Barossa PWRA

Upper Aquifer

2015 Groundwater level and salinity status report

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

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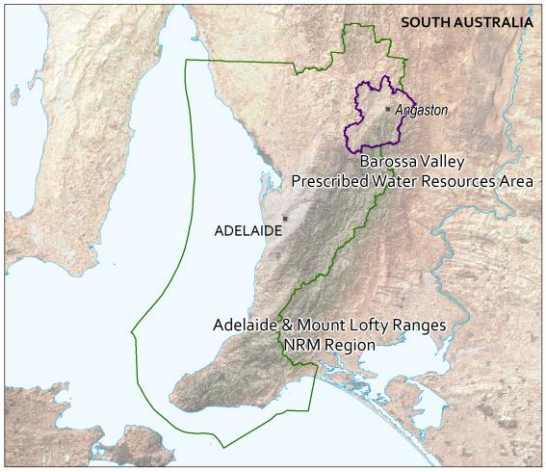
2015 Summary



The Barossa Prescribed Water Resources Area (PWRA) encompasses both the highland areas of the Mount Lofty Ranges (MLR) and the Barossa Valley, approximately 60 km north-east of Adelaide. It is located within the Adelaide and Mount Lofty Ranges Natural Resources Management Region and is a regional-scale resource for which surface water and groundwater have been prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan provides for the sustainable management of the water resources.

The Barossa PWRA consists of three major groundwater systems: two sedimentary aquifers (Upper and Lower) that are located within the area's largest valley; and, underlying the sedimentary aquifers, fractured rock aquifers that crop out in the MLR towards the eastern and western margins of the valley. The sedimentary Upper Aquifer of the Barossa PWRA is the focus of this report.

Groundwater flow within the Upper Aquifer is in a south-westerly direction in the northern part of the valley and in a northerly direction near Lyndoch. Recharge to the Upper Aquifer originates from rainfall, with contribution from streamflow in some areas.

Trends in groundwater levels and salinity in the Upper Aquifer of the Barossa PWRA are primarily climate driven: below-average rainfall results in a reduction in recharge to the aquifers. Below-average summer rainfall can also result in increasing irrigation extractions, and these two elements can cause groundwater levels to fall and salinity to increase. Conversely, increases in rainfall results in increases in recharge, decreases in irrigation extractions and groundwater levels may rise and salinity stabilise or decline. Seasonal responses to recharge are common, except where there is overlying Quaternary clay.

The Angaston rainfall station (BoM Station 23300) recorded 386 mm of rain in 2014–15, 139 mm below the long-term average of 525 mm (1900–2015) and 145 mm below the five-year average of 531 mm (Figs 1 and 2). Despite three of the past five years recording above-average rainfall, rainfall shows a five-year declining trend (Fig. 2). Furthermore, annual rainfall for 2014–15 is the sixth-lowest on record for the period 1900–2015. Long-term seasonal rainfall patterns show generally higher rainfall during the winter months and lower rainfall over summer. Notable seasonal anomalies over the past five years include the wet water-use year of 2010–11, though January and April recorded just 18% of their long-term monthly average, and the dry spring–summers of 2012–13 and 2013–14, which ended in 2014 with February of recording more than four-and-a-half times its long-term average monthly rainfall. The 2014–15 water-use year has been particularly dry, with seven months receiving less than half their average monthly rainfall; although, January received more than double its long-term average.

Licensed groundwater extractions from the Upper Aquifer totalled 377 ML[1] in 2014–15, a 3% decrease from the previous water-use year and 19% more than the five-year average annual extraction (Fig. 3). The Upper Aquifer supplied 13% of the groundwater extracted from the Barossa PWRA in 2014–15.

Long-term groundwater level data for the Upper Aquifer display a broad relationship with rainfall patterns, although some wells show stable groundwater levels. Above-average rainfall in 2009 and 2010 resulted in a general rise in groundwater levels. In the five years to 2015, 25 out of 29 of monitoring wells (86%) show a declining groundwater level trend, and one of these wells shows its lowest level on record in 2015 (Fig. 4). Declines ranged between 0.05 and 0.5 m/y, with a median 0.15 m/y and are mainly concentrated in the northern half of the aquifer and south of Lyndoch. Two wells show rising trends in groundwater level and another two wells show stable water levels (Fig. 4). The wells showing rising trends at rates of 0.25 and 0.89 m/y, are located south of Nuriootpa.

