold and stable groundwater salinity in 2014 when compared to 2013 salinity data.

To view descriptions for all status symbols, please visit [WaterConnect](#).

To view the *Peake, Roby and Sherlock PWA Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, location of rainfall stations and relevant groundwater-dependent ecosystems, please visit the *Water Resource Assessments* page on [WaterConnect](#).

To view or download groundwater level and salinity data from observation wells within the Peake, Roby and Sherlock PWA, please visit [Groundwater Data](#) on WaterConnect.

For further information about the Peake, Roby and Sherlock PWA, please see the *Water Allocation Plan for the Peake, Roby and Sherlock Prescribed Wells Area* on the Natural Resources SA Murray-Darling Basin [website](#).

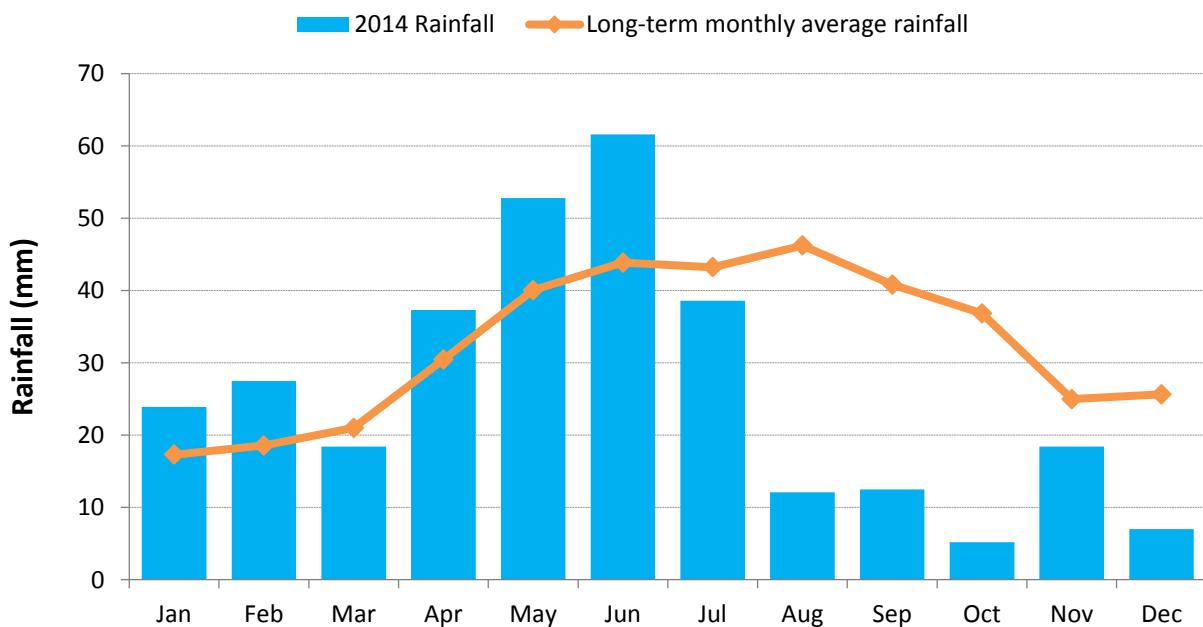


Figure 1. Monthly rainfall (mm) for 2014 and the long-term average monthly rainfall (mm) at the Peake rainfall station¹ (number 25513) in the Peake, Roby and Sherlock Prescribed Wells Area

