

Southern Basins PWA

Uley Wanilla lens

2015 Groundwater level and salinity status report



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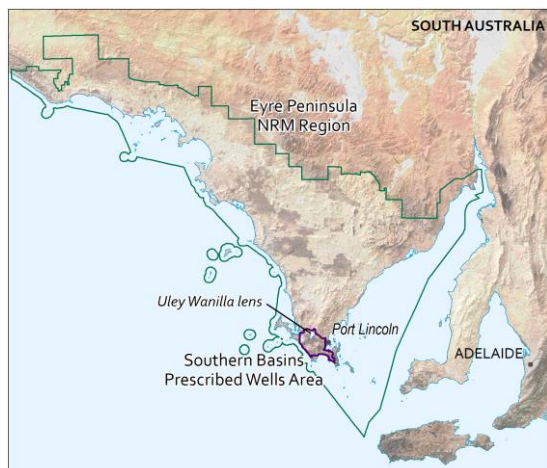
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2015 Summary



The Southern Basins Prescribed Wells Area (PWA) is located at the southernmost part of the Eyre Peninsula, between Port Lincoln and Coffin Bay in the Eyre Peninsula NRM Region. It is prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan provides for the sustainable use of the groundwater resources. The Uley Wanilla lens is located in the north of the Southern Basins PWA.

Within the Southern Basins PWA, there are two main sedimentary sequences containing groundwater that overlie basement rocks: the Quaternary limestone aquifer and underlying Tertiary sands aquifer. The Quaternary limestone aquifer comprises a generally thin veneer of aeolianite sediments of the Bridgewater Formation and is continuous across the PWA. Areas within the Quaternary limestone aquifer delineated by groundwater salinity of less than 1000 mg/L, such as the Uley Wanilla lens, are described as fresh

groundwater lenses in the current water allocation plan. The main source of recharge to the Quaternary limestone aquifer is the direct infiltration of rainfall, and groundwater flow is predominantly in a southerly direction.

Groundwater levels and salinities in the Southern Basins PWA are highly dependent on recharge from rainfall and any trends in groundwater level or salinity are primarily climate driven: below-average rainfall results in a reduction in recharge to the aquifers. Below-average summer rainfall can also result in increased extraction, and combined can cause the groundwater levels to fall and salinities to increase. Conversely, above-average rainfall can result in increased recharge, decreased extraction and groundwater levels may rise and salinities stabilise or decline. Historical rainfall data indicate that trends of above or below-average rainfall can last for up to 25 years, and that high-intensity rainfall can result in greater and more-rapid water level (i.e. recharge) responses.

The Big Swamp rainfall station (BoM Station 18017), located approximately 3 km east of the Uley Wanilla lens, recorded 344 mm of rainfall in the 2014–15 water-use year, the third-lowest rainfall total on record for that station. This is 217 mm less than the long-term average of 561 mm (1900–2015) and 226 mm less than the five-year average of 570 mm (Figs. 1 and 2). A trend of declining rainfall over the past five years is evident, despite the high rainfall in 2013–14 (Fig. 2). Long-term seasonal rainfall patterns show generally higher rainfall during the winter months and lower rainfall over summer. Notable seasonal variations over the past five years include the unusually wet spring and summer of 2010–11, the dry spring–summer of 2012–13, and the wet summer and autumn–winter of 2013–14. The 2014–15 water-use year has been particularly dry, with seven months recording less than half their long-term monthly-average rainfall, although April recorded twice its average.

Licensed groundwater extractions within the Southern Basins PWA occur predominantly from fresh groundwater lenses within the Quaternary limestone aquifer, and in 1949 the Uley Wanilla lens was the first groundwater resource developed to augment public water supply that had previously been sourced solely from the Tod River Reservoir. Extractions from the Uley Wanilla lens have decreased steadily since 1993, in response to declining groundwater levels. During 2012–13, which was a period of low demand for water, groundwater extractions were intentionally minimised in order to observe the dynamics of the system (Fig. 3). In 2014–15, metered extractions from the Uley Wanilla lens totalled 111 ML, which is a 28% increase from the previous water-use year and 43% higher than the five-yearly average extraction (Fig. 3). This volume of extraction equates to 72% of the total allocation limit of 155 ML for the Uley Wanilla lens and accounts for 2% of the total licensed extractions within the Southern Basins PWA.