Groundwater salinity in the Upper Aquifer is highly variable, from 1000 mg/L south of Lyndoch to 12 000 mg/L north of Nuriootpa (Fig. 5). The groundwater salinity of the Upper Aquifer was not monitored in 2015 and as such, the most recent data available (2010 to 2014, inclusive) was used for salinity trend analysis in this report. In the five years to 2014, most monitoring wells (70%) show

[1] The licenced groundwater use for the 2014–15 water-use year is based on the best data available as of March 2016 and could be subject to change, as some extraction volumes may be in the process of being verified.

either stable salinity or a decreasing trend in salinity (Fig. 6). The remaining 30% of monitoring wells show trends indicating rising salinity.

To determine the status of the Upper Aquifer for 2015, the trends in groundwater levels over five years (2011 to 2015, inclusive) and salinities (2010 to 2014, 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 a detailed explanation of the new method of status assessment.

The Upper Aquifer of the Barossa PWRA has been assigned a yellow status for 2015:

2015 Status Minor adverse trends have been observed over the past five years

The 2015 status of the Upper Aquifer is based on:

- most monitoring wells (86%) showing a five-year trend of declining groundwater levels.

Although a yellow status has been assigned based on the declining trend in groundwater levels, the overall decreasing trend in salinities shown by most wells (for the period 2010–14 inclusive), is acknowledged.

To view descriptions for all status symbols, please visit the *Water Resource Assessments* page on WaterConnect.

To view the *Barossa PWRA 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 on WaterConnect.

To view or download groundwater level and salinity data from monitoring wells within the Barossa PWRA, please visit Groundwater Data on WaterConnect.

For further details about the Barossa PWRA, please see the *Water Allocation Plan for the Barossa Prescribed Water Resources Area* on the Natural Resources Adelaide and Mount Lofty Ranges website.

