

Clare Valley PWRA Fractured Rock 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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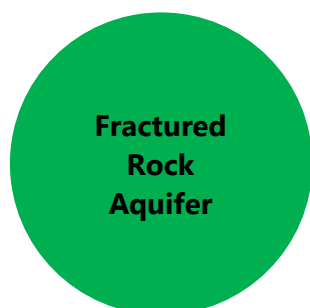
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2017 Status summary

Clare PWRA

Fractured Rock Aquifer



The Fractured Rock Aquifer (FRA) of the Clare Valley Prescribed Water Resources Area (PWRA) 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, 92% of wells show rising or stable groundwater levels and 72% show decreasing or stable salinities.

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

See Figures 1, 2 and 3

Rainfall station	Calcannia Bureau of Meteorology (BoM) rainfall station 21075, located in the northern part of the PWRA
Annual total ¹	696 mm 144 mm (26%) greater than the five-year average of 552 mm 146 mm (27%) greater than the long-term average of 550 mm
Monthly summaries	Well-above average rainfall in September, December, January and April Well-below average rainfall recorded in March and June
Rainfall station	Watervale BoM rainfall station 21054, located in the southern part of the PWRA
Annual total	790 mm 191 mm (32%) greater than the five-year average of 599 mm 147 mm (23%) greater than the long-term average of 643 mm
Monthly summaries	Well-above average rainfall in July, September, December and January Well-below average rainfall recorded in March, May and June
Spatial distribution	Rainfall in 2016–17 was well above average across the entire PWRA

¹ For the water-use year 1 July 2016 to 30 June 2017

Water use

See Figure 4

Total allocated volume: 2016–17	2120 ML
Licensed groundwater extractions*	483 ML ² (23% of total allocations)
Extraction volume comparison	43% less than the previous year 41% less than the five-year average

*Stock and domestic use is not included in licensed extractions

Groundwater level

See Figure 5

Five-year trend: 2013–17	34 out of 39 wells (87%) show rising trends, at rates of 0.04–1.04 m/y (median of 0.42 m/y) 2 wells (5%) are stable 3 wells (8%) show declining trends, at rate of 0.03–0.09 m/y (median of 0.08 m/y)
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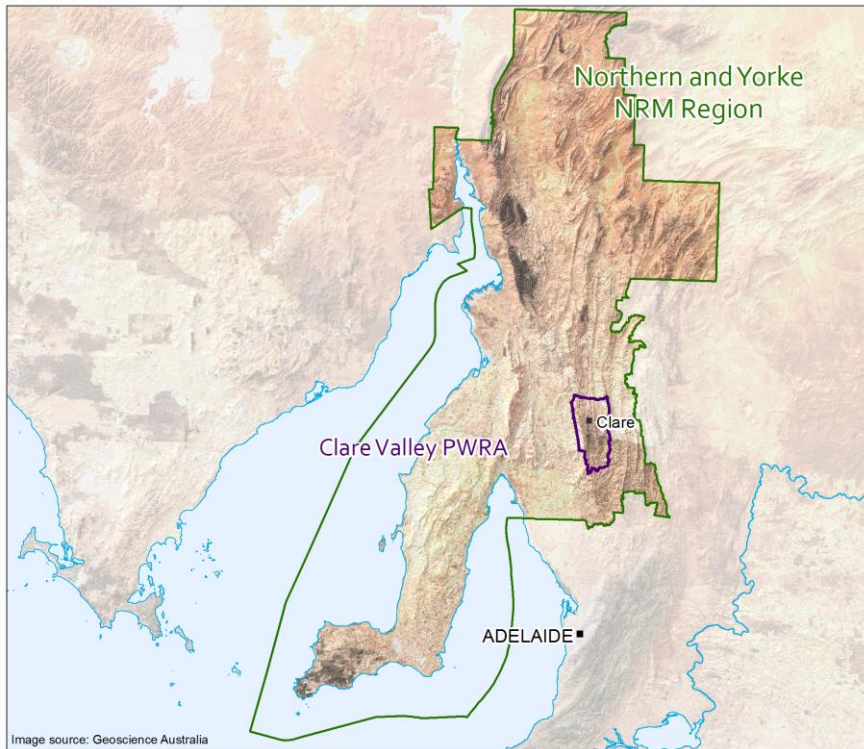
Groundwater salinity

See Figures 6 and 7

2017 salinity	281–2681 mg/L 5 out of 21 wells (24%) show salinities more than 1500 mg/L, which is the salinity threshold for most crop types
Five-year trend: 2013–17	5 out of 18 wells (28%) show decreasing trends, at rates of 43–191 mg/L/y (median of 63 mg/L/y) 8 wells (44%) are stable 5 wells (28%) show increasing trends, at rates of 26–64 mg/L/y (median of 36 mg/L/y)

² Total licensed extractions are subject to change as extraction data have not yet been verified in full – see [More information](#)

Regional setting



The Clare Valley PWRA is located approximately 130 km north of Adelaide, within the Northern and Yorke Natural Resources Management Region. It is a regional-scale resource for which groundwater, surface water and watercourse water are prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan (WAP) provides for the sustainable management of the groundwater resource.