Groundwater levels in the Uley Wanilla lens show a positive correlation with Big Swamp rainfall. A trend of declining groundwater levels between 1992 and 2008 coincided with a dominant below-average trend in rainfall recorded at the Big Swamp rainfall station for that period. Since 2009, the rise in groundwater levels observed in most wells correlates with generally above-average rainfall and a substantial reduction in rates of extraction, although groundwater levels are still lower than those measured prior to 1985.

In the five years to 2015, trends in groundwater levels in the Uley Wanilla lens have been variable, with 60% of groundwater level monitoring wells showing a rising trend and 40% a declining trend (Fig. 4). The rate of increase ranges between 0.03 and 0.17 m/y and wells with a rising trend are concentrated in the northern part of the lens. Rates of decline in groundwater levels range between 0.01 and 0.03 m/y. Wells showing a declining trend are located toward the centre and south of the lens.

Long-term salinity data show a variety of trends over the historical record, with most monitoring wells showing consistent rises in salinities from the late 1980s to 2008, which coincides with below-average rainfall over this period. Regular salinity measurements taken from town water supply wells show that salinities have generally stabilised since 2009.

In 2015, seven salinity monitoring wells showed salinities in the range of 500–830 mg/L (Fig. 5). In the five years to 2015, six monitoring wells (85%) show stable salinities, while only one salinity monitoring well recorded a slight rising trend (Fig. 6).

To determine the status of the Uley Wanilla lens for 2015, the trends in groundwater level and salinity 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 a detailed explanation of the new method of status assessment.

The Uley Wanilla lens of the Southern Basins PWA has been assigned a green status for 2015:

2015 Status



Positive trends have been observed over the past five years

The 2015 status of Uley Wanilla lens is based on:

- most monitoring wells (60%) showing a five-year trend of rising groundwater levels
- most monitoring wells (85%) showing stable salinities.

While the Uley Wanilla lens has been assigned a green status, there are areas in the central and southern parts of the lens where the groundwater is declining.

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

To view the *Southern Basins Prescribed Wells Area 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 monitoring wells within the Southern Basins PWA, please visit [Groundwater Data](#) on WaterConnect.

For further details about the Southern Basins PWA, please see the *Water Allocation Plan for the Southern Basins and Musgrave Prescribed Wells Areas* on the Natural Resources Eyre Peninsula [website](#).

