

Peake, Roby and Sherlock PWA

Confined aquifer

2015 Groundwater level and salinity status report



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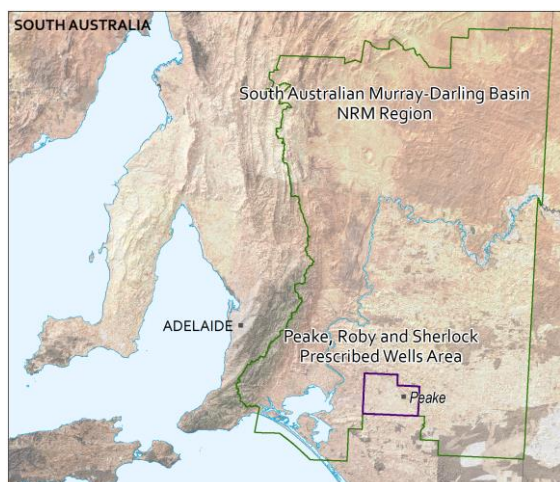
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2015 Summary



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 used mainly by a small number of irrigators, feedlots and public water supply. 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 are taken 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 comprises interbedded sands and clays and there are very few wells that extract from this aquifer. As the Buccleuch and Renmark Group aquifers are confined, they are not recharged by incident rainfall. The primary source of recharge is the lateral inflow of groundwater from aquifers located in south-western Victoria.

Despite being a confined aquifer that does not receive direct recharge from incident rainfall, the intensity and timing of local rainfall and subsequent extraction practices can have an effect on groundwater levels and salinity. For example, if the region experienced above-average rainfall during typically dry summer months, this could result in less groundwater being extracted for irrigation and consequently there may be an increase in groundwater levels and/or stable or declining salinity. Conversely, below-average rainfall might result in increases in irrigation and groundwater levels may fall and salinity rise.

The Peake rainfall station (BoM Station 25513) recorded 225 mm of rainfall in the 2014–15 water-use year. This is 162 mm less than the long-term average annual rainfall (1900–2015) of 387 mm and 138 mm less than five-year average annual rainfall (2010–15) of 363 mm (Figs 1 and 2). A trend of decreasing rainfall over the past five years is evident (Fig. 2).

In 2014–15, licensed extractions from the confined aquifer totalled 160¹ ML, a decrease of 78% from the previous water-use year and 83% below the five-year average of 950 ML (Fig. 3). This significant reduction is due to several irrigation enterprises ceasing operations during the year. The volume of extraction from the confined aquifer during 2014–15 equates to 7% 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 commenced in 2004. The degree of pressure-level drawdown decreases with distance from the areas of irrigation. Groundwater levels declined from 2004 to 2010 but have recovered since 2011 in response to reduced rates of extraction. In the five years to 2015, all 14 monitoring wells show a trend of rising groundwater pressure levels (Fig. 4), which range between 0.06 and 2.0 m/y with a median of 0.5 m/y.

Rising salinity in the western portion of the PWA is the greatest risk resulting from irrigation extraction. Insufficient time has passed since large-scale irrigation commenced for the establishment of long-term trends. However, short-term observations show little variation in salinity from 2006 to 2011. When long-term trends incorporating pre-irrigation salinity values (mostly at the time of drilling) are examined, only minor variation in salinity is evident indicating salinity in the region at this stage appears relatively stable.

In 2015, salinities range from 1720 to 4671 mg/L (Fig. 5) and in the five years to 2015, salinity levels have been stable in all 10 monitoring wells (Fig. 6).

¹ The licensed groundwater use and managed aquifer recharge volumes for the 2014–15 water-use year are based on the best data available as of February 2016 and may be subject to change, as some extraction volumes are in the process of being verified.

The Water Allocation Plan (WAP) for the Peake, Roby and Sherlock PWA has identified resource condition indicators for the confined aquifer. These limits are designed to give early warning of declines in water levels and increasing salinity that may adversely affect groundwater users.

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. 7). 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 February–March) are also above the drawdown thresholds in all designated wells (Fig. 8).

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. 9). Observation well RBY017 has only two years of salinity data to allow the calculation to be made at this time.

To determine the status of the confined aquifer in the Peake, Roby and Sherlock PWA for 2015, the trends in groundwater pressure levels and salinities over the past five years (2011 to 2015, inclusive) were analysed. This is a new approach, 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 more detail on the current method of evaluating the status of groundwater resources.

The confined aquifer of the Peake, Roby and Sherlock PWA has been assigned a green status for 2015:

2015 Status



Positive trends have been observed over the past five years

The 2015 status for the confined aquifer is based on:

- all monitoring wells showing a five-year trend of rising groundwater pressure levels
- all monitoring wells showing stable salinities over the past five years.