There are two groundwater systems within the Clare Valley region: (1) a Quaternary alluvial aquifer which occurs at shallow depths of less than 15 m in valley floors and provides only a small portion of the groundwater resource (mainly in the vicinity of Stanley Flat); and (2) an extensive fractured rock aquifer that underlies the Quaternary aquifer. The FRA is the main groundwater system in the Clare Valley and is the focus of this report. Both aquifers are recharged by local rainfall.

The FRA, which provides groundwater for irrigation in the Clare Valley, comprises the Mintaro Shale, Saddleworth Formation, Undalya Quartzite and the Skillogalee Dolomite. Fracturing in the region is considered to be continuous and groundwater can flow across geological units. Within the FRA, the fractures act as conduits for groundwater flow. The groundwater yield of any particular well is dependent on the size, spacing and orientation of the fractures intercepted. The FRA can be divided into two zones: a relatively permeable zone in the upper 20–40 m, within which fractures are closely spaced (generally <0.5 m); and a deeper, low-permeability regional zone within which the size and spacing of fractures tends to decrease with depth.

Trends in groundwater levels and salinities in the Clare Valley 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 the groundwater levels to decline and salinities to increase. Conversely, increases in rainfall results in increases in recharge, decreases in irrigation extractions and groundwater levels may rise and salinities may stabilise or decrease.

