

Musgrave PWA

Bramfield lens

2015 Groundwater level and salinity status report



Department of Environment, Water and Natural Resources
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	

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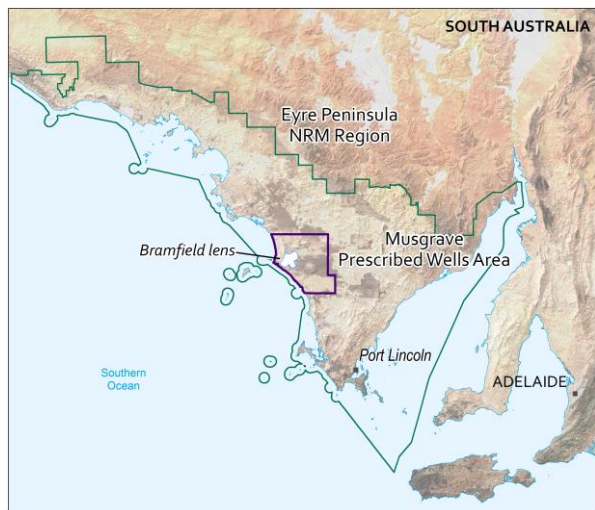
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2015 Summary



The Musgrave Prescribed Wells Area (PWA) is situated in central Eyre Peninsula, approximately 120 km north-west of Port Lincoln 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 Bramfield lens is situated in the north west of the Musgrave PWA.

Within the Musgrave PWA, there are three main sedimentary sequences containing groundwater that overlie basement rocks: the Quaternary limestone aquifer, the underlying Tertiary sands aquifer, and deeper Jurassic sediments within the Polda Trough. 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 salinity of less than 1000 mg/L, such as the Bramfield 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 westerly to south-westerly direction toward the Southern Ocean.

Groundwater levels and salinity in the Musgrave PWA are highly responsive to recharge from rainfall and groundwater level or salinity trends 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 extractions, and these two elements can cause the groundwater levels to fall and salinity to increase. Conversely, above-average rainfall can result in increases in recharge, decreases in extractions and groundwater levels may rise and salinity 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.

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The Elliston rainfall station (BoM Station 18069), located to the south-west of the Bramfield lens in the township of Elliston, recorded 242 mm of rain in the 2014–15 water-use year, with seven months receiving less than half their long-term average monthly rainfall. Rainfall for 2014–15 was 186 mm below the long-term average of 428 mm (1900–2015) and 182 mm below the five-year average annual rainfall of 424 mm (Figs. 1 and 2). The 2014–15 annual rainfall is the lowest in 21 years and despite the high rainfall in 2013–14, a trend of declining rainfall over the past five years is evident (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 and the dry spring and summer of 2012–13.

Licensed groundwater extractions occur predominantly from the fresh groundwater lenses within the Quaternary limestone aquifer, and the Bramfield lens has provided groundwater for the town water supply of Elliston since 1974. Metered extractions from the Bramfield lens in 2014–15 totalled 65 ML, an 8% decrease from the previous water-use year and 16% below the five-year average annual extraction¹ (Fig. 3). This volume of extraction equates to 5.5% of the total allocation limit of 1191 ML for the Bramfield lens and accounts for 99% of the total licensed extractions within the Musgrave PWA.

Long-term monitoring data show a steady decline in groundwater levels of 2–3 m between 1980 and 2009, corresponding to an extended period of below-average rainfall. Above-average rainfall in 2009, 2010 and 2013 resulted in a marked rise in groundwater levels, particularly in the south of the lens. Year-to-year variations in groundwater levels since 2010 reflect the influence of above or below-average rainfall.

In the five years to 2015, groundwater levels trends in the Bramfield lens have been varied, with three of the five monitoring wells within the lens extent showing a rising trend, one well shows stable levels and another well recording a declining trend (Fig. 4). One well to the north-east (outside of the boundary of the lens) showed a decline. Rates of change in groundwater levels are small, with rises ranging between 0.06 and 0.11 m/y and declines around 0.02 m/y.

¹ The actual five-year average annual extraction volume may be higher as extraction data for the one of the three licensed users was not collected in 2012–13.