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on [WaterConnect](#).

To view the *Peake, Roby and Sherlock 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 [WaterConnect](#).

To view or download groundwater level and salinity data from monitoring 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](#).

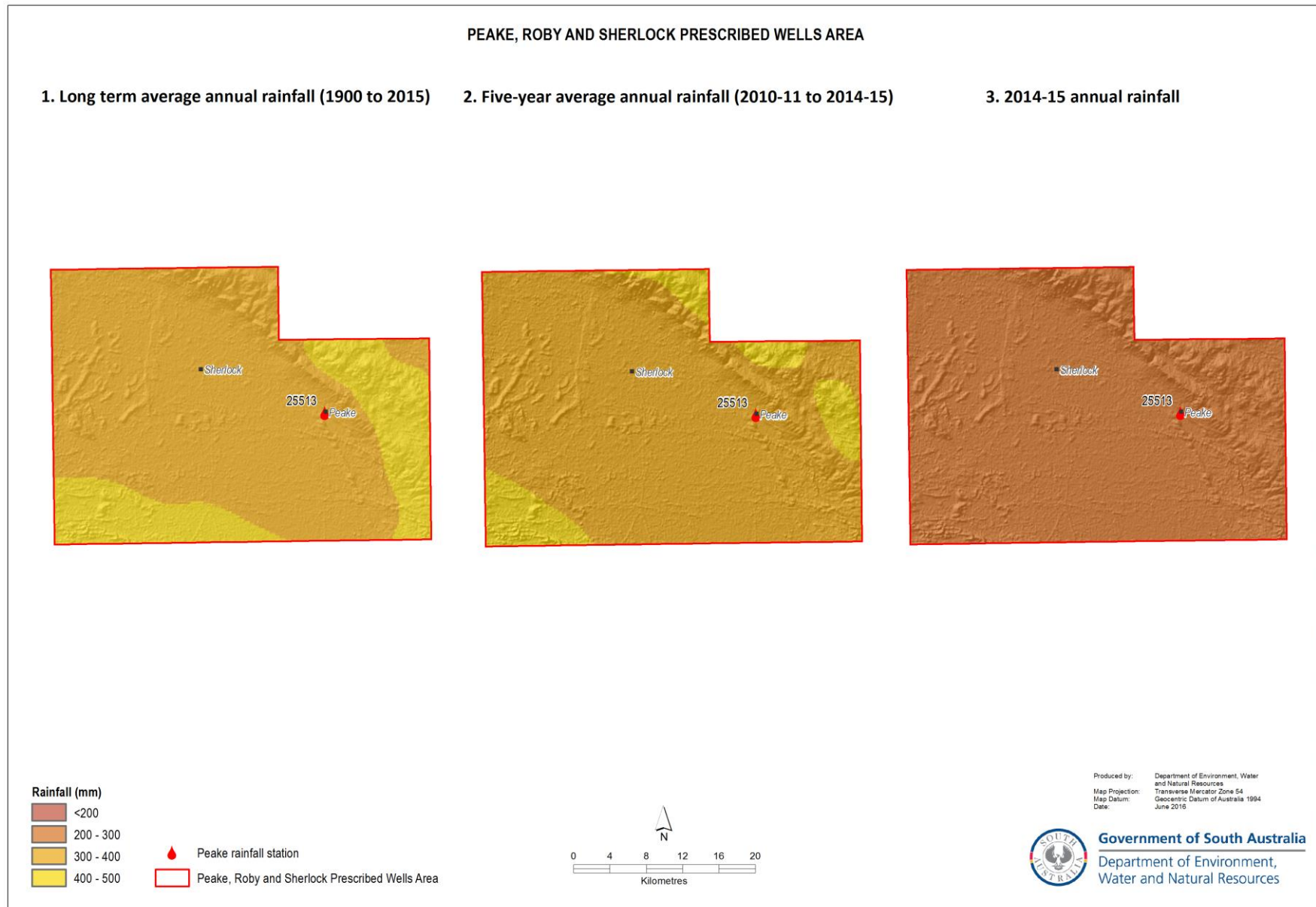


Figure 1. (1) Long-term and (2) five-year average annual rainfall and (3) annual rainfall for the 2014–15 water-use year in the Peake, Roby and Sherlock Prescribed Wells Area²

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.