CLARE VALLEY PRESCRIBED WATER RESOURCES AREA

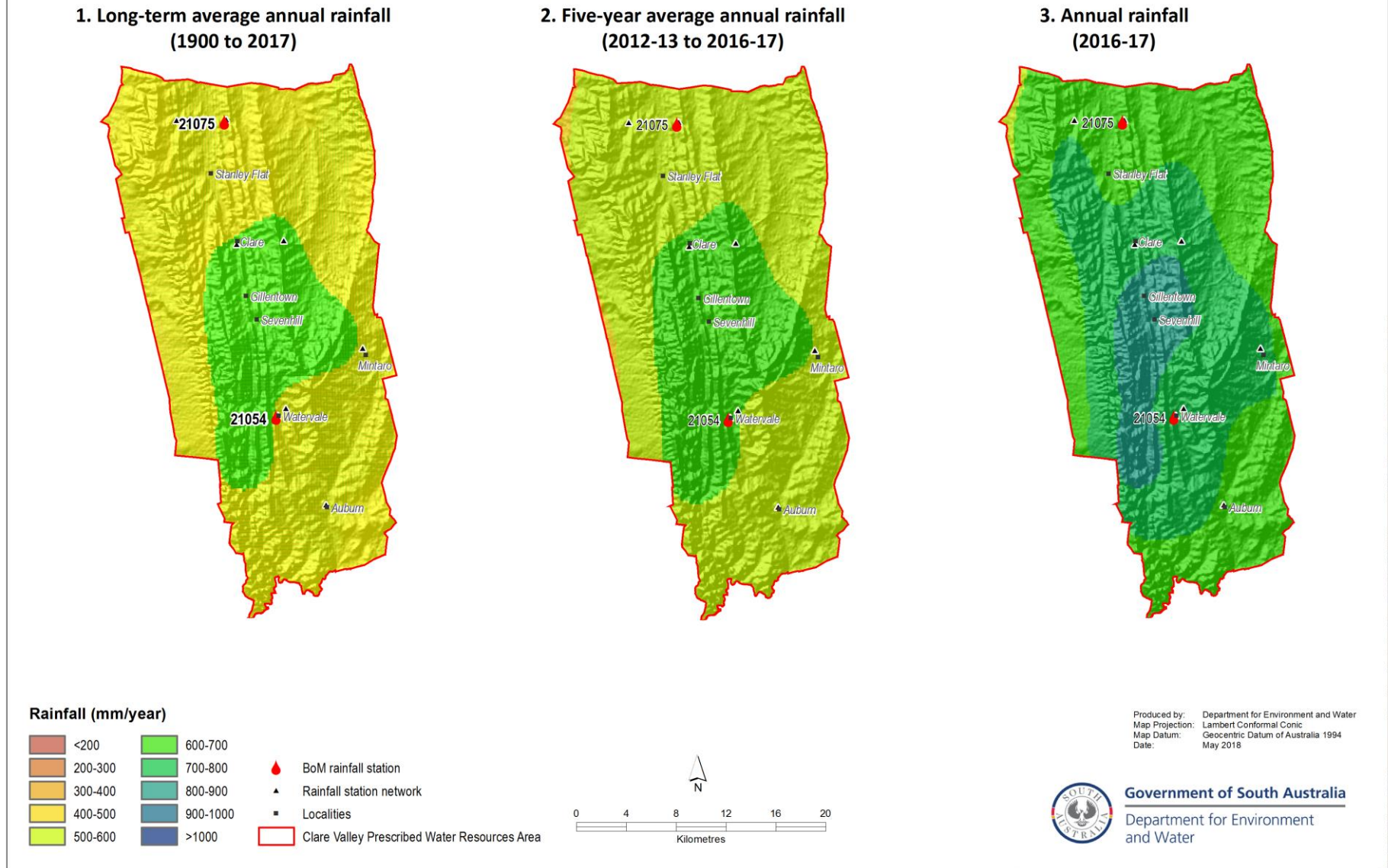


Figure 1. Spatial distribution of (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall³

³ Data sources: SILO Patched Point Dataset <https://silo.longpaddock.qld.gov.au/> and BoM Australian Water Availability Project (<http://www.bom.gov.au/jsp/awap/>) – see [More information](#)