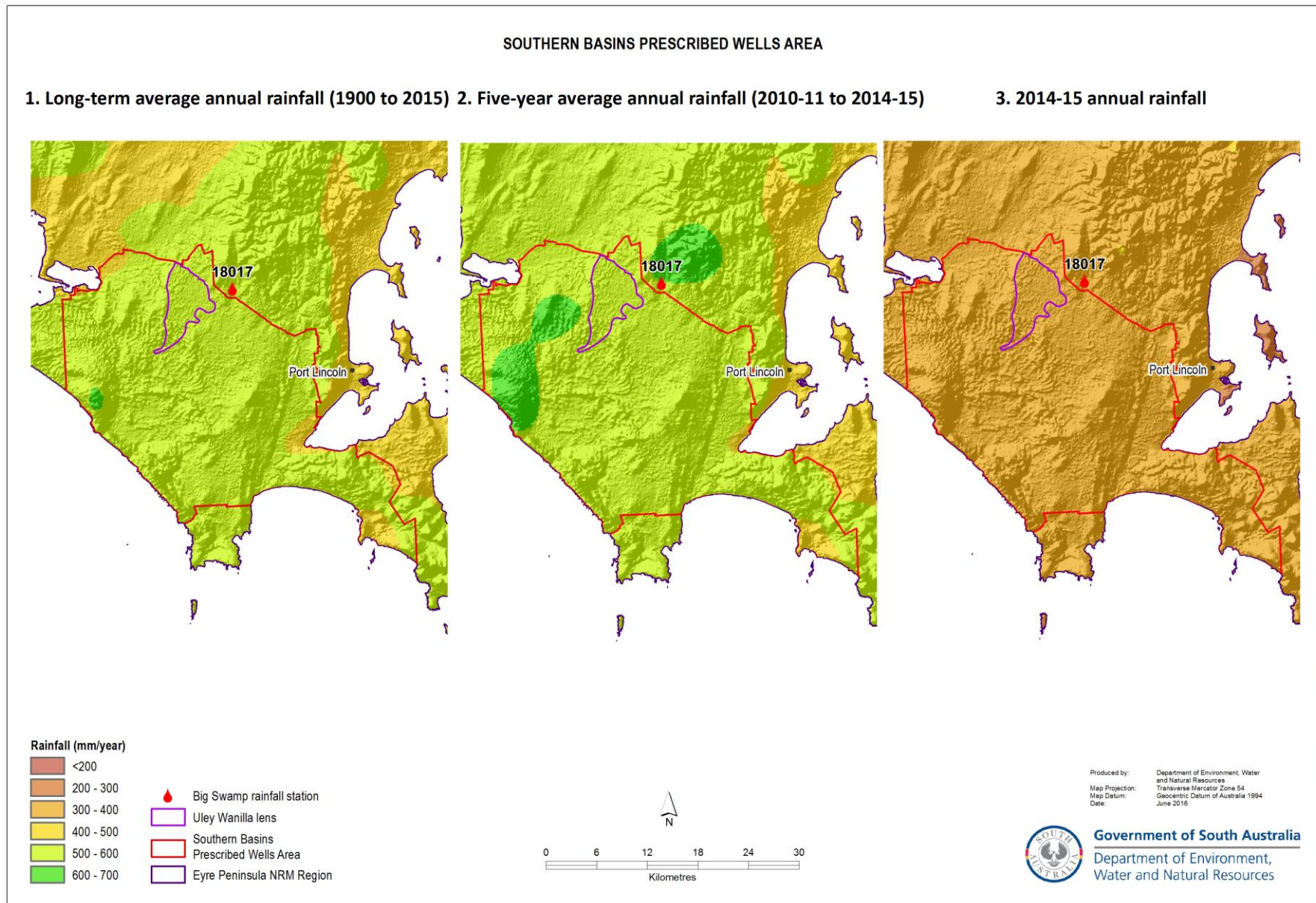


Figure 1 (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2014–15 water-use year in the Southern Basins Prescribed Wells Area¹

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.