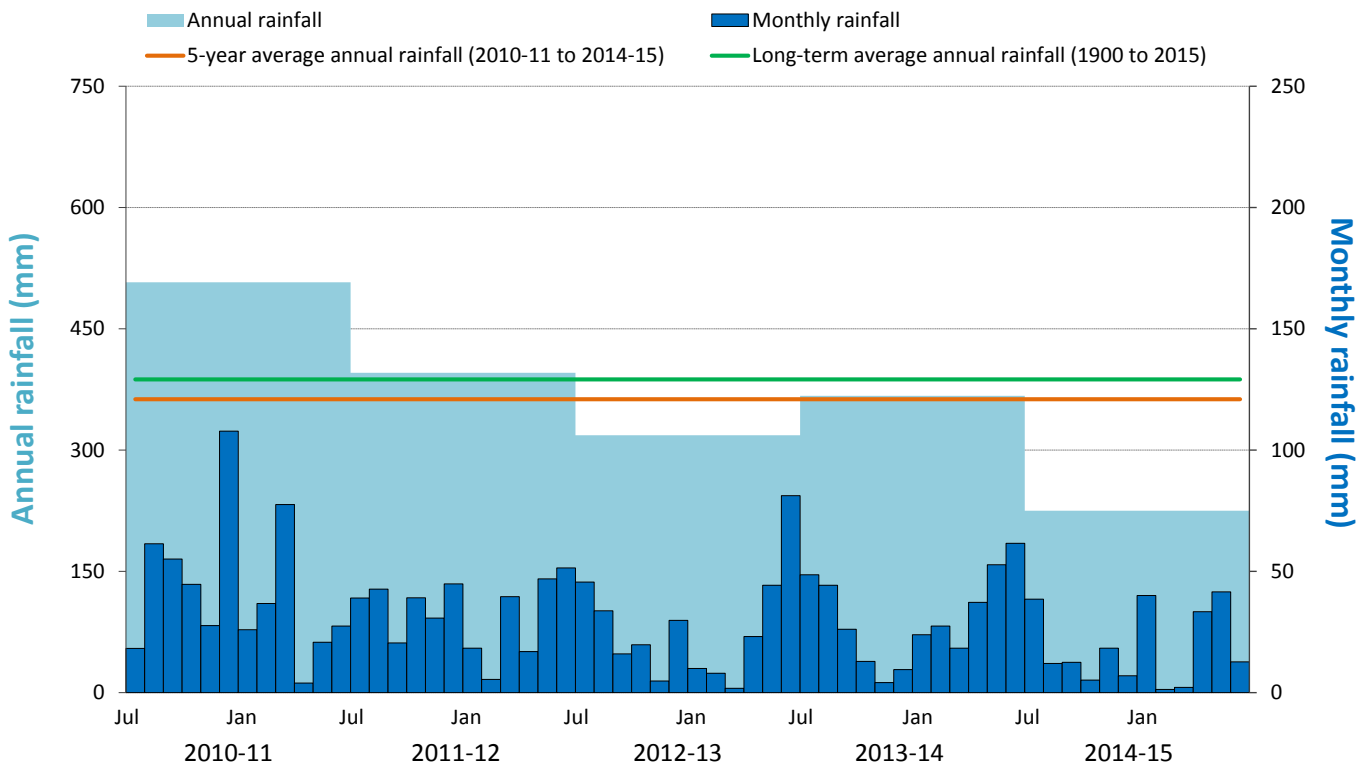


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-yearly and long-term average annual rainfall recorded at Peake (BoM Station 25513)³