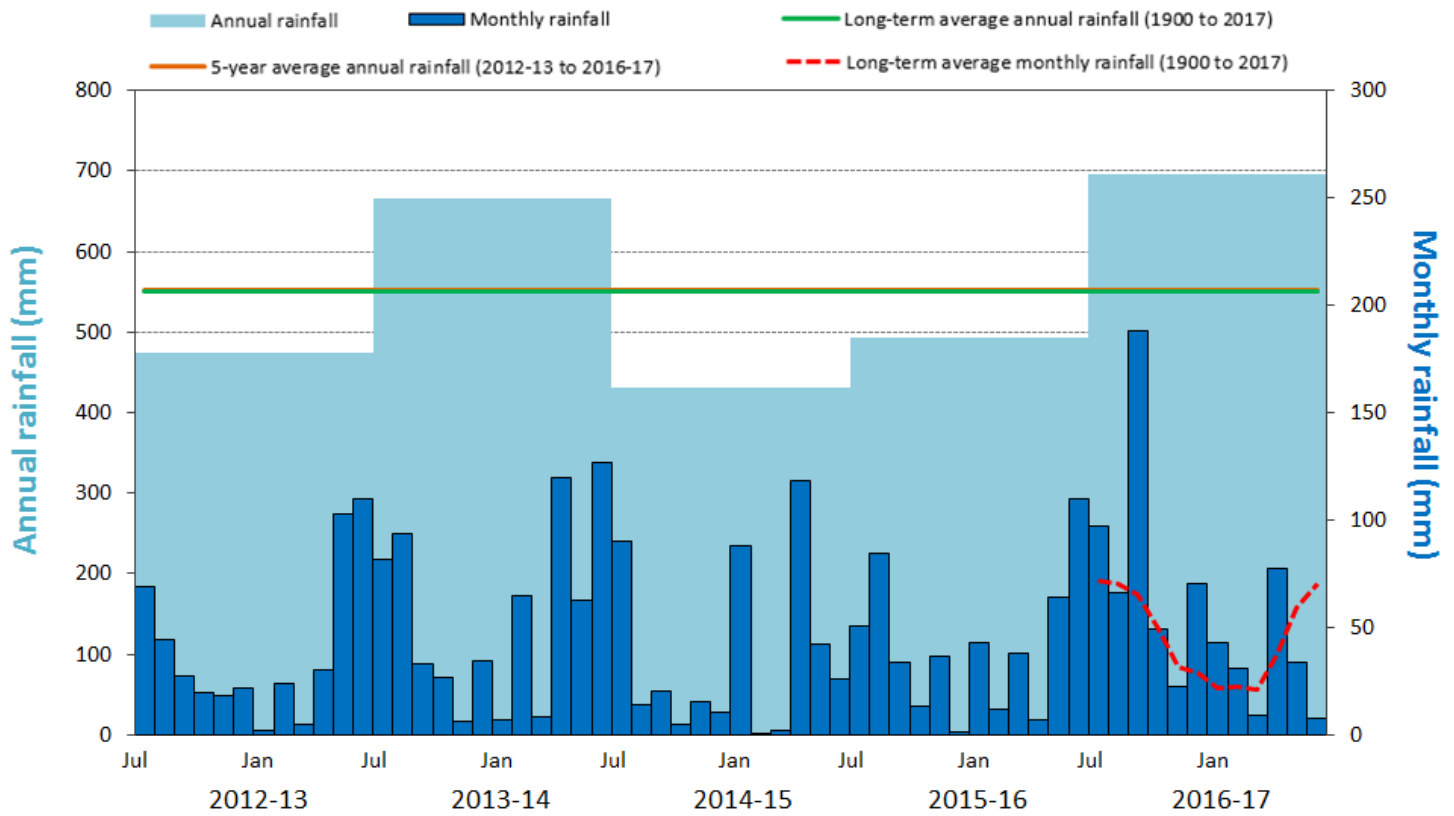


Figure 2. Annual and monthly rainfall for the past five water-use years recorded at Calcannia (BoM Station 21075)⁴