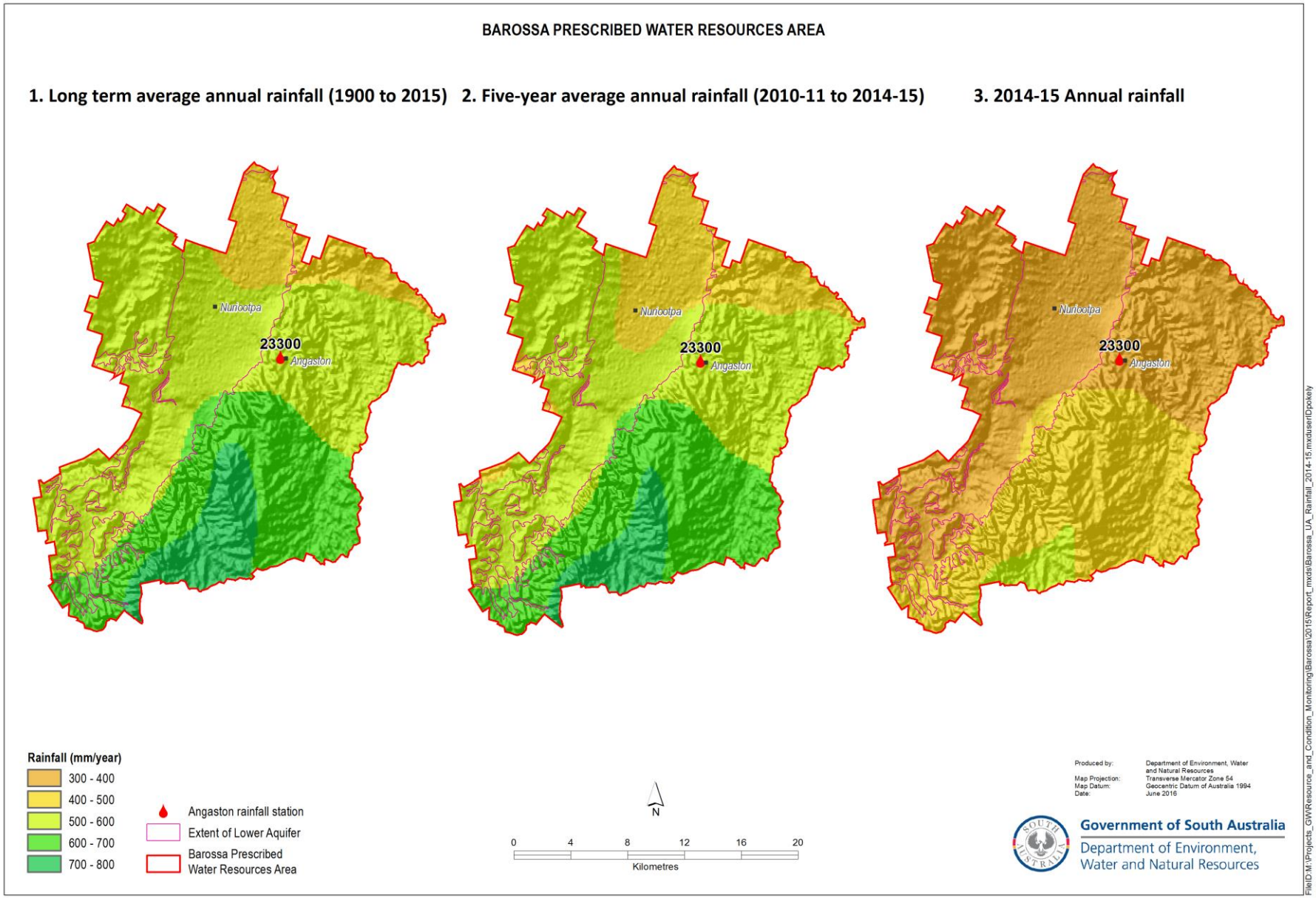


Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2014–15 water-use year in the Barossa Prescribed Water Resource[2]

[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.

