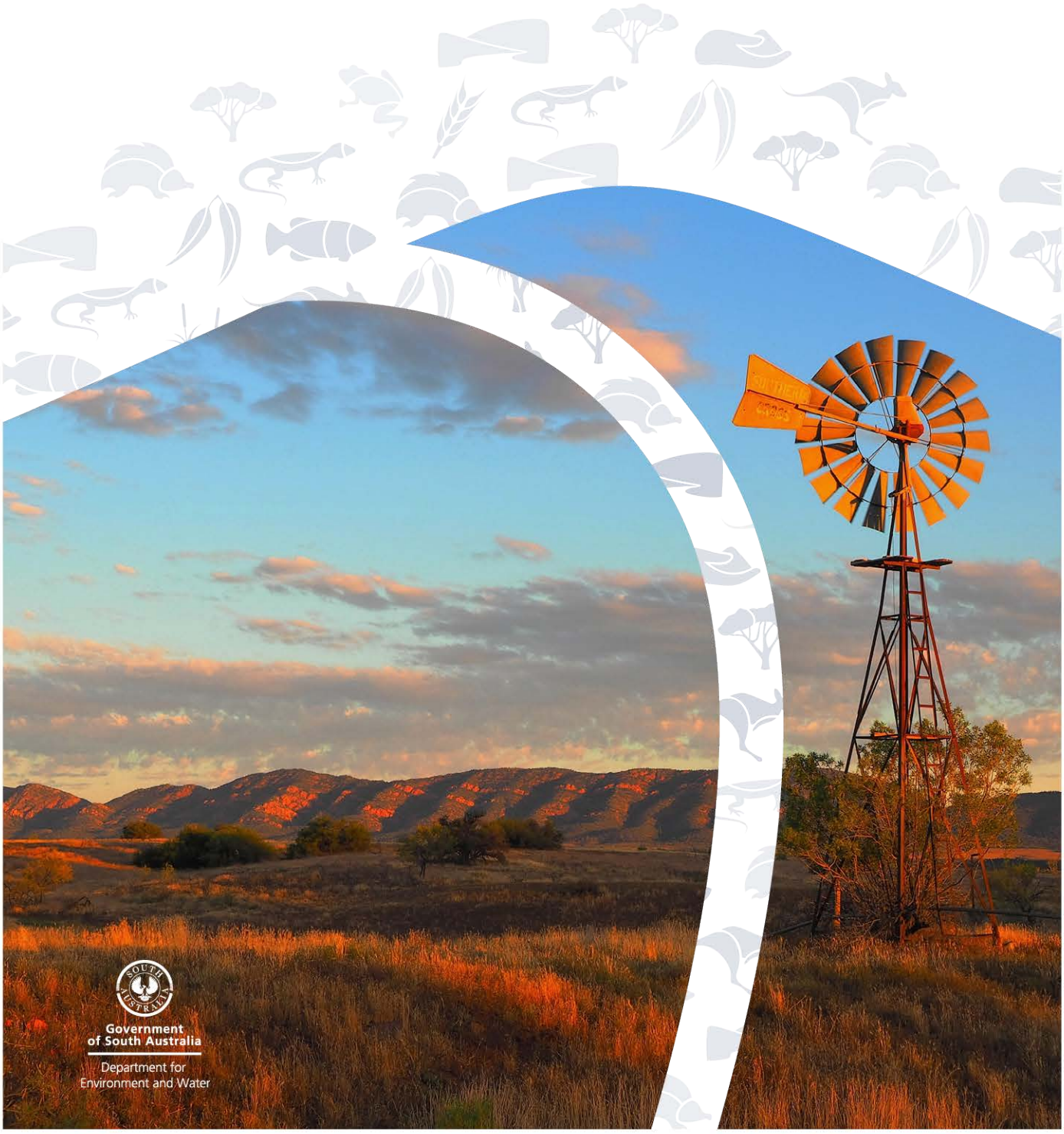
Far North PWA
Great Artesian Basin (J-K) aquifer

2017 Groundwater level and salinity status report



Government of South Australia
Department for Environment and Water

Department for Environment and Water
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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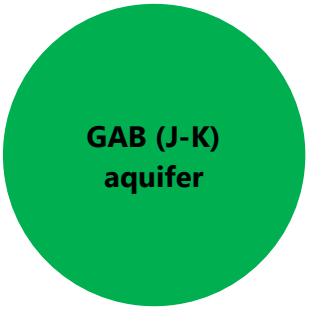
2017 Status summary
Far North PWA
Great Artesian Basin (J-K) aquifer



The Great Artesian Basin (GAB) Jurassic-Cretaceous (J-K) aquifer of the Far North Prescribed Wells Area (PWA) has been assigned a ***green*** status for 2017 because positive trends have been observed over the past five years.