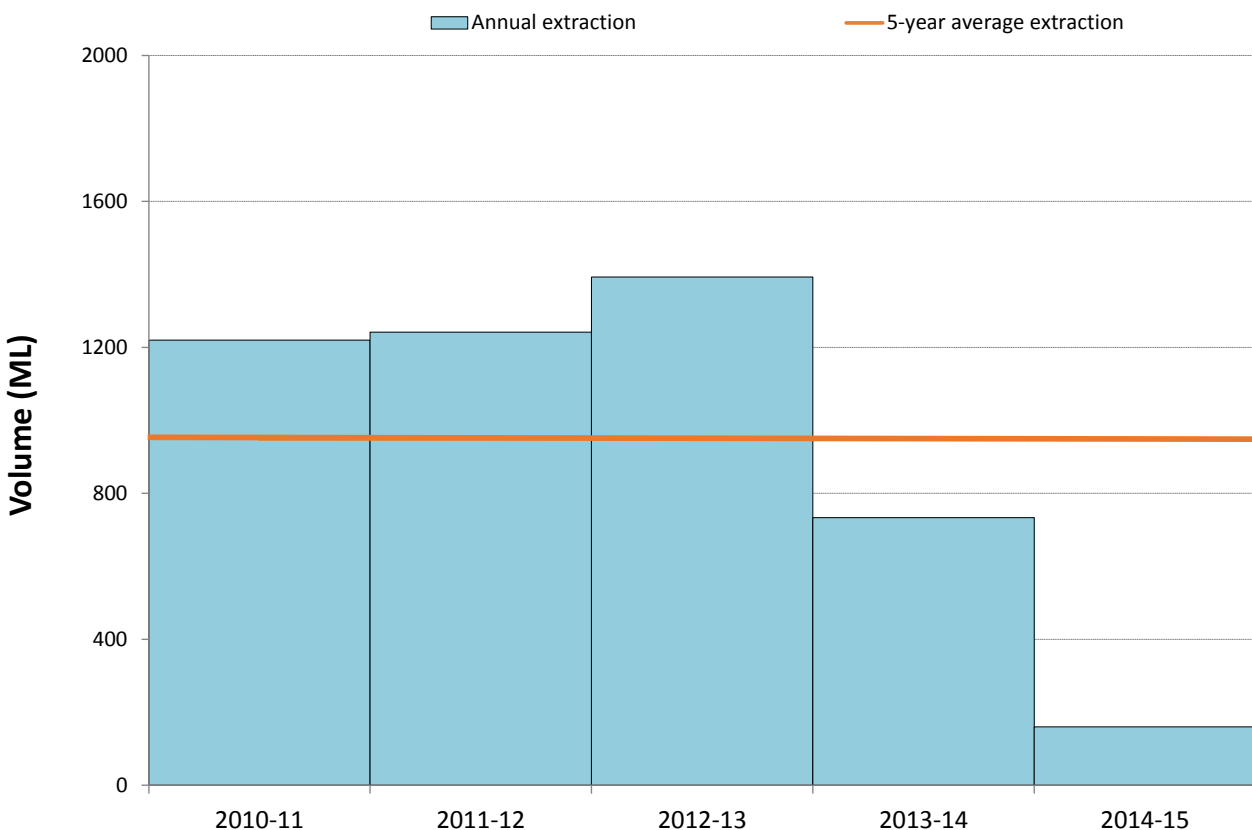
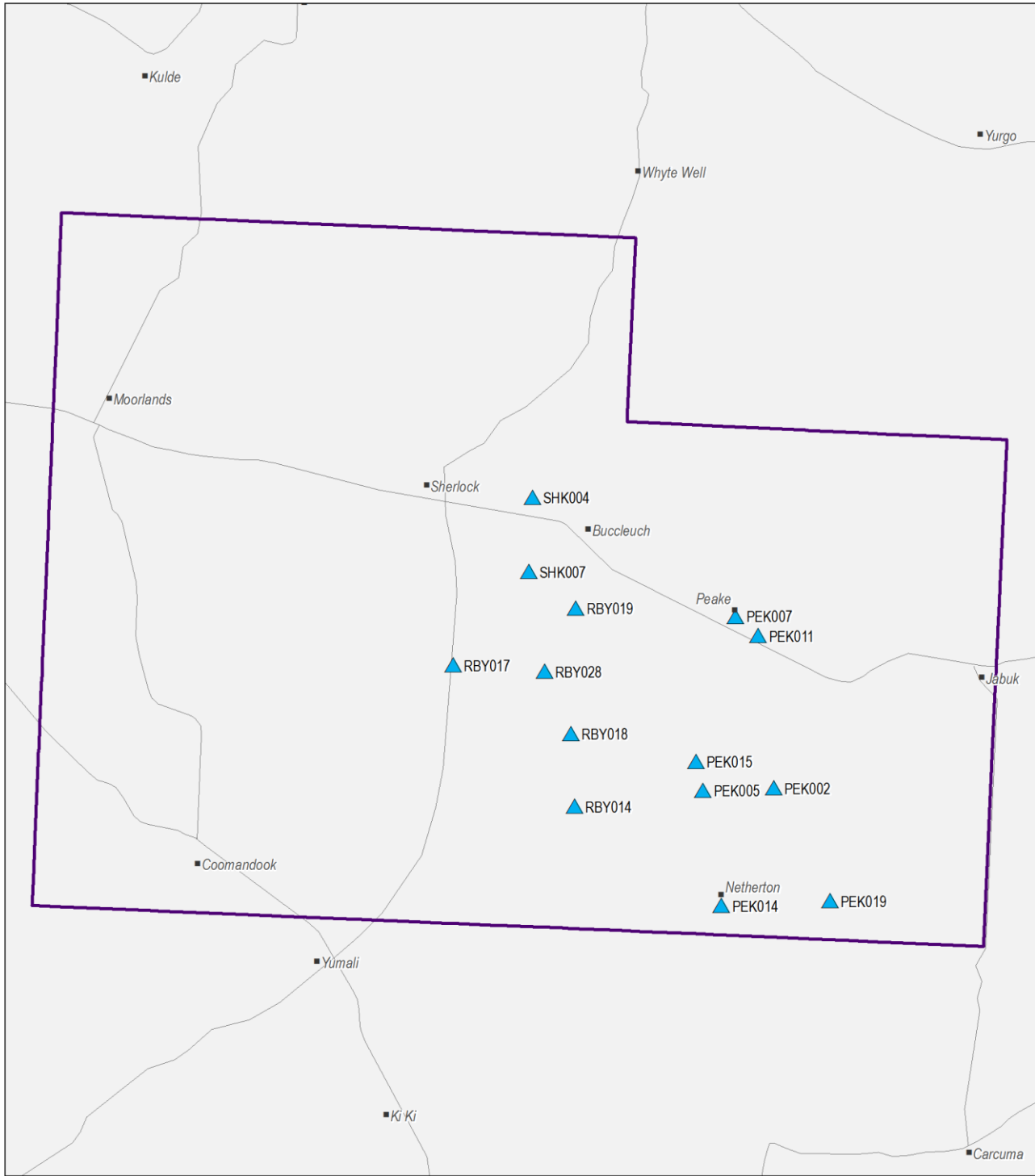