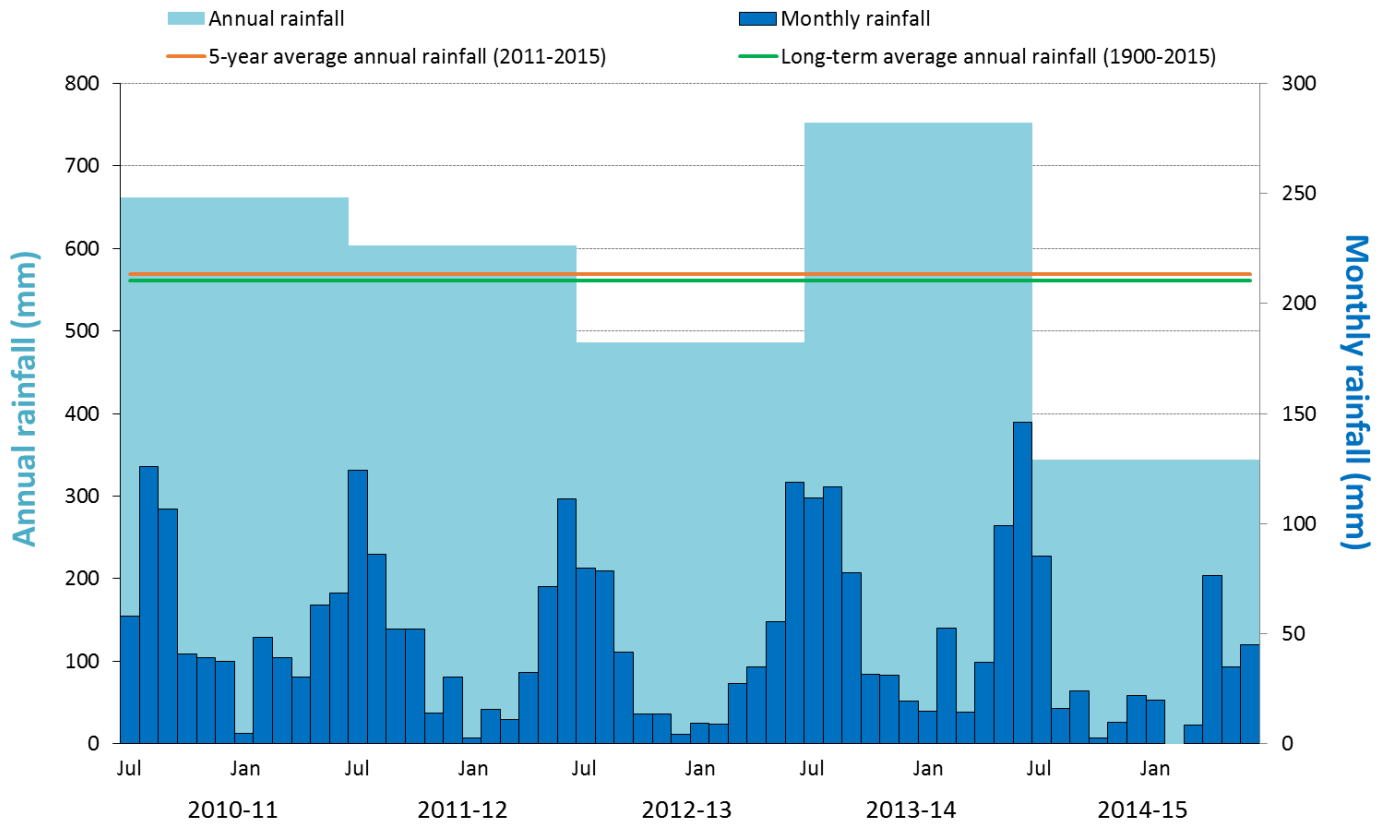


Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Big Swamp (BoM Station18017)²

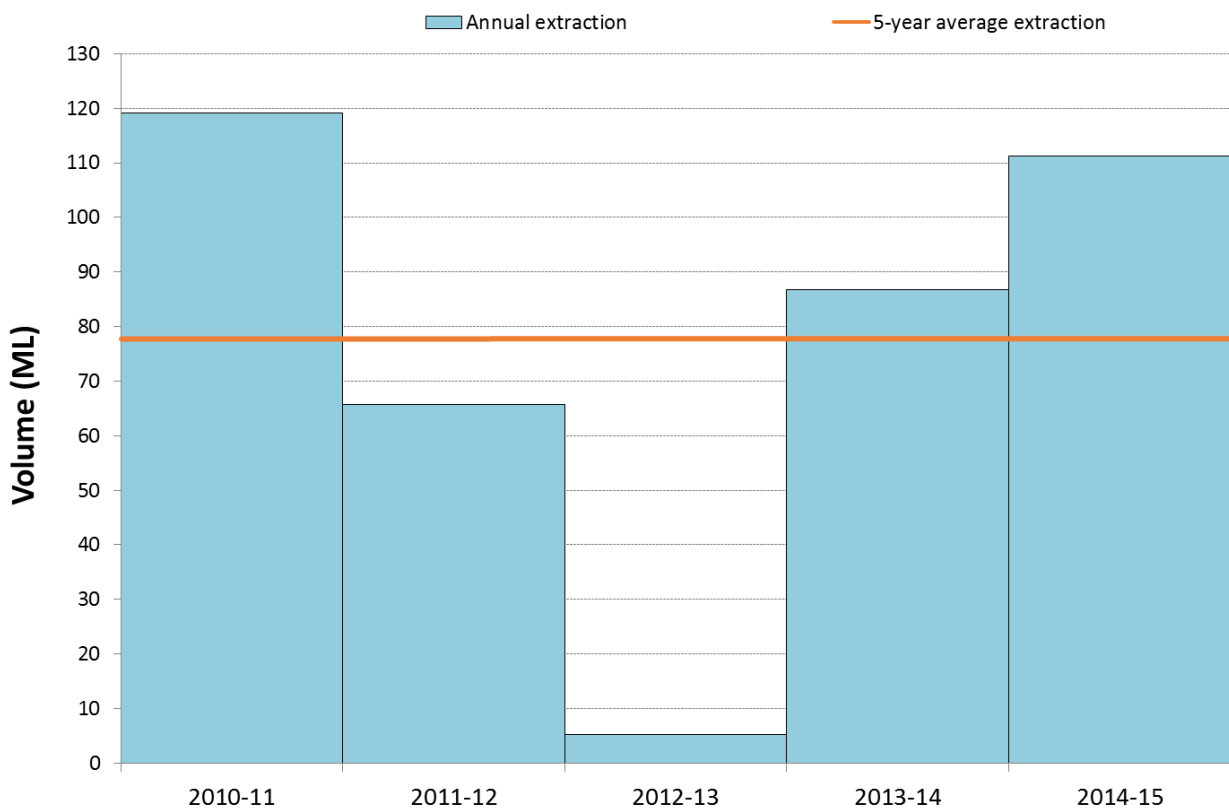


Figure 3. Licensed groundwater extraction volumes for the past five water-use years, for the Uley Wanilla lens in the Southern Basins Prescribed Wells Area

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.