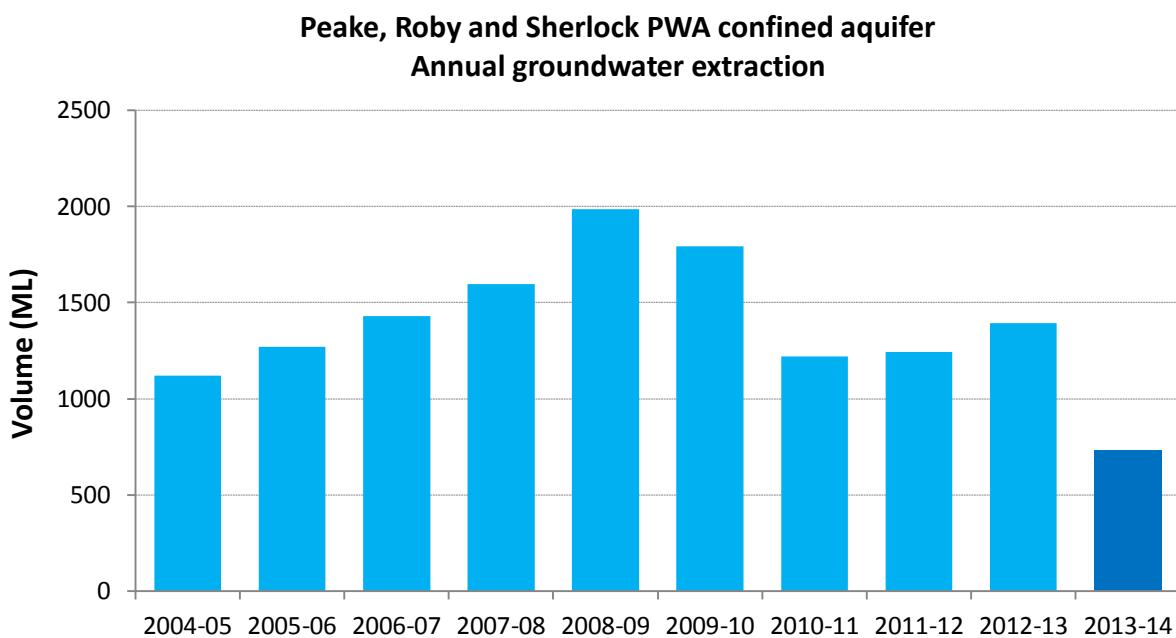


Figure 2. Historical licensed groundwater use for the confined aquifer of the Peake, Roby and Sherlock Prescribed Wells Area

¹ 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.