Figure 3. Licensed groundwater extraction volumes⁴ for the past five water-use years, from the confined aquifer in the Peake, Roby and Sherlock Prescribed Wells Area

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.

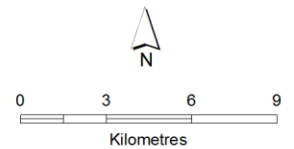
⁴ The licensed groundwater use and managed aquifer recharge volumes for the 2014–15 water-use year are based on the best data available as of February 2016 and may be subject to change, as some extraction volumes are in the process of being verified.



2015 water level

- ▲ Groundwater level is above the historical minimum and has a rising trend
- Groundwater level is above the historical minimum and is stable
- ▼ Groundwater level is above the historical minimum but has a declining trend
- ▲ Groundwater level is the lowest on record but has a rising trend
- Groundwater level is the lowest on record but is stable
- ▼ Groundwater level is the lowest on record and has a declining trend

— Road
 Peake, Roby and Sherlock Prescribed Wells Area



Produced by: Science, Monitoring and Knowledge Branch
 Map Projection: Lambert Conformal Conic
 Map Datum: Geocentric Datum of Australia 1994
 Date: October 2016



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Figure 4. 2015 status of groundwater levels in the confined aquifer of the Peake, Roby and Sherlock Prescribed Wells Area based on the 5-year trend from 2011 to 2015