Most long-term salinity monitoring data shows considerable variability over the historical record, with rising salinities during the below-average rainfall years between 2006 and 2009. Decreases in salinities were observed after June 2009 as a result of increased recharge from above-average rainfall. In 2015, salinity ranged between 429 and 1116 mg/L, and four of five salinity monitoring wells within the Bramfield lens showed salinities below 1000 mg/L (Fig. 5). In the five years to 2015, all monitoring wells showed a trend of decreasing or stable salinity (Fig. 6).

To determine the status of the Bramfield lens for 2015, the trends in groundwater 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 Bramfield lens of the Musgrave 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 the Bramfield lens is based on:

- most monitoring wells (80%) showing a five-year trend of rising or stable groundwater levels
- all monitoring wells showing a five-year trend of stable or decreasing salinity.

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

To view the *Musgrave Prescribed Wells Area 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 Musgrave PWA, please visit [Groundwater Data](#) on WaterConnect.

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

MUSGRAVE PRESCRIBED WELLS AREA

1. Long term average annual rainfall (1900 to 2015) 2. Five-year average annual rainfall (2010-11 to 2014-15) 3. 2014-15 annual rainfall

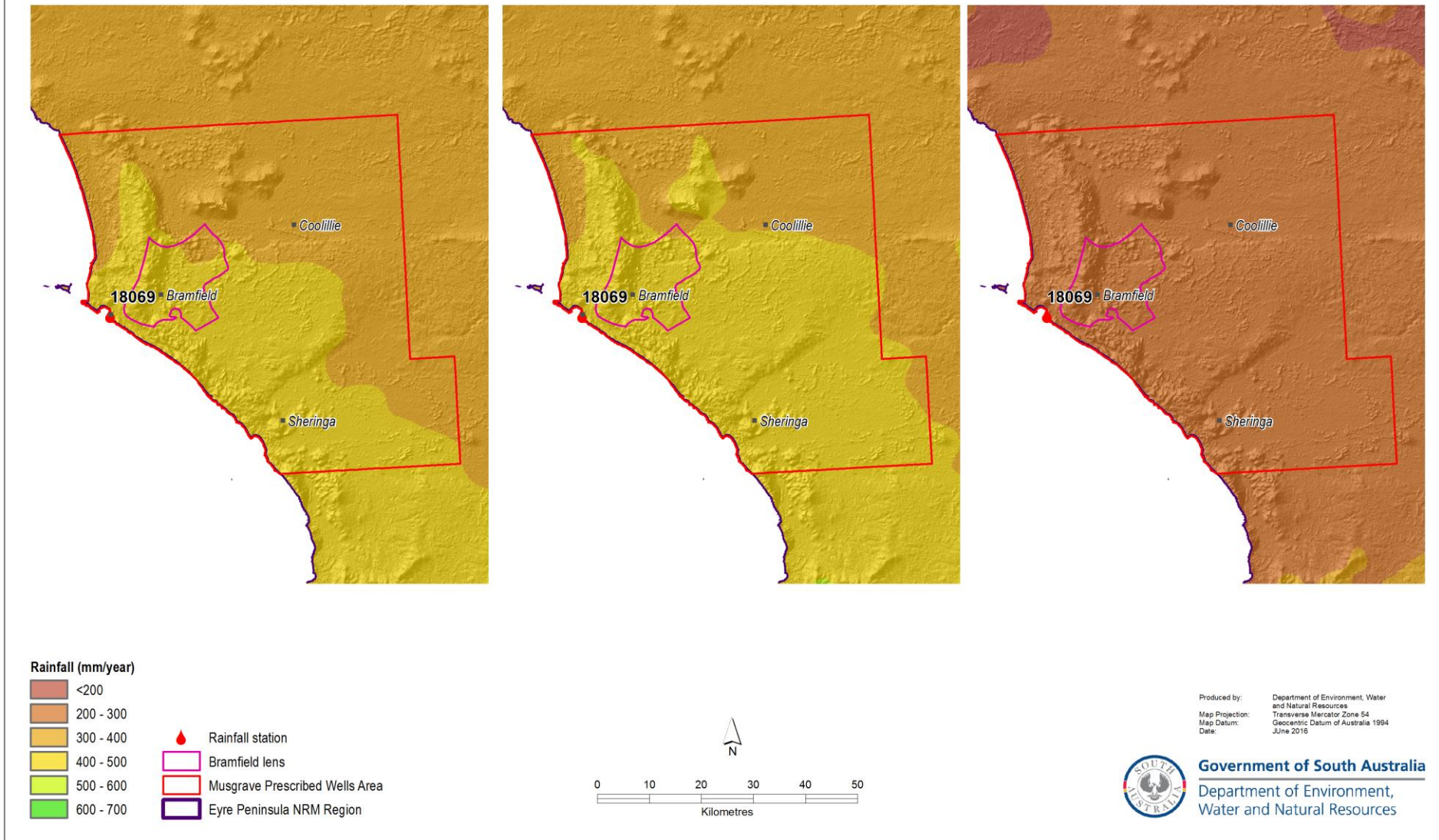


Figure 1. (1) Long-term and (2) five year average annual rainfall, and (3) annual rainfall for the 2014–15 water-use year in the Musgrave Prescribed Wells Area