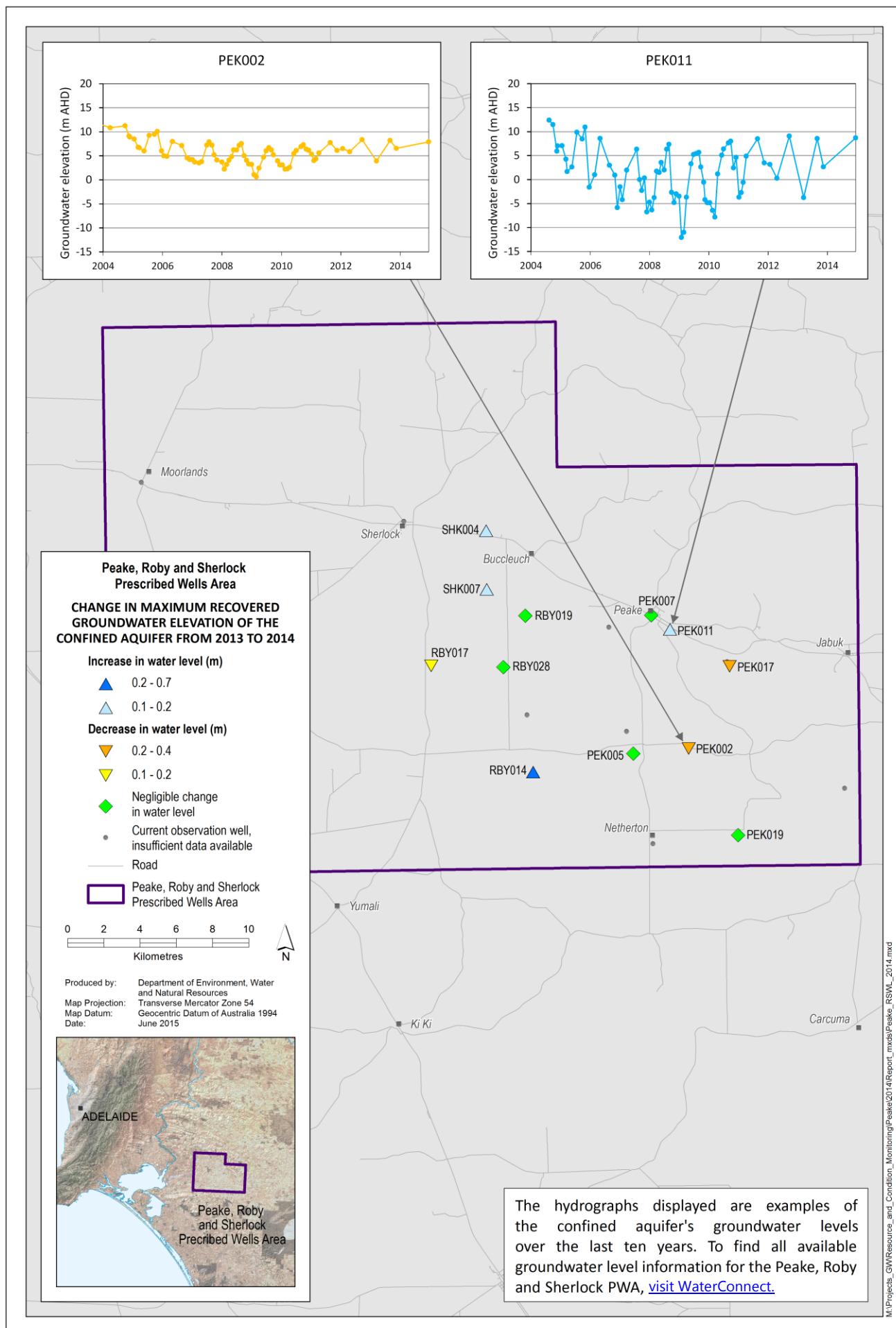


Figure 3. Overall changes in maximum groundwater levels of the confined aquifer in the Peake, Roby and Sherlock Prescribed Wells Area from 2013 to 2014