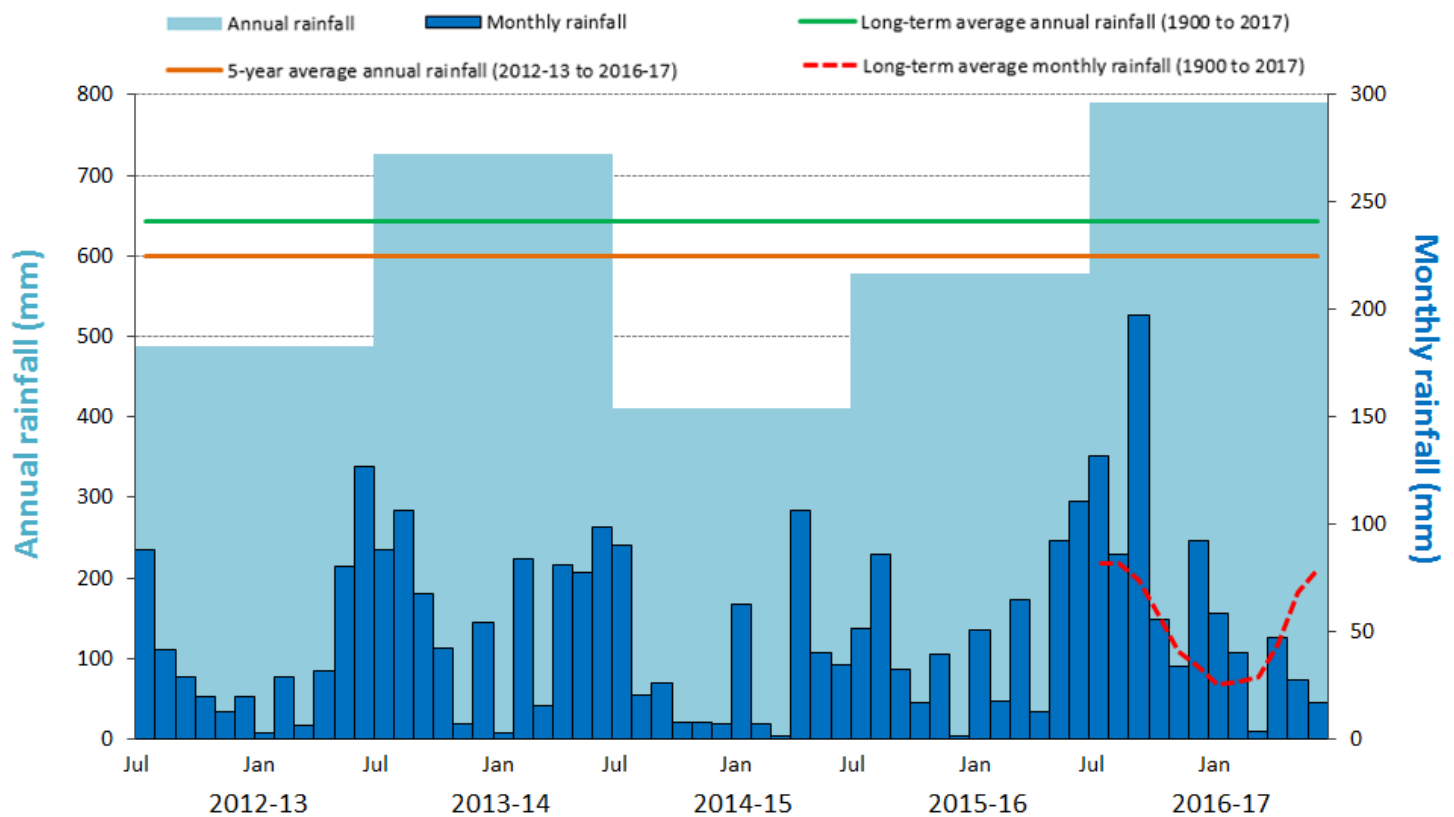


Figure 3. Annual and monthly rainfall for the past five water-use years recorded at Watervale (BoM Station 21054)⁴