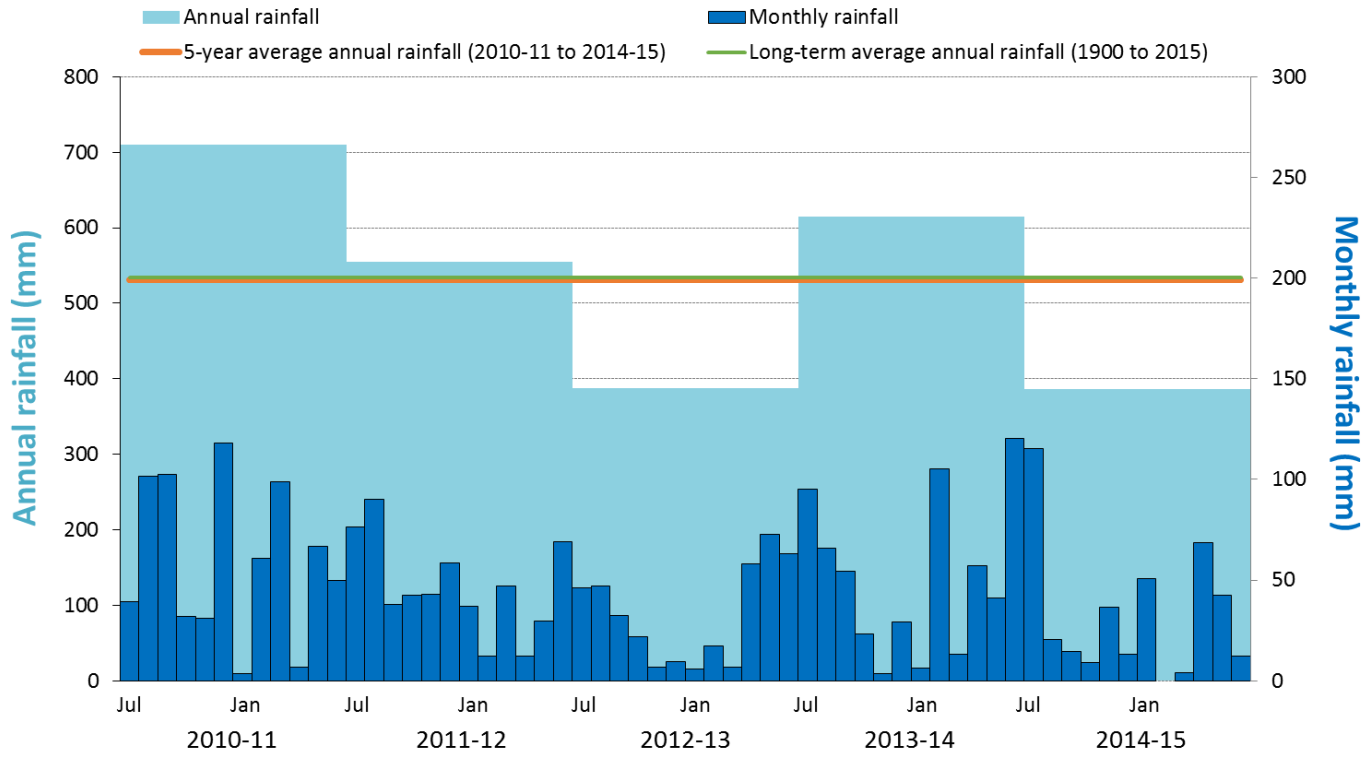


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Angaston (BoM Station 23300)[3]

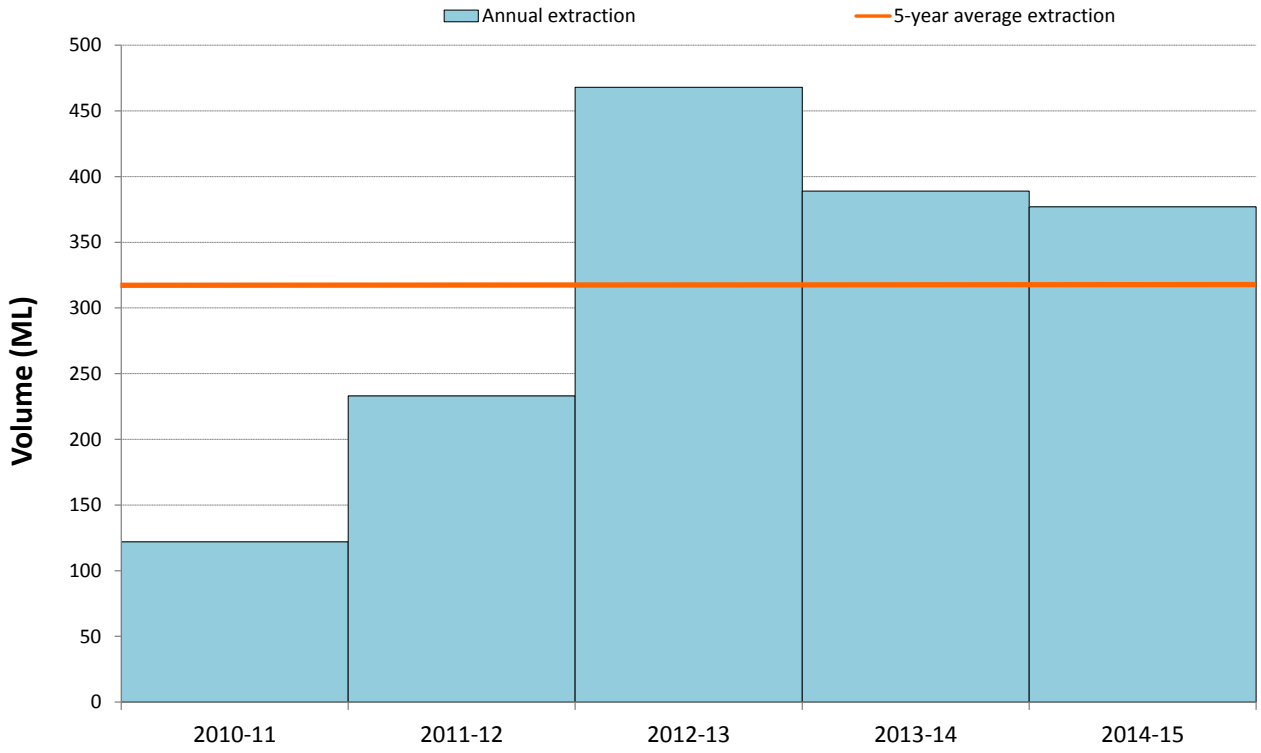


Figure 3. Licensed groundwater extraction volumes[4] for the past five water-use years, for the Upper Aquifer

[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 licenced groundwater use for the 2014–15 water-use year is based on the best data available as of March 2016 and could be subject to change, as some extraction volumes may be in the process of being verified.