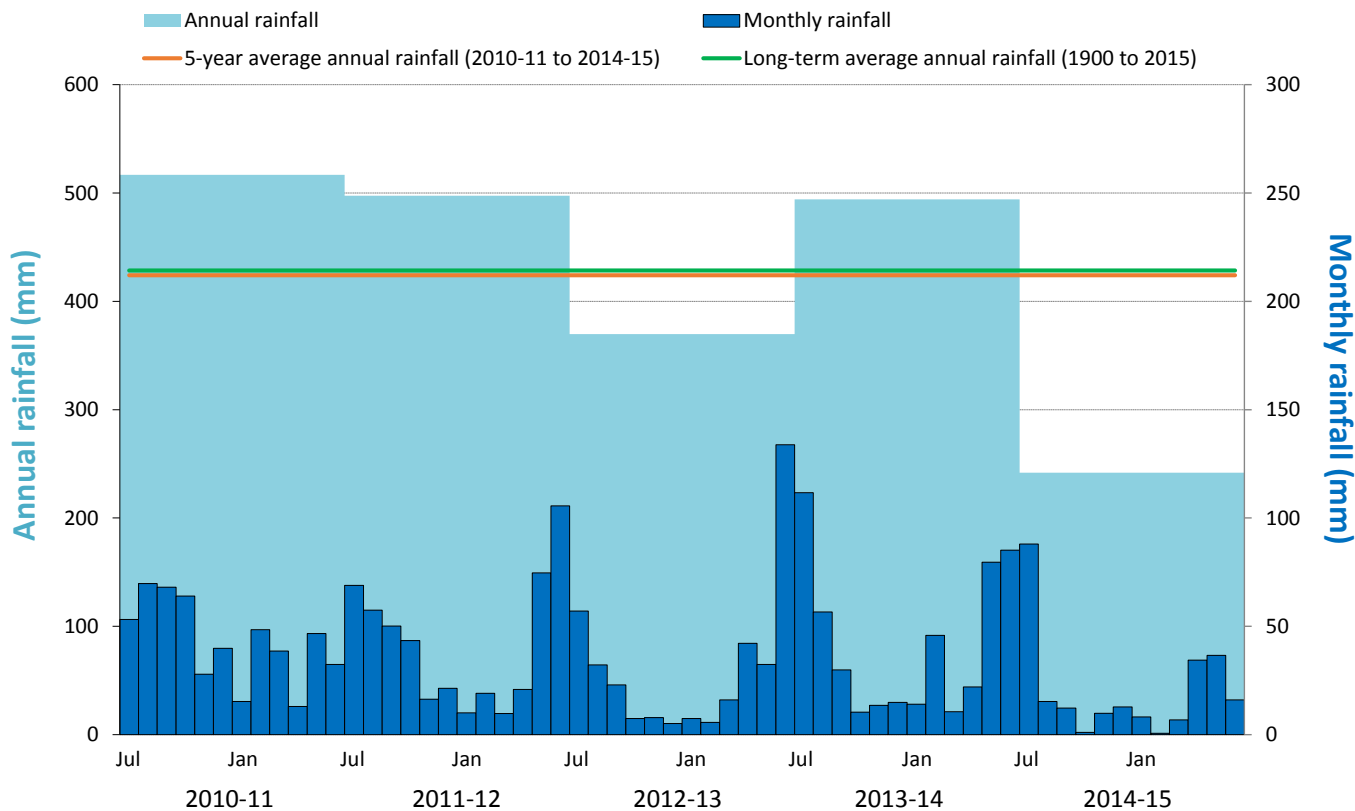


Figure 2. Annual (July–June) and monthly rainfall for the past five-years water-use years, and the five-year and long-term average annual rainfall recorded at Elliston (BoM Station 18069)²