⁴ Data source: SILO Patched Point Dataset, available <https://silo.longpaddock.qld.gov.au/> – see [More information](#)

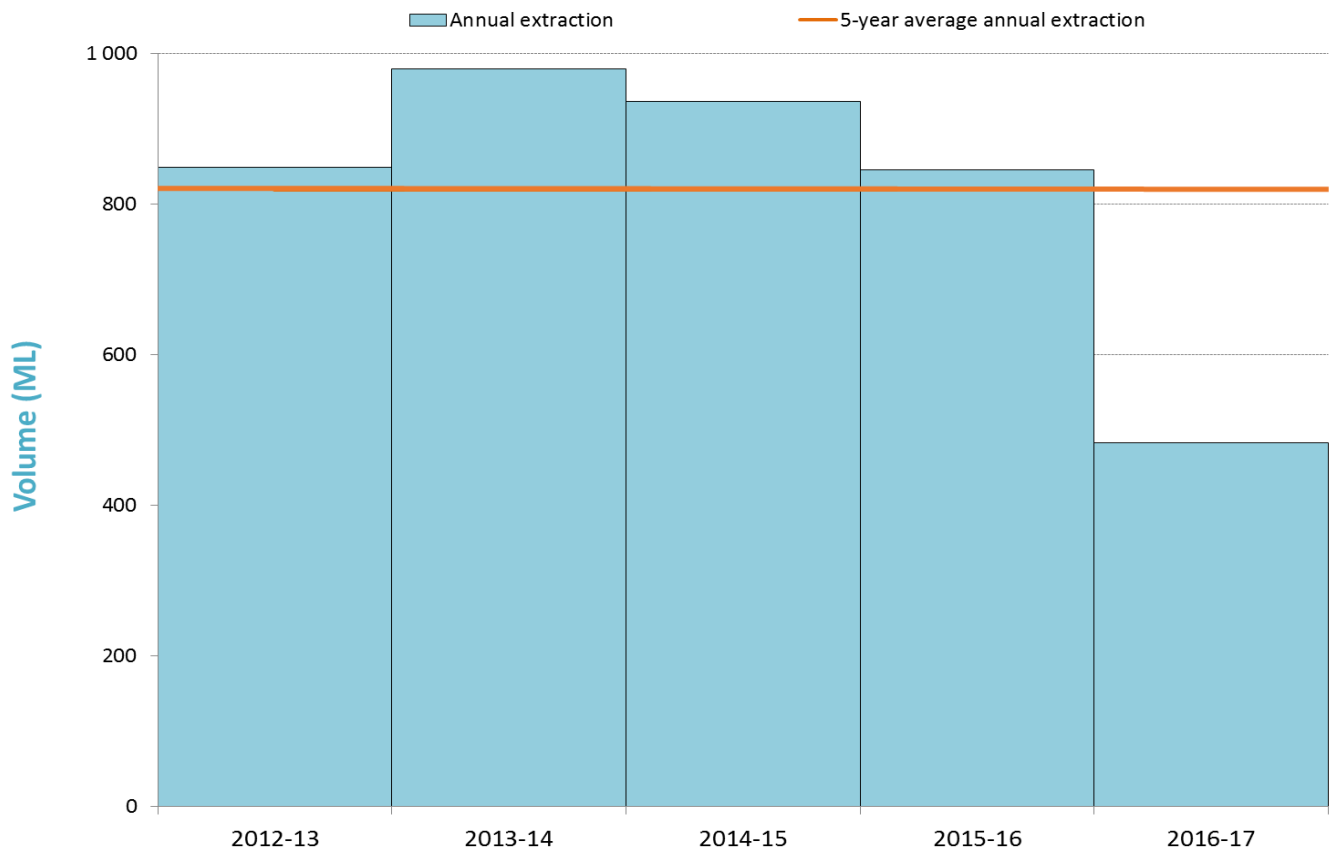
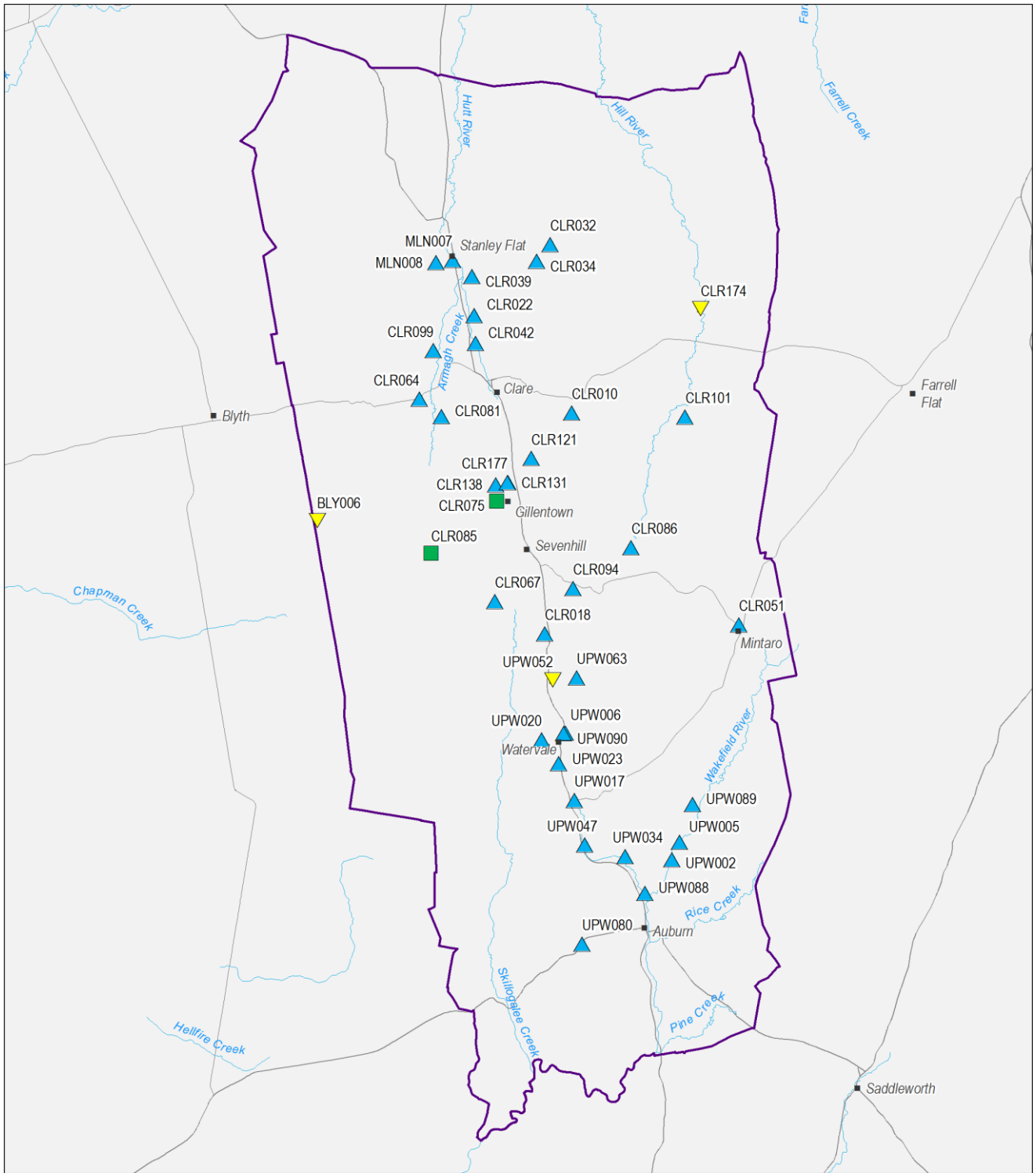