The status is based on five-year trends: over the period 2013–17, 79% of wells show rising or stable groundwater levels and all wells show stable salinities.

The assigned status for the J-K aquifer cannot be generalised across the entire GAB groundwater system due to a reduced number of recent water pressure measurements in the Western Recharge Zone, Western Zone and Central Zone of the PWA.

This status report does not seek to evaluate the sustainable limits of the resource, nor does it make any recommendations on management or monitoring of the resource. These actions are important, but occur through separate processes such as prescription and water allocation planning.

Rainfall

Summary	As local rainfall has no influence on pressure levels or rates of groundwater extraction from the GAB, rainfall analysis is not presented in this report

Water use

Total allocated volume[1]	49 528 ML/y* (for all aquifer of the PWA)

*Stock and domestic use is licensed in the Far North PWA - See More information

Groundwater pressure level

See Figure 1

Five year trend: 2013–17	20 out of 29 wells (69%) show a rising trend, at rates of 0.04–2.31 m/y (median of 0.36 m/y) 3 wells (10%) show stable pressure levels 6 wells (21%) show declining pressure levels, at rates of 0.07-0.46 m/y (median of 0.26 m/y); of these, two wells show their lowest level on record Monitoring wells of BHP's Olympic Dam mine (i.e. the Wellfield B extraction area) show a declining trend in groundwater pressure levels consistent with the Olympic Dam Environmental Protection and Management Program[2]

[1] Total licensed extraction volumes from all sectors are currently not availble and as such not presented in this report
[2] BHP's Olympic Dam mine monitoring network data is not yet available via DEW's Enviro Data SA website, but can be found online

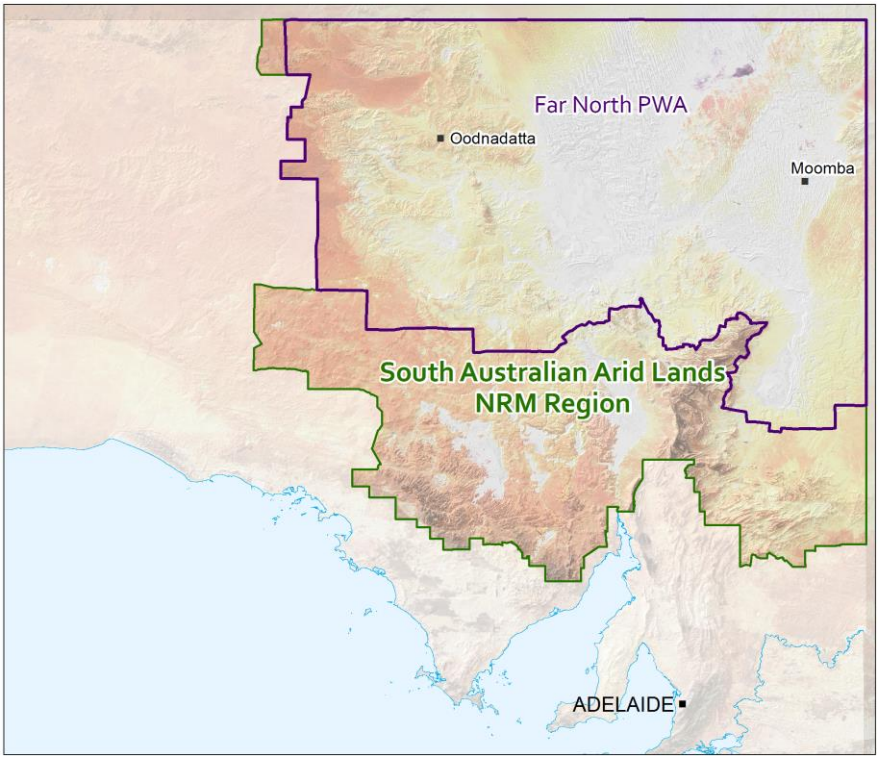
Groundwater salinity

See Figures 2 and 3

2017 salinity	580–21 600 mg/L 22 out of 85 wells (26%) show salinities less than 1500 mg/L
Five year trend: 2013–17	All 26 wells are stable Monitoring wells of the Heathgate Resources mine, south-east of Arkaroola, show a five-year trend (2013–17) of stable groundwater salinities[3]