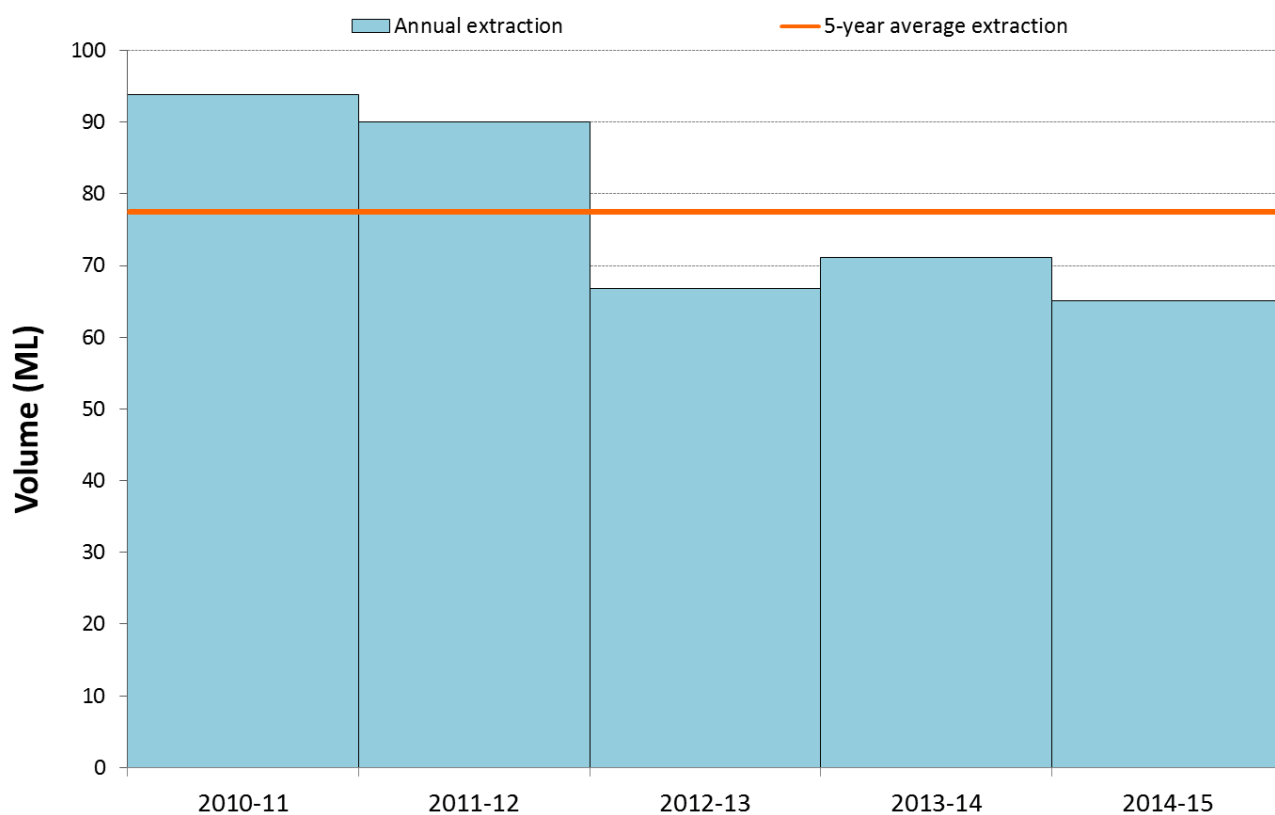


Figure 3. Licensed groundwater extraction volumes for the past five water-use years, for the Bramfield lens in the Musgrave Prescribed Wells Area

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.