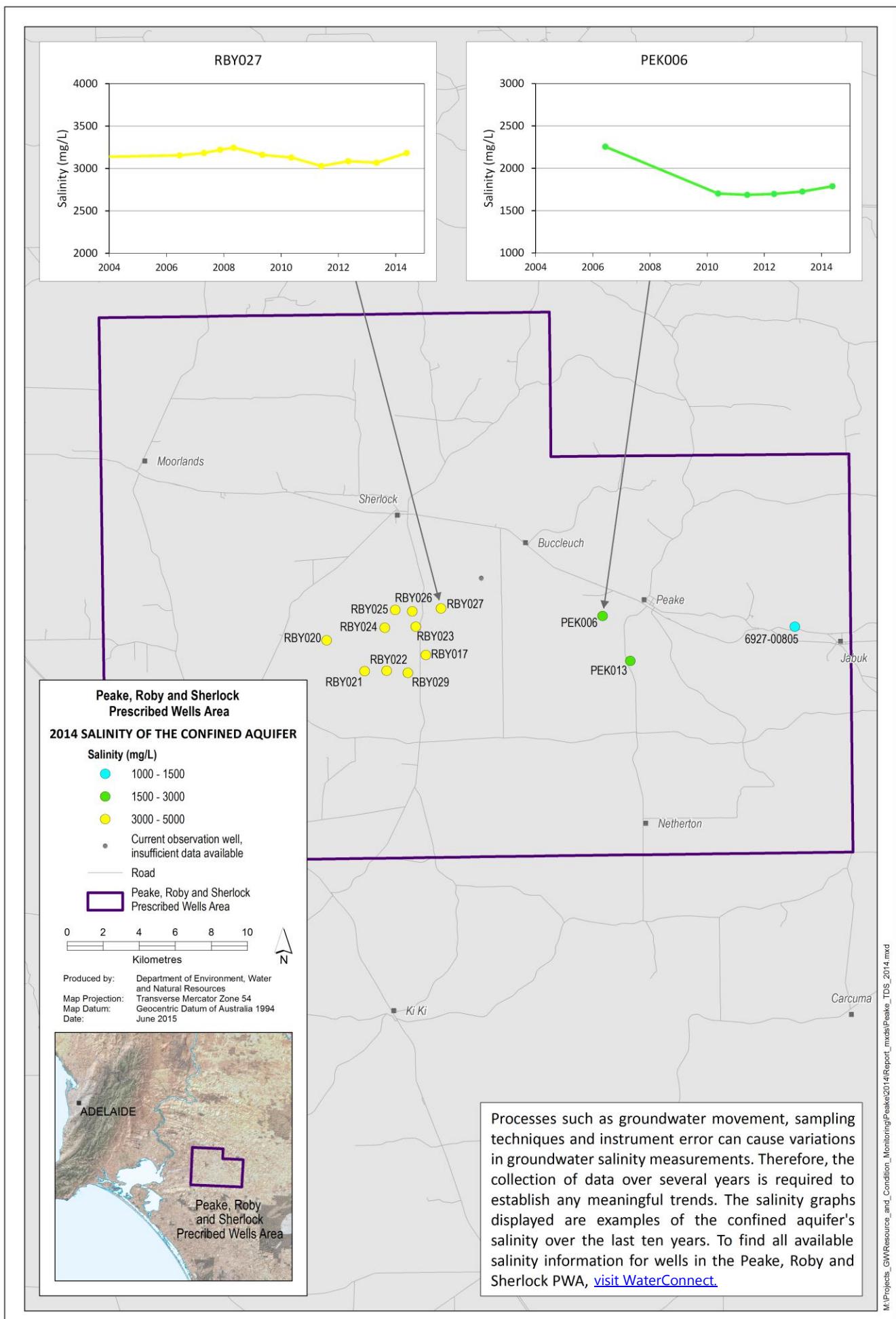


Figure 4. Groundwater salinity of the confined aquifer in the Peake, Roby and Sherlock Prescribed Wells Area for 2014