[3] Heathgate Resources mine monitoring network data is not yet available via DEW's Enviro Data SA website, but can be found online

Regional setting



The Far North (PWA) is located in the South Australian Arid Lands Natural Resources Management Region, and is bounded in the north and east by the state's shared borders with New South Wales, Queensland and the Northern Territory. The Far North PWA covers approximately 315 000 km^2 (~32% of the state) and is prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan (WAP) provides for the sustainable use of the groundwater resources.

Groundwater in the Far North PWA is sourced predominately from the Cadna-owie Formation and Algebuckina Sandstone (and equivalents), which as a single aquifer unit is described as the Jurassic-Cretaceous (J-K) aquifer, and represents the Great Artesian Basin (GAB) at a regional scale. The depth to the GAB (J-K) aquifer is as much as 2400 m below ground level in the state's north-east, but this decreases towards the edge of the basin, with the aquifer cropping out along the western and southern margins. The GAB (J-K) aquifer ranges from less than 50 m in thickness around the basin's western margin to greater than 500 m near the Poolowanna Trough (Fig. 1).

Recent research has shown that much of the groundwater contained in the GAB (J-K) aquifer in South Australia was recharged more than 10 000 years ago under different climatic conditions to those that are observed today. Present-day recharge along the western margin of the GAB (J-K) aquifer in South Australia is low, and although active recharge occurs to the GAB (J-K) aquifer from the occasional flooding of ephemeral rivers in the Northern Territory, the rates of recharge are relatively low compared to rates of discharge. Upward leakage from the underlying Cooper Basin is also thought to contribute recharge to the GAB (J-K) aquifer, but the magnitude of this flow is yet to be determined.