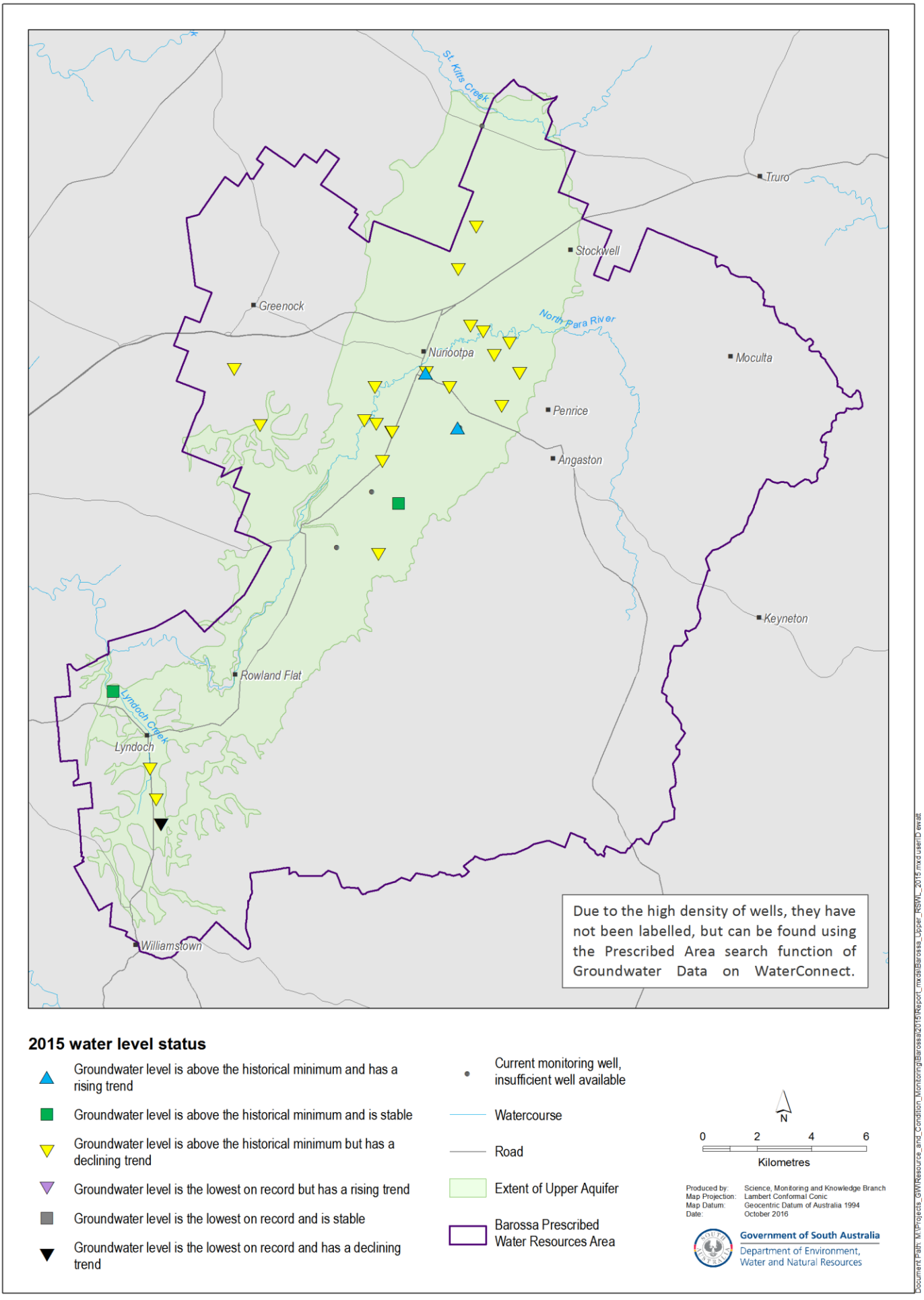


Figure 4. 2015 status of the groundwater levels in the Upper Aquifer of the Barossa Prescribed Water Resources Area, based on five-year trends from 2011 to 2015