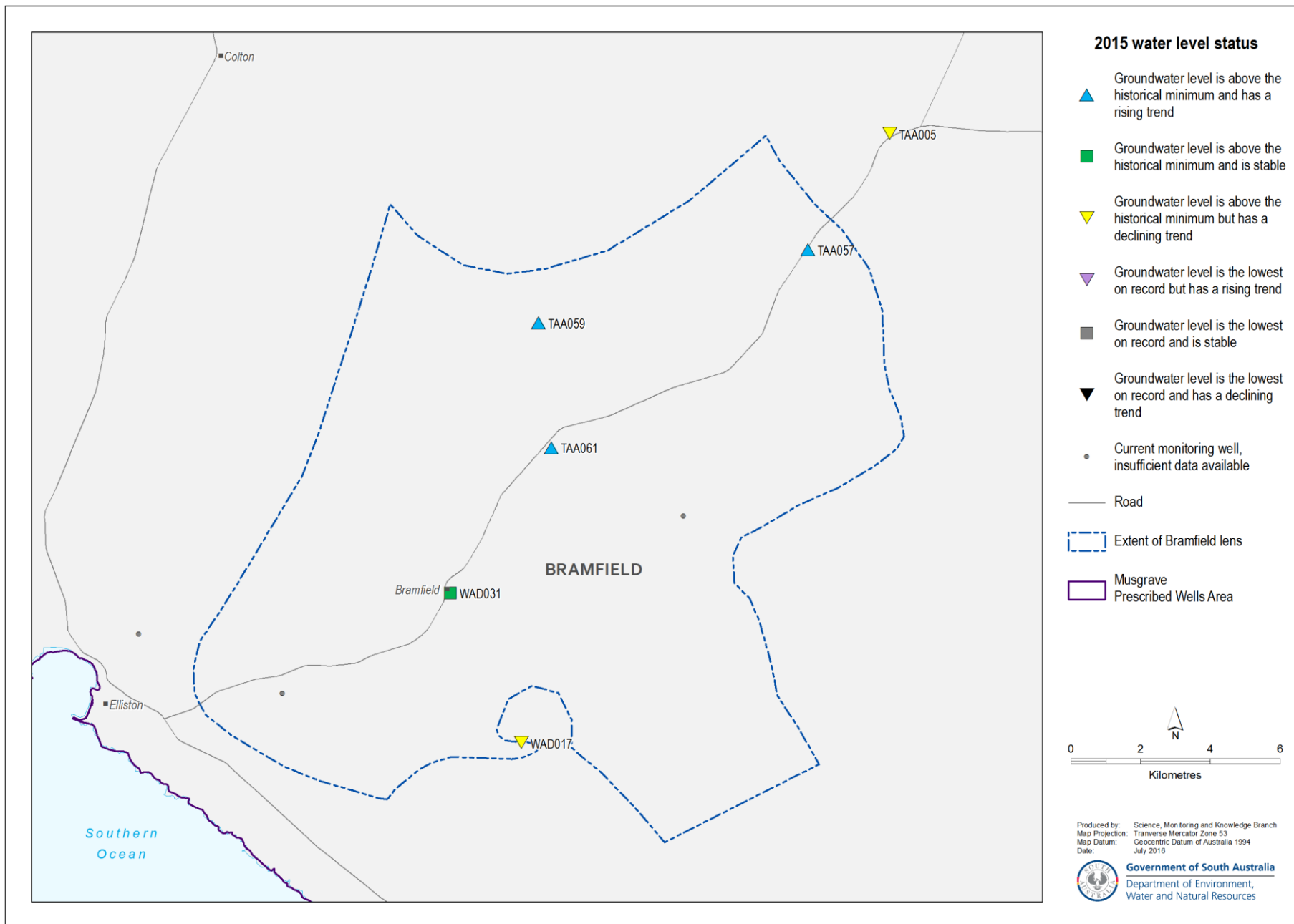


Figure 4. 2015 status of groundwater levels in the Bramfield lens (Musgrave Prescribed Wells Area) based on the five-year trend from 2011 to 2015