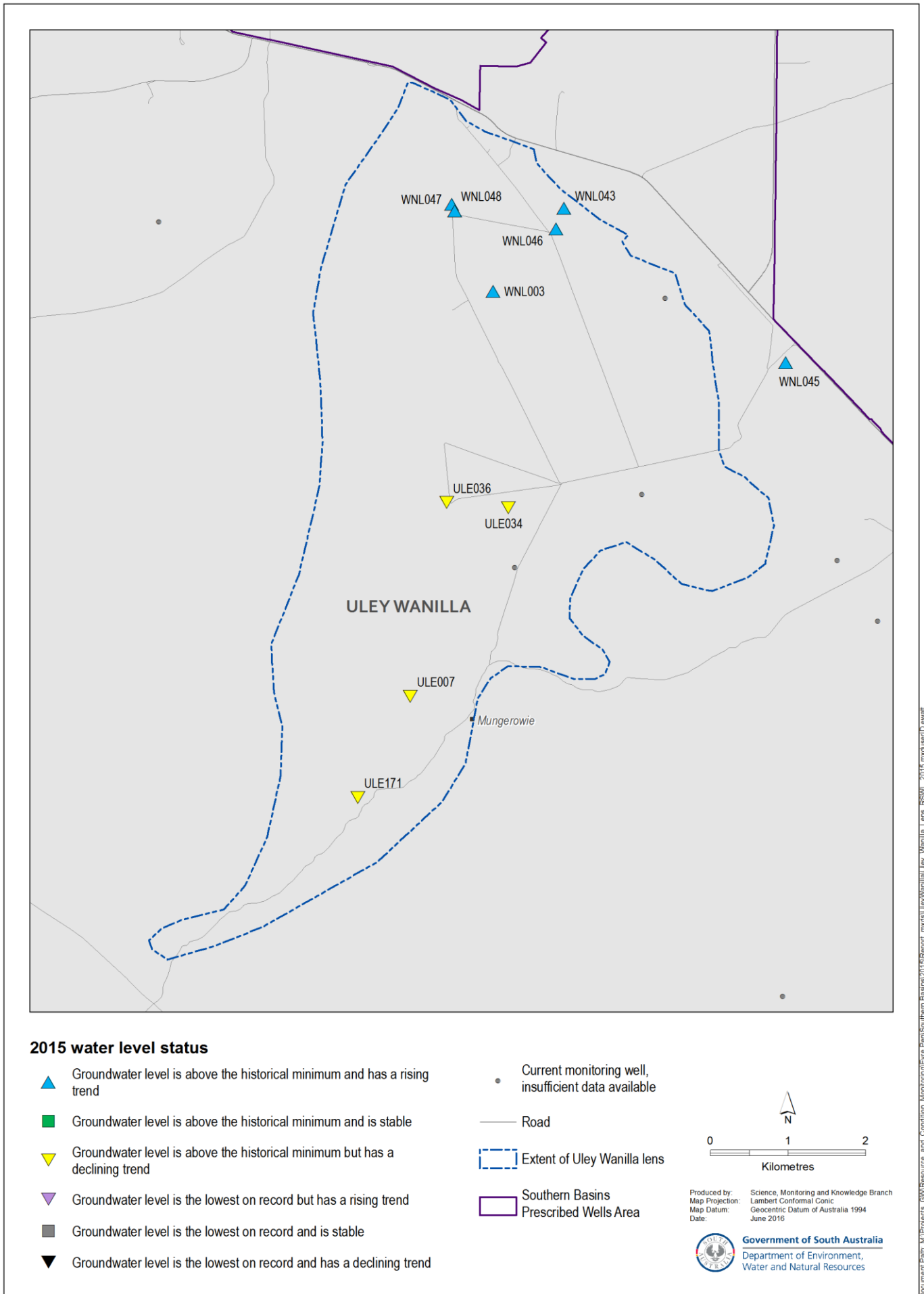


Figure 4. 2015 status of groundwater level in the Uley Wanilla lens (Southern Basins Prescribed Wells Area) based on the five-year trend from 2011 to 2015