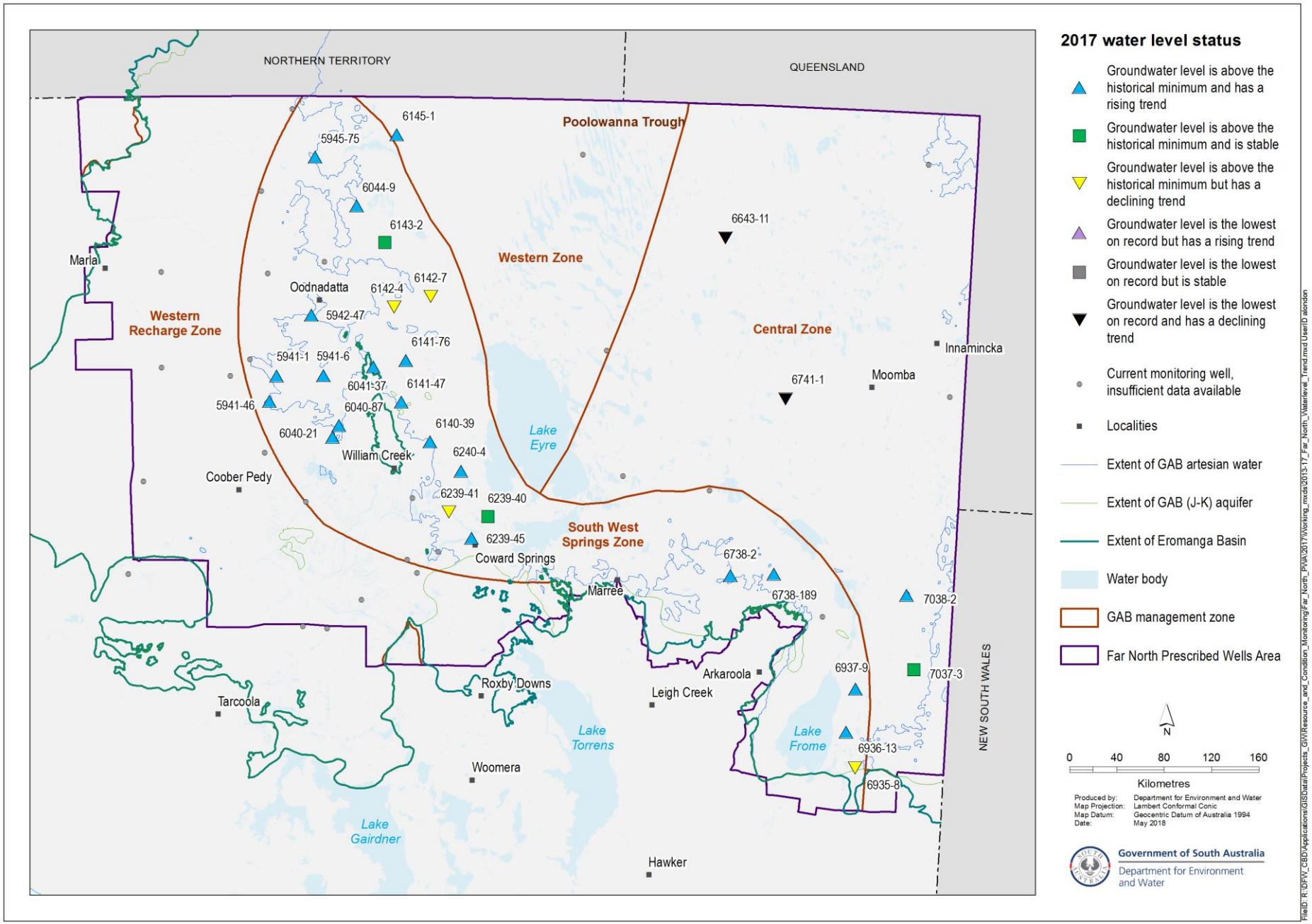


Figure 1. Five-year trends (2013–17) in groundwater pressure levels: GAB (J-K) aquifer