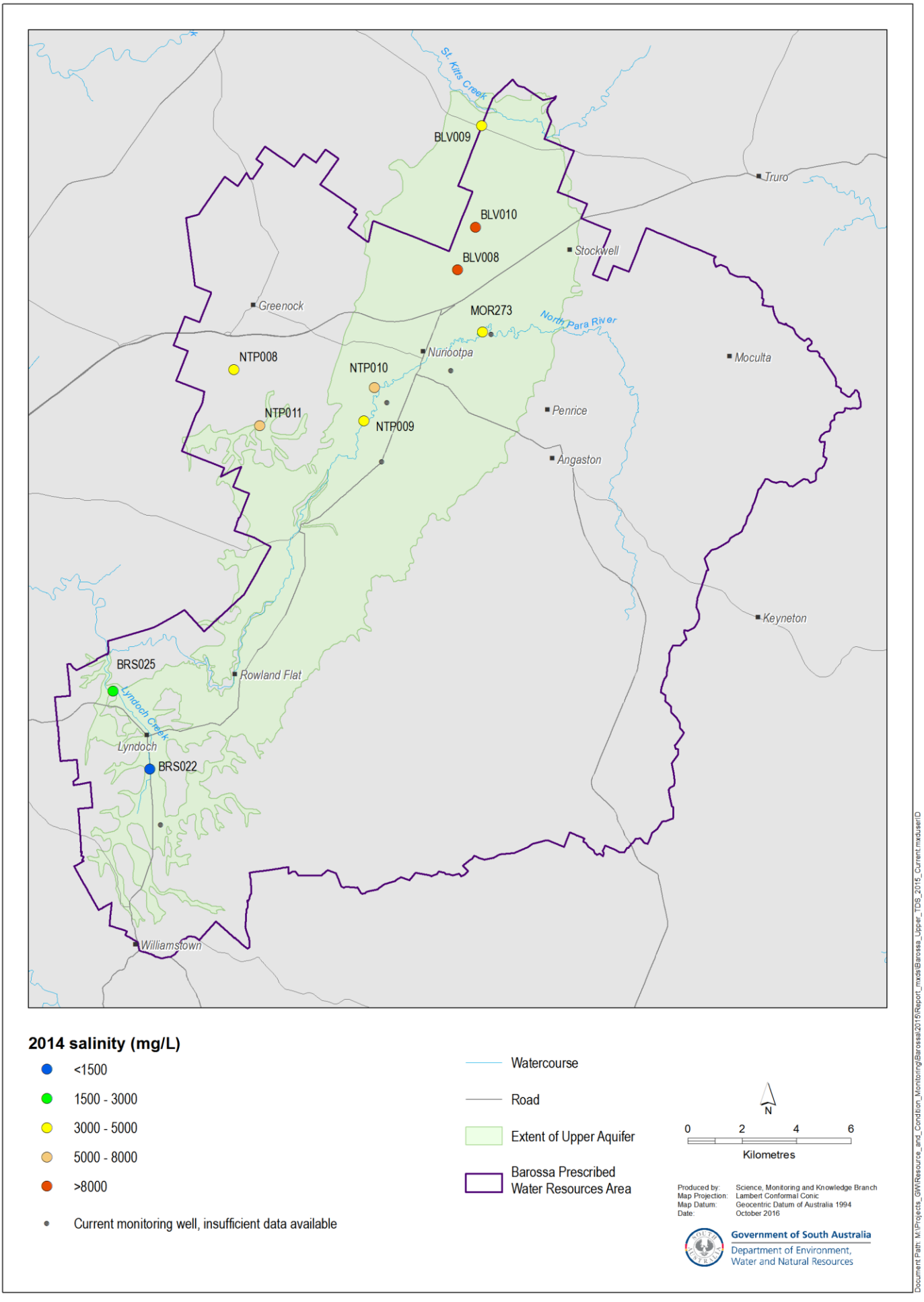


Figure 5. 2014 groundwater salinity of the Upper Aquifer in the Barossa Prescribed Water Resources Area