Figure 4. Licensed groundwater extraction volumes⁵ for the past five water-use years

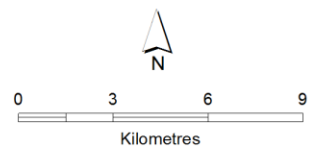
⁵ Total licensed extractions are subject to change as extraction data have not yet been verified in full – see [More information](#)



2017 water level status

- ▲ 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

- Current monitoring well, insufficient data available
- Localities
- Watercourse
- Road
- Clare Valley Prescribed Water Resources Area

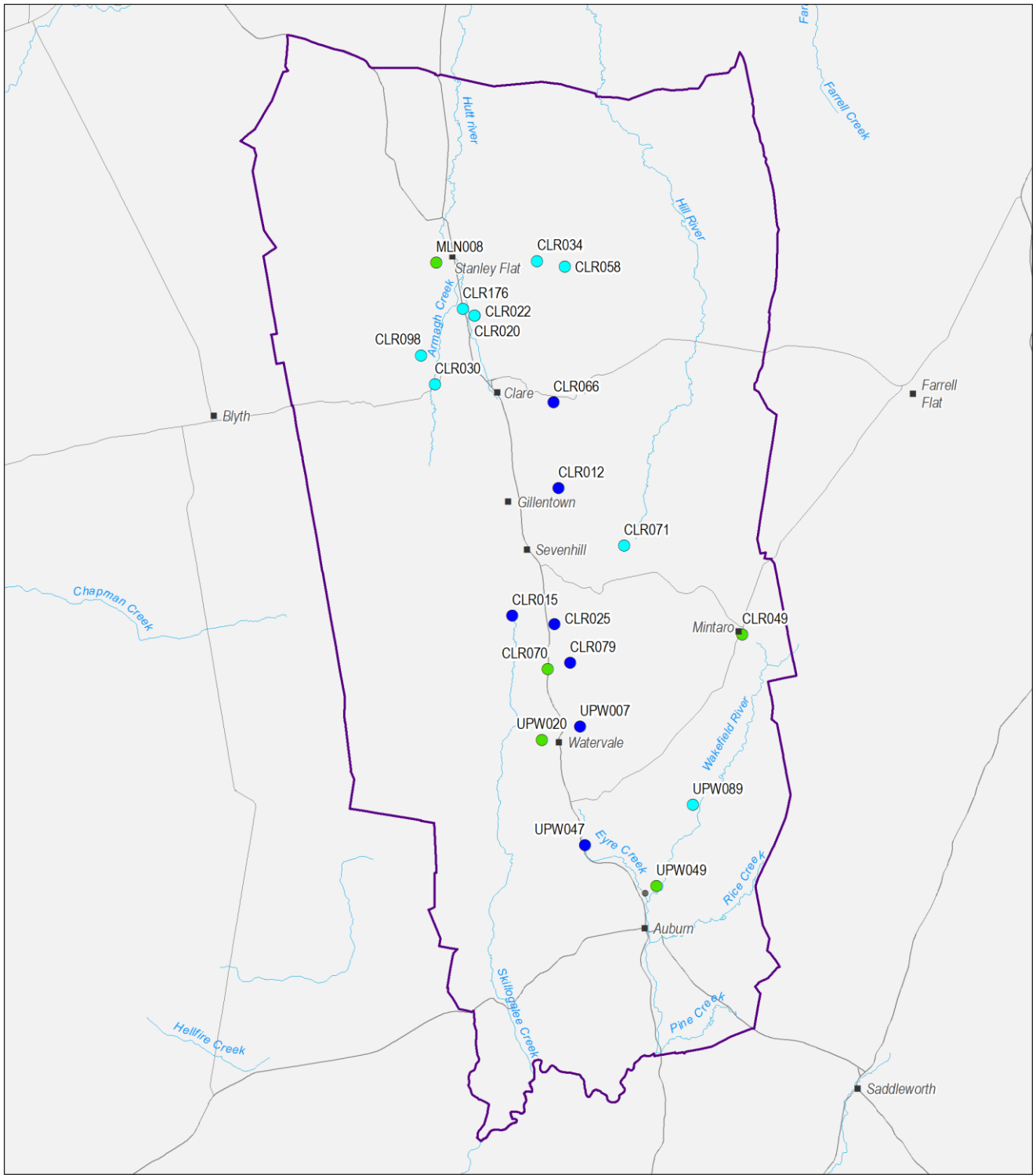


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 Date: May 2018



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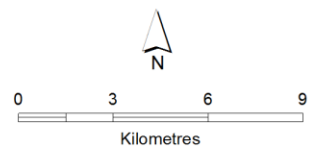
Figure 5. Five-year trends (2013–17) in groundwater pressure levels: Fractured Rock Aquifer



2017 Salinity (mg/L)

- < 1000
- 1000 - 1500
- 1500 - 3000
- 3000 - 5000
- 5000 - 8000
- > 8000

- Current monitoring well, insufficient data available
- Localities
- Watercourse
- Road
- ▭ Clare Valley Prescribed Water Resources Area