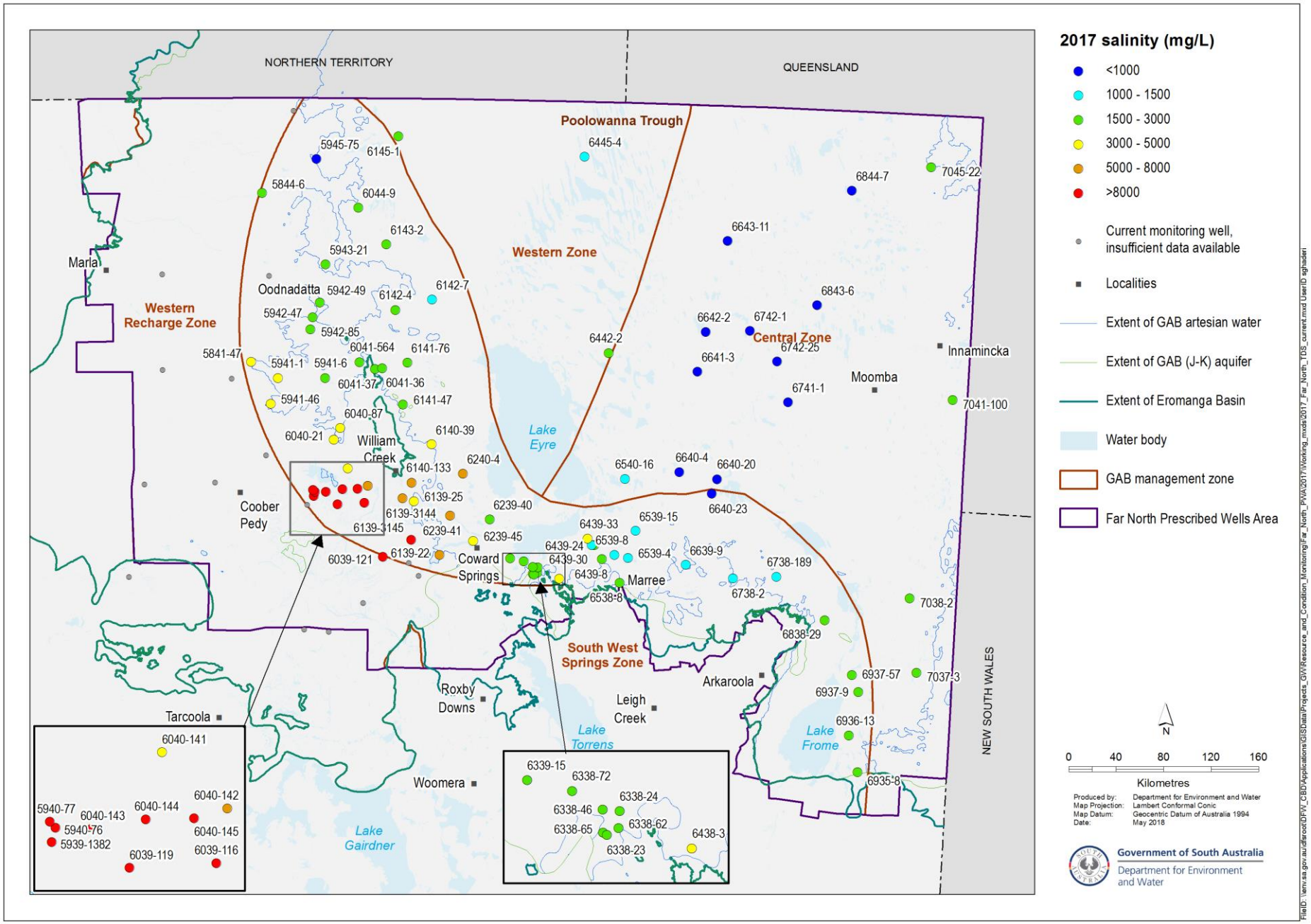


Figure 2. 2017 groundwater salinities: GAB (J-K) aquifer

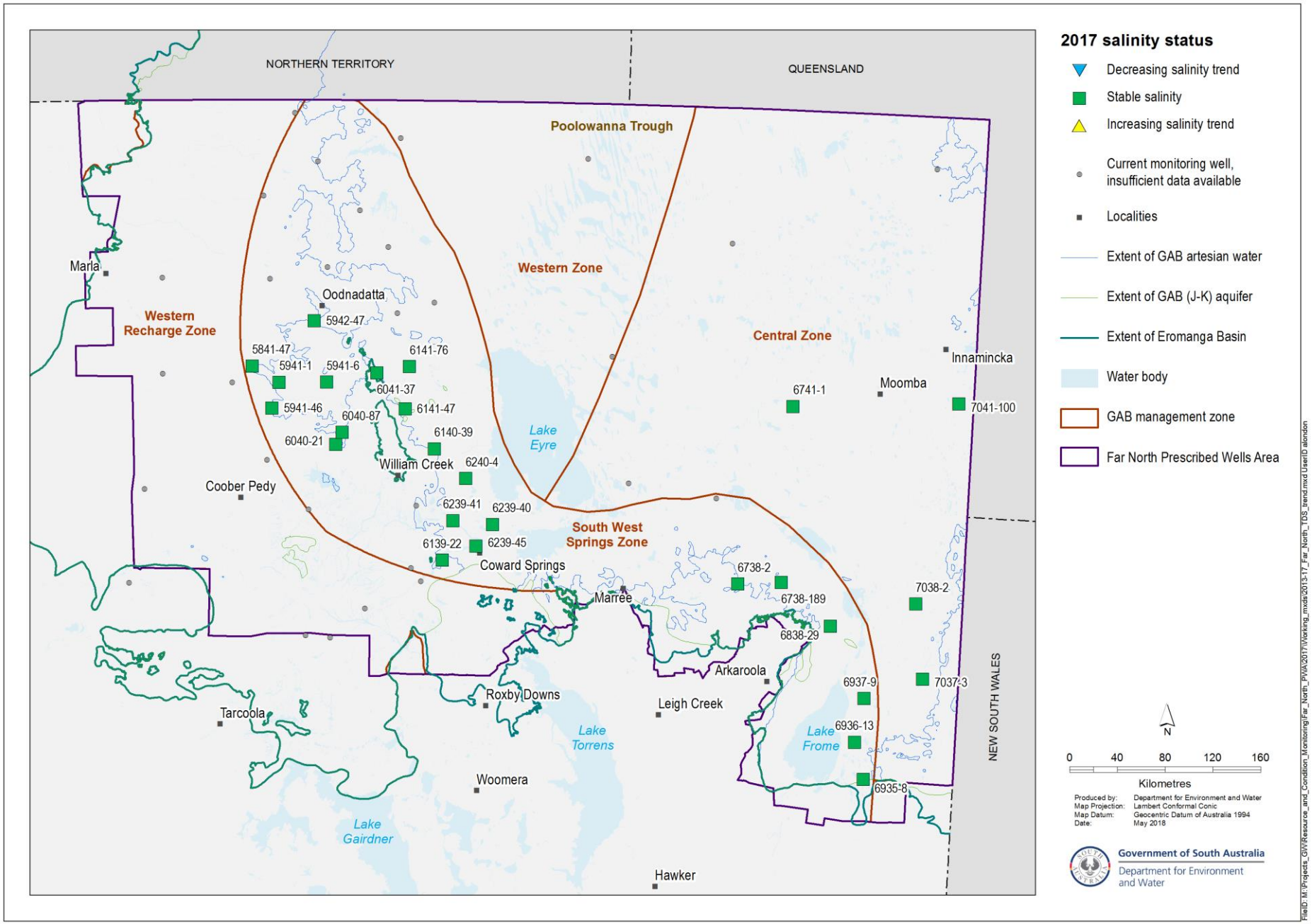


Figure 3. Five-year trends (2013–17) in groundwater salinities: GAB (J-K) aquifer

More information

To determine the status of the GAB (J-K) aquifer for 2017, the trends in groundwater levels and salinities over the past five years (2013 to 2017, inclusive) were analysed, in contrast to the year-to-year assessments that have been used in *Groundwater level and salinity status reports* published prior to 2015. 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.

To view descriptions for all status symbols, and to review the full historical record of the monitoring wells, please visit the *Water Resource Assessments* page on WaterConnect.

For additional information related to monitoring wells nomenclature, please refer to the *Well Details* page on WaterConnect.

The WAP for the Far North PWA estimates groundwater extraction from the GAB (J-K) aquifer to be in the order of 90 ML/d for stock and domestic use and 4 ML/d for town water supply purposes. Recent water-use savings have been achieved via the Great Artesian Basin Sustainability Initiative that has included replacing bore drains with piping and rehabilitating free-flowing wells. As of June 2017, across the SA extent of the GAB, these measures have resulted in an estimated saving of 134 ML/d (49 000 ML/y). Estimated total groundwater discharge from naturally-occurring springs is around 66 ML/d, but this has not yet been validated because of the difficulties in measuring actual flows. Petroleum operations have a current allocated volume of 60 ML/d for water that is co-produced during the extraction of oil and gas. Current mining operations have a total allocated volume of 44.6 