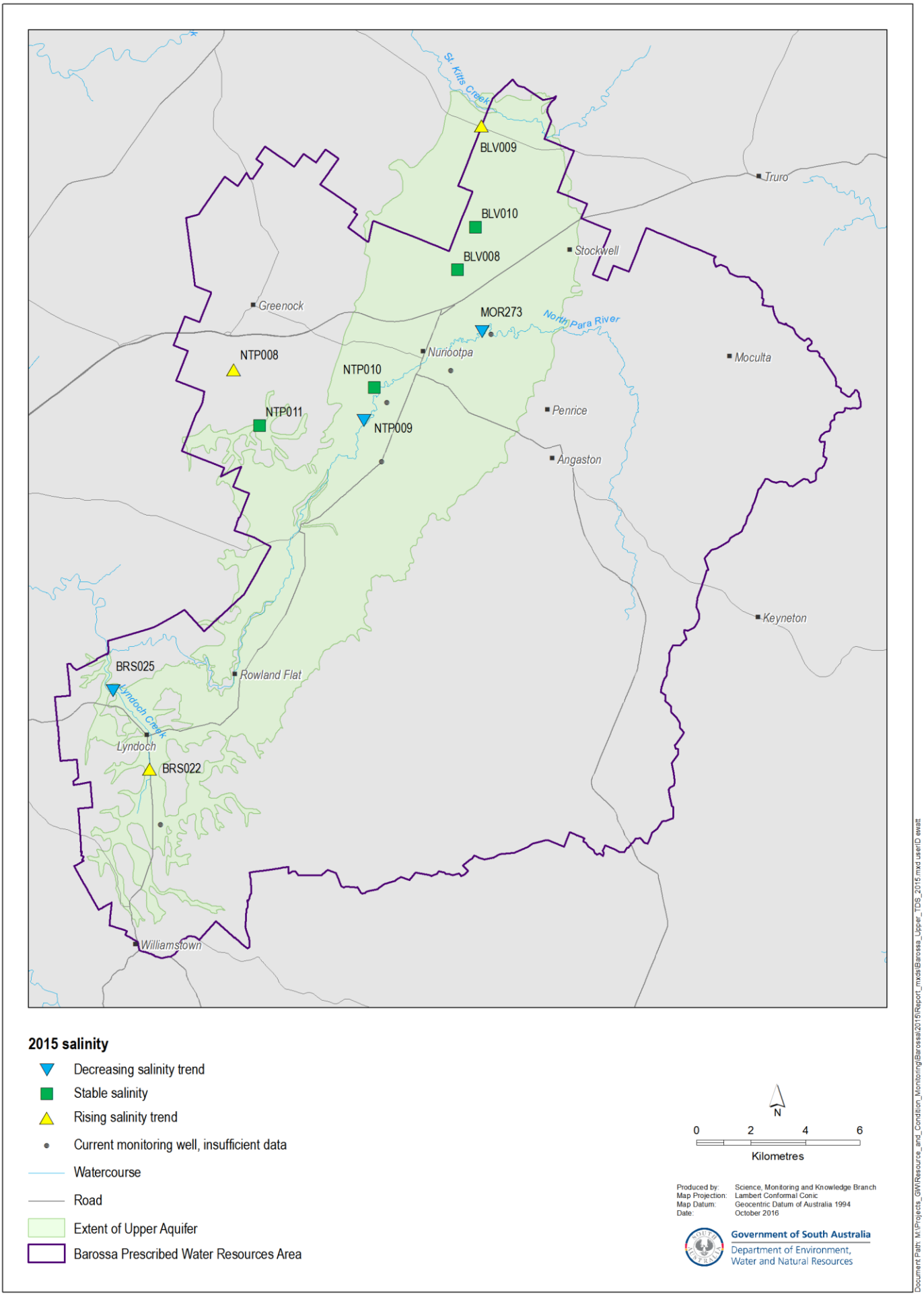


Figure 6. 2015 status of the groundwater salinity in the Upper Aquifer of the Barossa Prescribed Water Resources Area based on five-year trends from 2010 to 2014

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