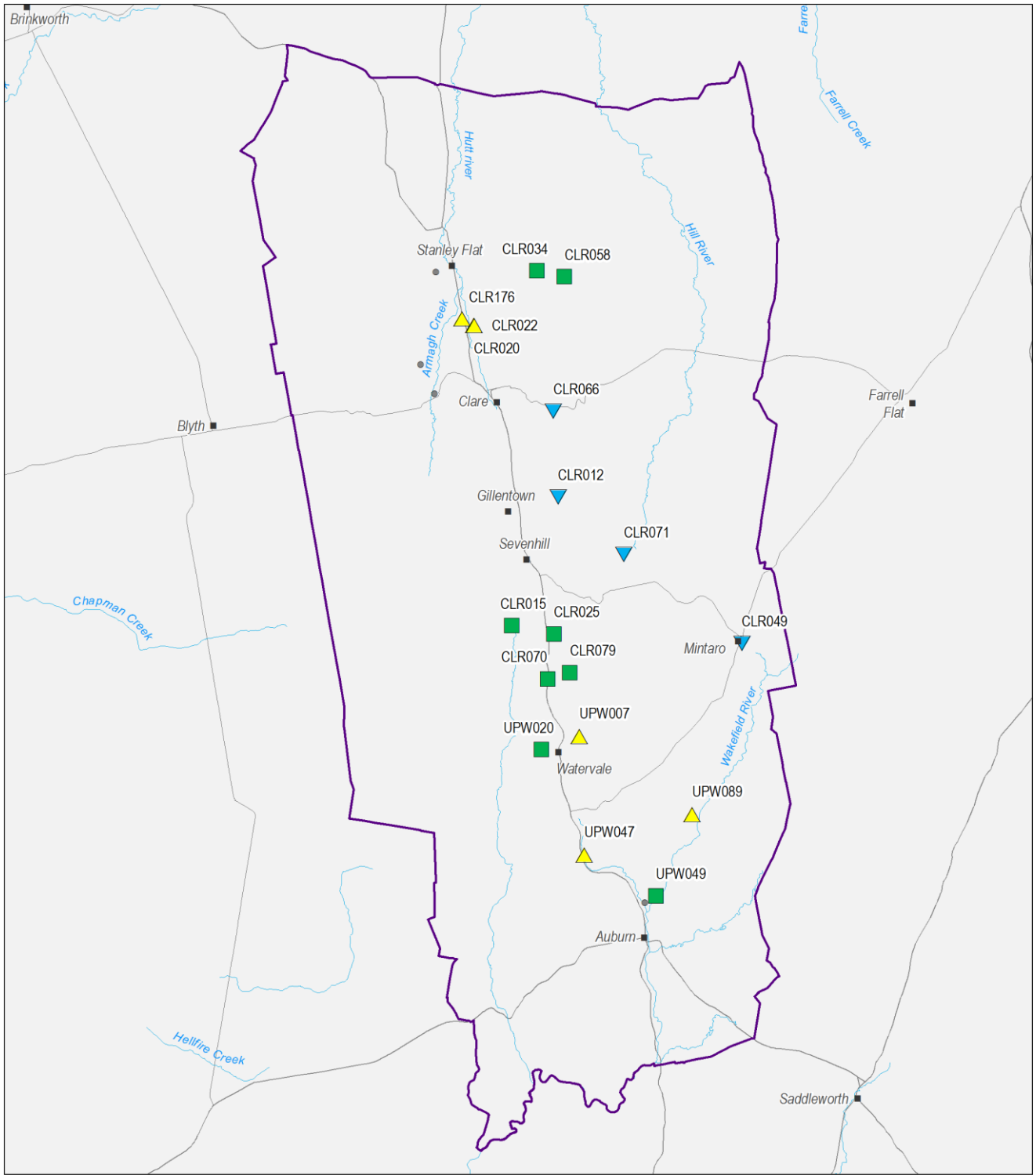


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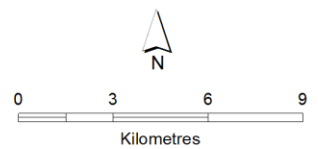
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Figure 6. 2017 groundwater salinities: Fractured Rock Aquifer



2017 salinity status

- ▼ Decreasing salinity trend
- Stable salinity
- ▲ Increasing salinity trend
- Current monitoring well, insufficient data available
- Localities
- Watercourse
- Road
- Clare Valley Prescribed Water Resources Area



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Figure 7. Five-year trends (2013–17) in groundwater salinities: Fractured Rock Aquifer

More information

To determine the status of the FRA 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 licensed groundwater use for the 2016–17 water-use year is based on the best data available as of January 2018 and may be subject to change, as some extraction volumes may be in the process of being verified.

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 *Clare Valley PWRA Groundwater Level and Salinity Status Report 2009–10*, 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 Clare Valley PWRA, please visit the *Groundwater Data* page under the Data Systems tab on [WaterConnect](#).

For further details about the Clare Valley PWRA, please see the *Water Allocation Plan for the Clare Valley Prescribed Water Resources Area* on the Natural Resources Northern and Yorke [website](#).

Units of Measurement

mm	millimetre
ML	megalitre
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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