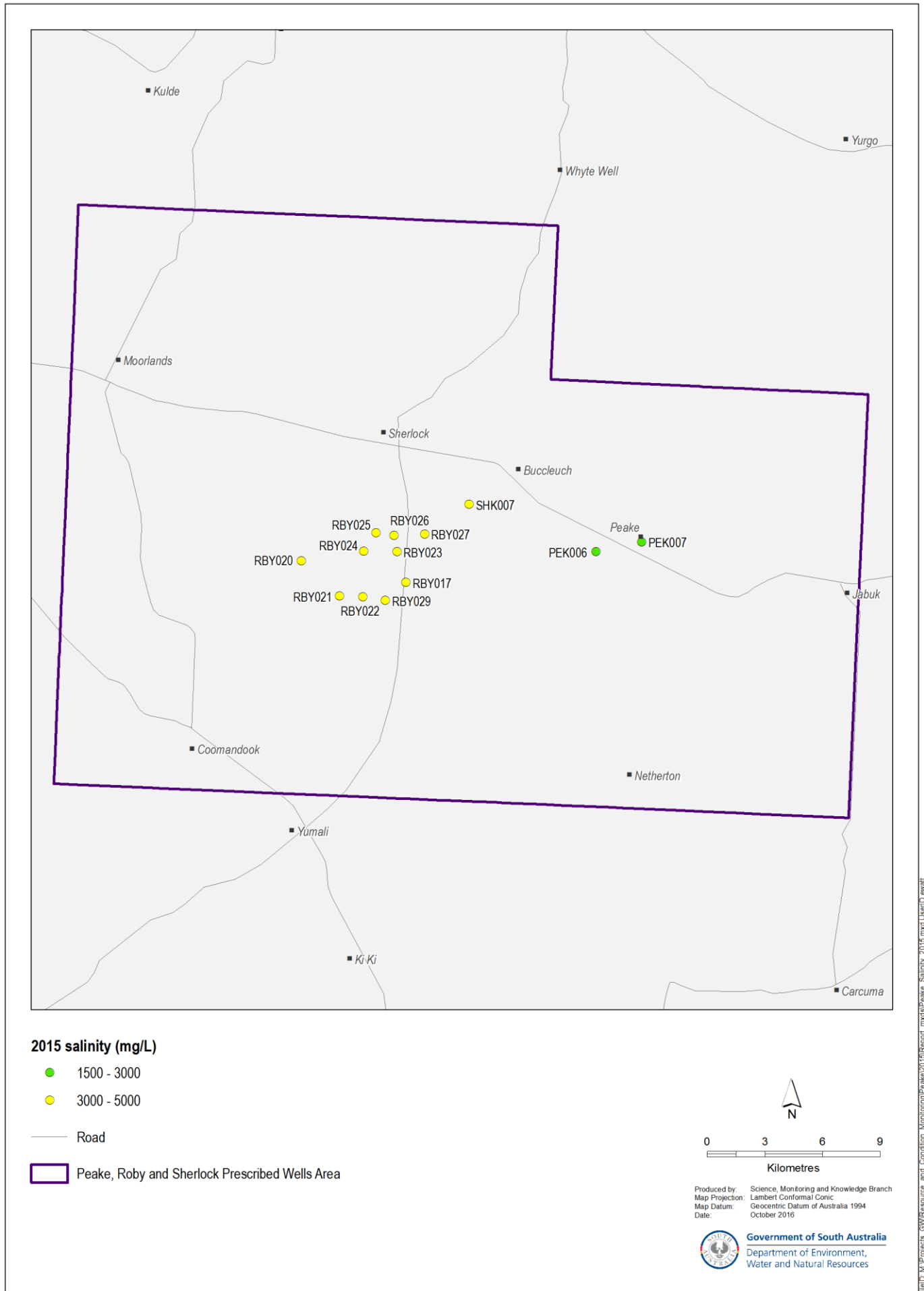


Figure 5. 2015 groundwater salinities of the Confined aquifer in the Peake, Roby and Sherlock Prescribed Wells Area