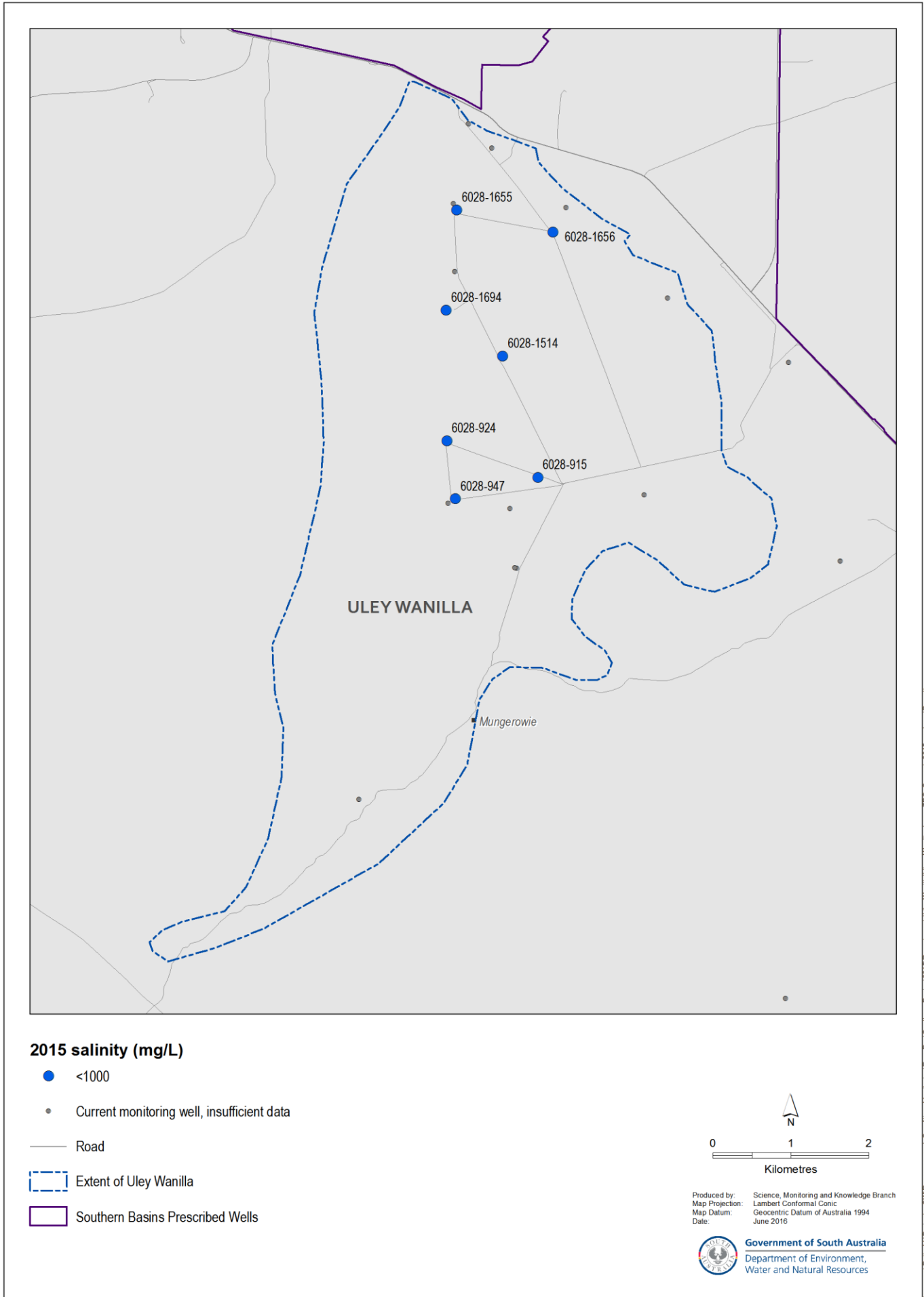
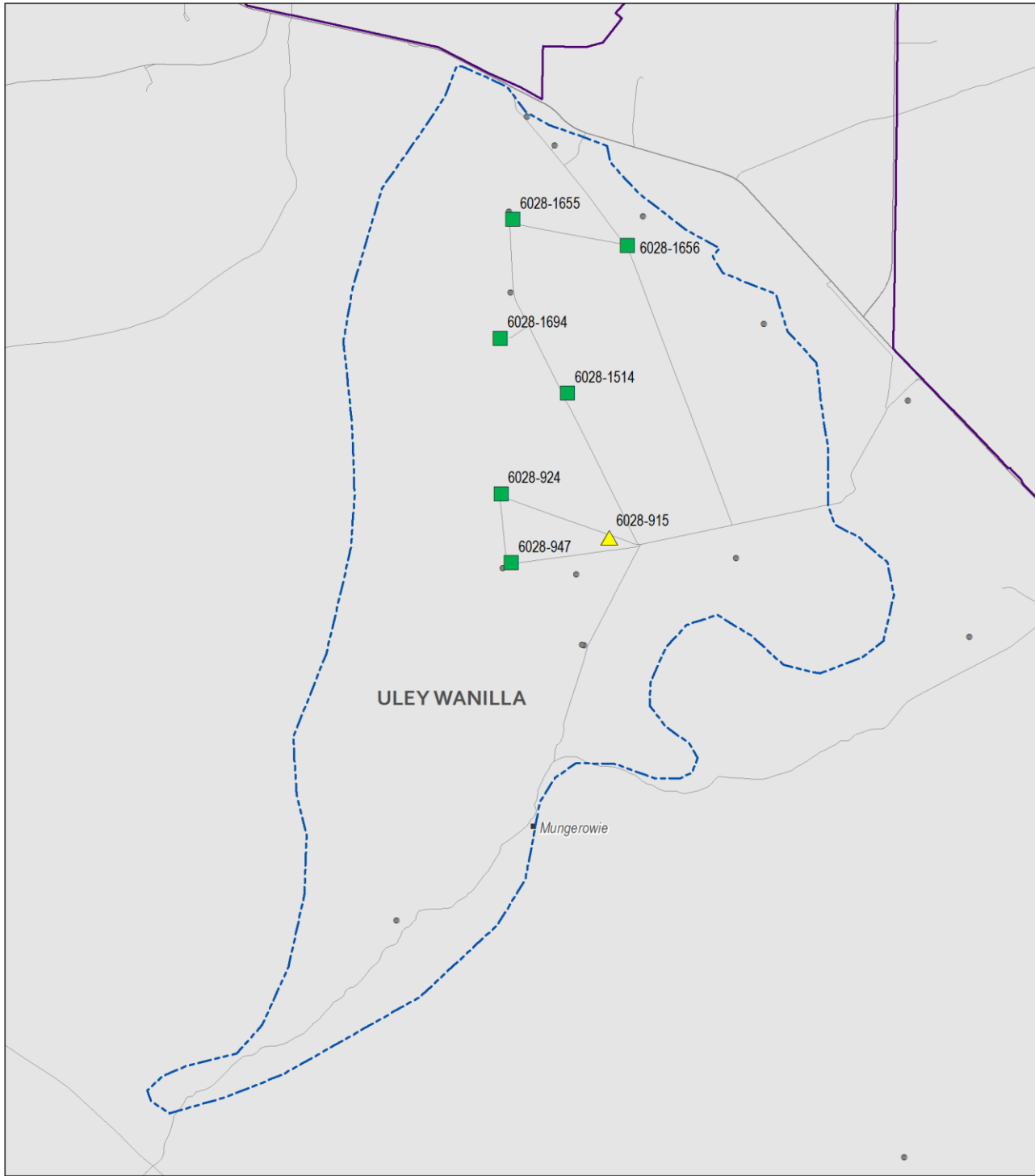


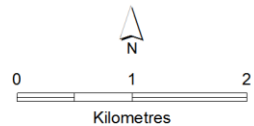
Figure 5. 2015 groundwater salinity of the Uley Wanilla lens (Southern Basins Prescribed Wells Area)



2015 salinity status

- ▼ Salinity is less than 1000 mg/L and has a decreasing trend
- Salinity is less than 1000 mg/L and is stable
- ▲ Salinity is less than 1000 mg/L but has a rising trend
- ▼ Salinity exceeds 1000 mg/L but has a decreasing trend
- Salinity exceeds 1000 mg/L but is
- ▲ Salinity exceeds 1000 mg/L and has a rising

- Current monitoring well, insufficient data available
- Road
- Extent of Uley Wanilla
- ▭ Southern Basins Prescribed Wells Area



Produced by: Science, Monitoring and Knowledge Branch
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 Map Datum: Geocentric Datum of Australia 1994
 Date: June 2016



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Figure 6. 2015 status of groundwater salinity in the Uley Wanilla lens (Southern Basins Prescribed Wells Area) based on the five-year trend from 2011 to 2015