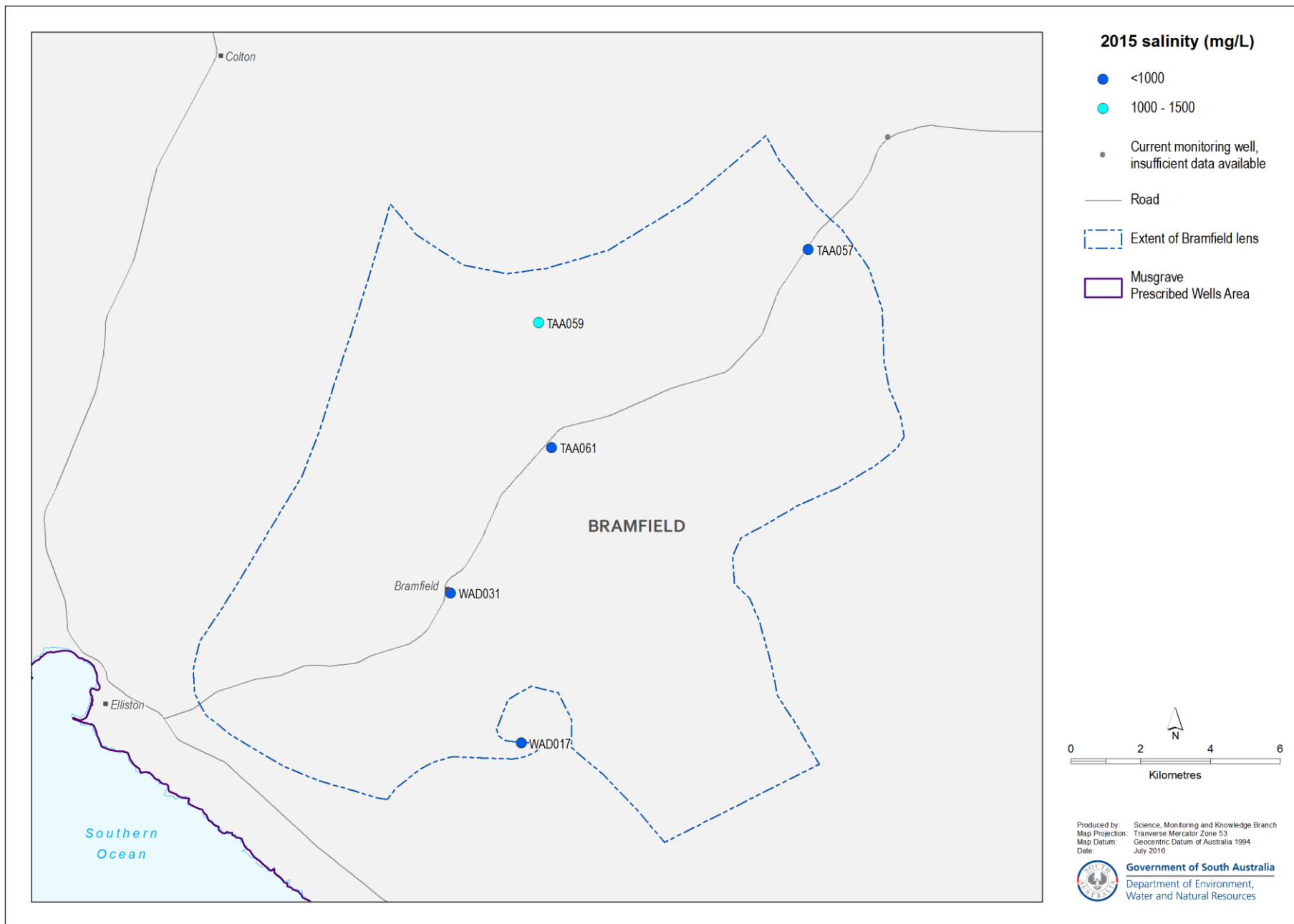


Figure 5. 2015 groundwater salinity of the Bramfield lens (Musgrave Prescribed Wells Area)