ML/d of which 42 ML/d have been granted to BHP's Olympic Dam mine as a special water licence to extract water from the GAB (J-K) aquifer under the *Roxby Downs (Indenture Ratification) Act 1982*. While the mine itself is located outside of the Far North PWA, the wellfields are located within the PWA.

For information completeness and consistency across all the groundwater and salinity status reports, the legend on each map herein shows the full range of water level and salinity status that could possibly be reported. However, the measured data that appear on each map may not span this full range.

Rainfall data used in this report is sourced from the SILO Patched Point Dataset, which uses original BoM daily rainfall measurements and is available online at https://silo.longpaddock.qld.gov.au/. Rainfall maps have been compiled using daily gridded data produced by the BoM Australian Water Availability Project (www.bom.gov.au/jsp/awap/).

To view the *Far North PWA Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, please visit WaterConnect. To view all past published *Groundwater level and salinity status reports*, please visit the Water Resource Assessments page on WaterConnect.

To download groundwater level and salinity data from monitoring wells within the Far North PWA, please visit the *Groundwater Data* page under the *Data Systems* tab on WaterConnect.

For further information about the Far North PWA, please see the *Water Allocation Plan for the Far North Prescribed Wells Area* on the Natural Resources South Australian Arid Lands website.

Units of Measurement

mm	millimetre
ML	megalitre
ML/d	megalitre per day
m/y	metres per year
mg/L	milligrams per litre
mg/L/y	milligrams per litre per year
mm/y	millimetres per year

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