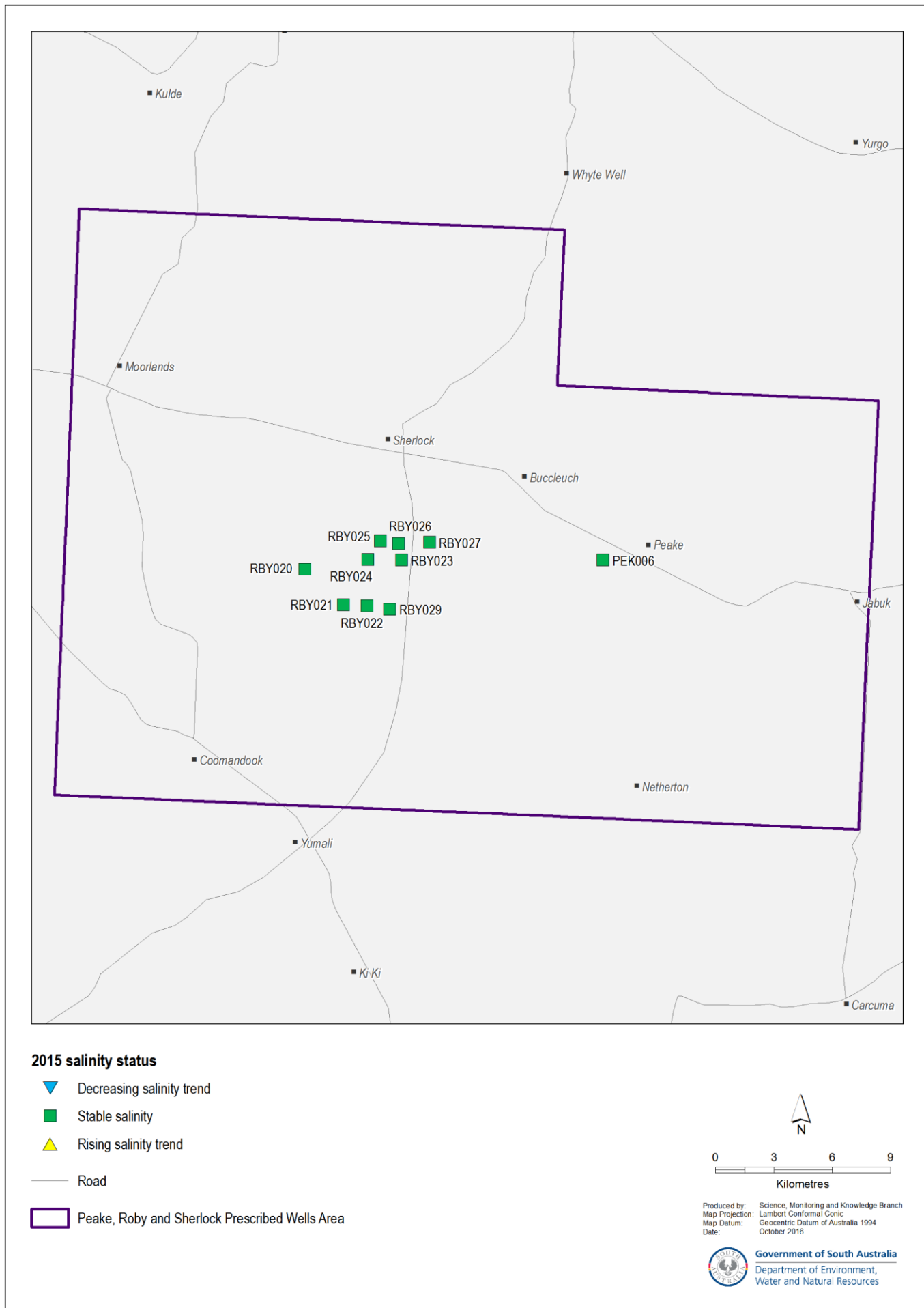


Figure 6. 2015 status of the groundwater salinities in the confined aquifer of the Peake, Roby and Sherlock Prescribed Wells Area based on the 5-year trend from 2011 to 2015

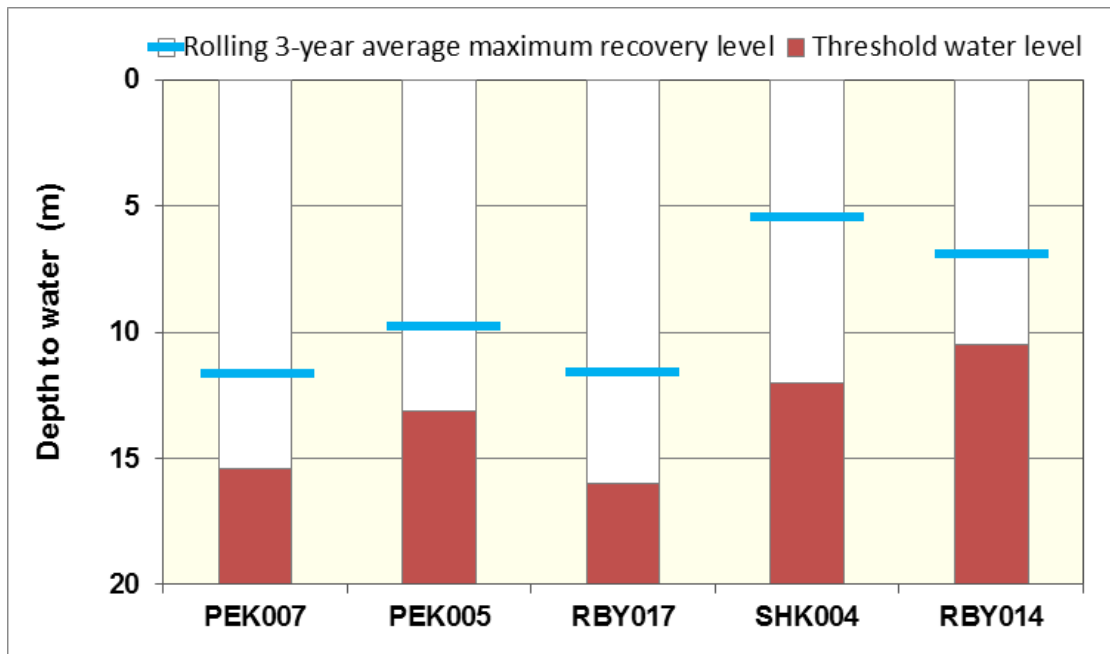


Figure 7. Maximum recovery level condition indicator thresholds of the Peake, Roby and Sherlock Prescribed Wells Area as defined in the water allocation plan and rolling three-year average max recovery level (from 2012 to 2015)