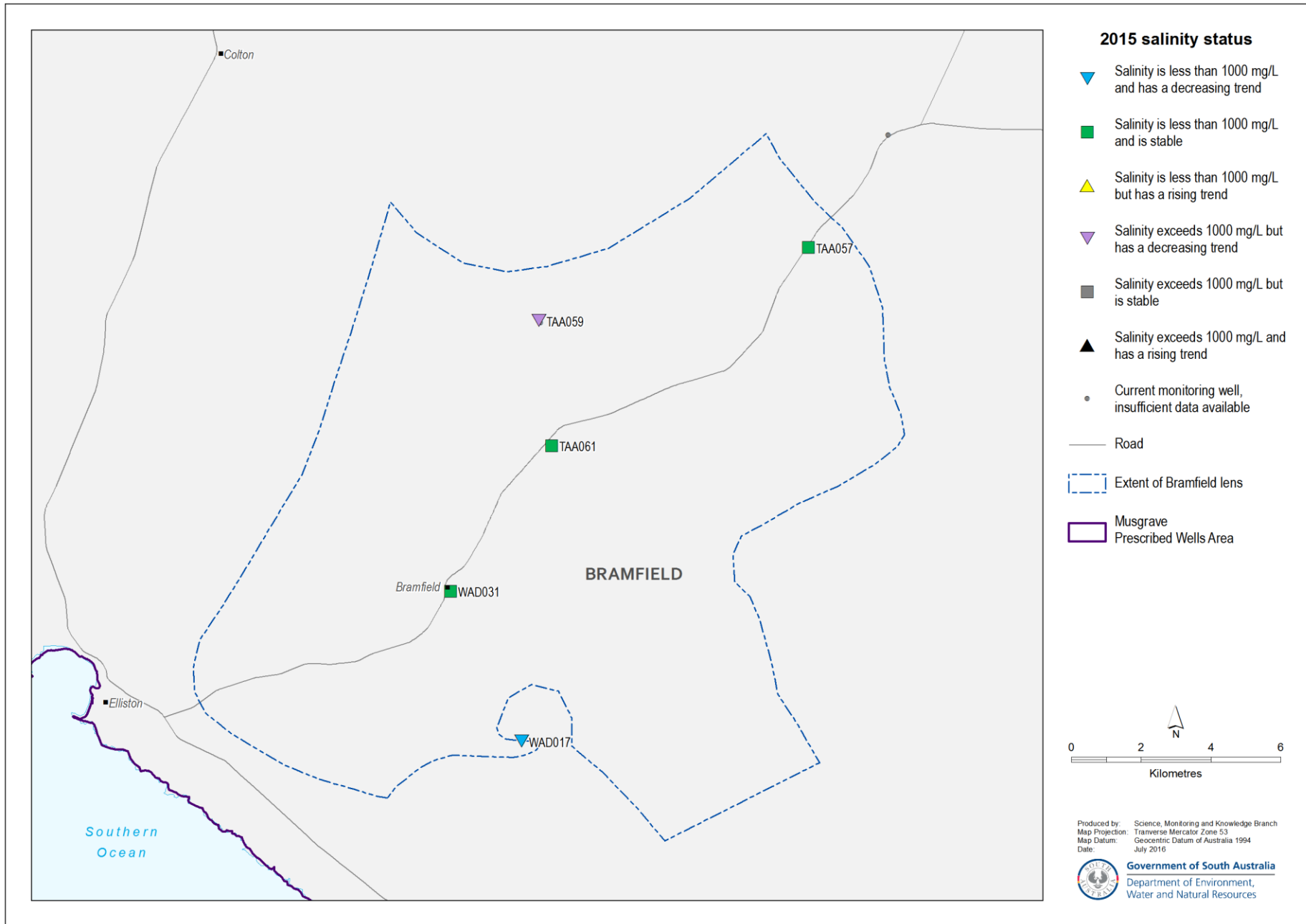


Figure 6. 2015 status of groundwater salinity in the Bramfield lens (Musgrave Prescribed Wells Area) based on the five-year trend from 2011 to 2015