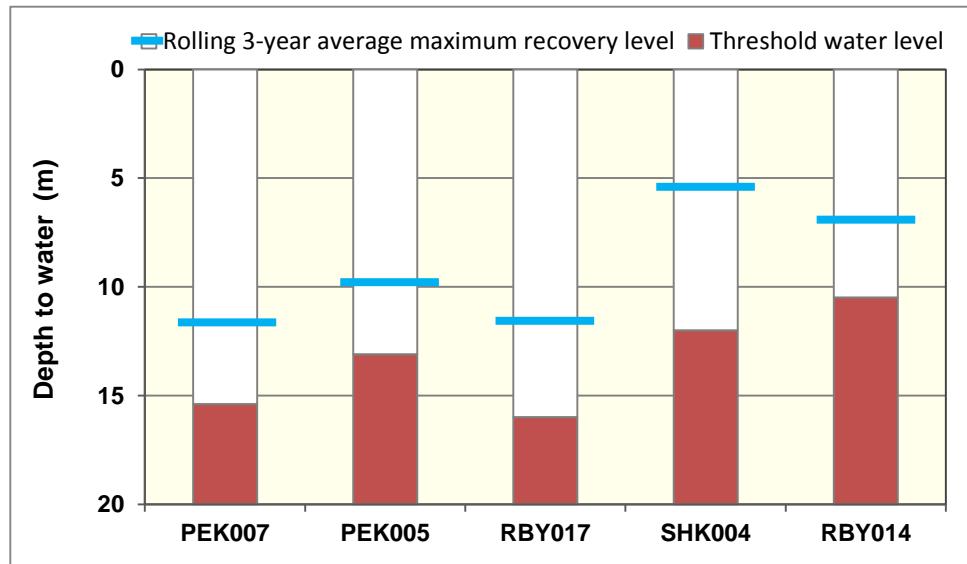


Figure 5. Maximum recovery level condition indicators

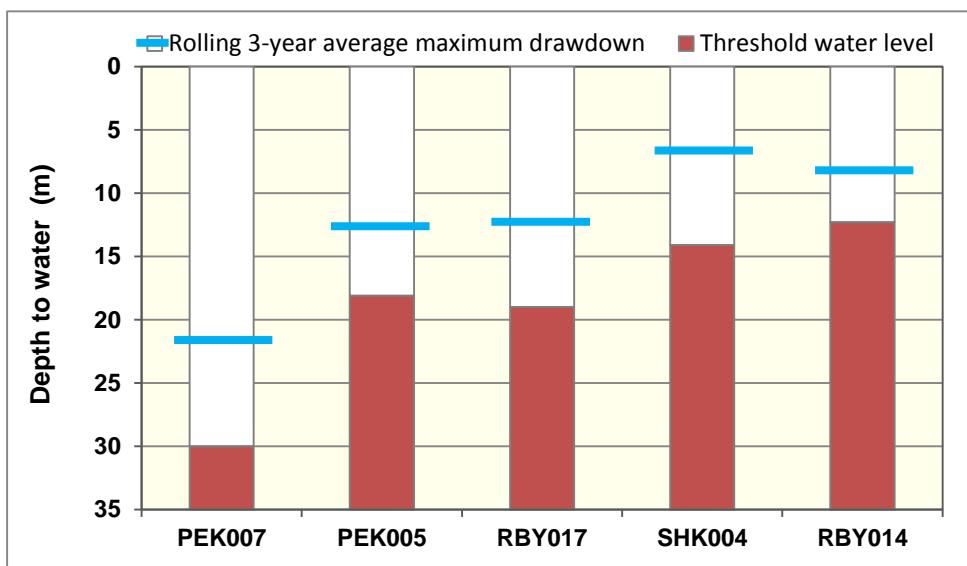


Figure 6. Maximum drawdown condition indicators

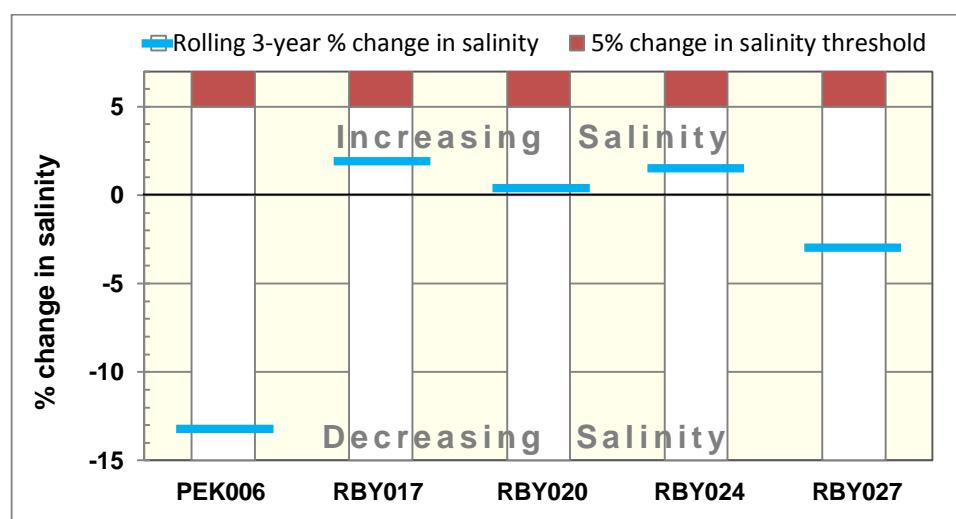


Figure 7. Salinity condition indicators