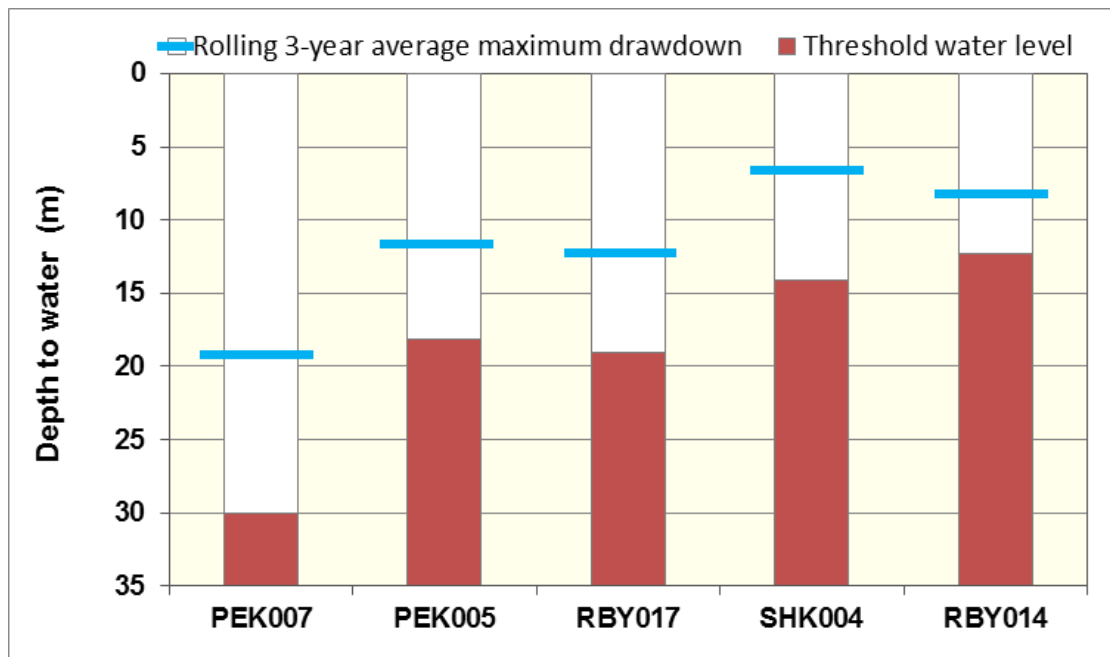


Figure 8. Maximum drawdown (DD) condition indicator thresholds of the Peake, Roby and Sherlock Prescribed Wells Area as defined in the water allocation plan and rolling three-year average max DD (from 2012 to 2015)

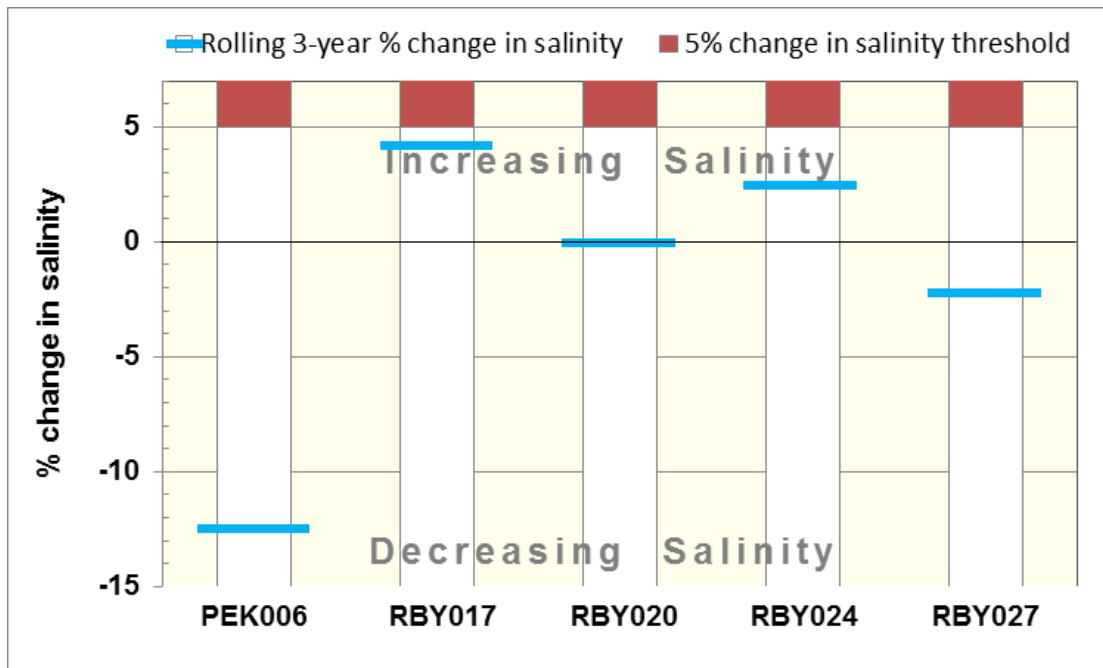


Figure 9. Salinity condition indicator thresholds of the Peake, Roby and Sherlock Prescribed Wells Area as defined in the water allocation plan and rolling three-year change in salinity (from 2012 to 2015)

