

Clare Valley Prescribed Water Resources Area Fractured rock aquifers

2018 Groundwater level and salinity status
report



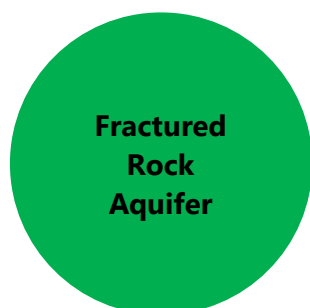
**Government
of South Australia**

Department for
Environment and Water

2018 Status summary

Clare Valley PWRA

Fractured rock aquifers



The fractured rock aquifers (FRAs) of the Clare Valley Prescribed Water Resources Area (PWRA) have been assigned a **green** status for 2018 because positive trends have been observed over the past five years.

The status is based on five-year trends: over the period 2014–18, 81% of wells show rising or stable groundwater levels and all wells show decreasing or stable salinities.

The status is based on five-year trends. To view the *Clare PWRA groundwater status report 2009–10*, which includes long-term trends in rainfall, groundwater levels and salinity, please visit the [Water Resource Assessments](#) page on WaterConnect. To download the full record of groundwater level and salinity data for the Clare Valley PWRA, please visit the *Groundwater Data* page on [WaterConnect](#).

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, number 21075, is located near the township of Clare in the northern part of the Clare PWRA. |
| Annual total ¹ | 440 mm 105 mm (19%) less than the five-year average of 545 mm 108 mm (20%) less than the long-term (1900–2018) average of 548 mm |
| Rainfall station | Watervale BoM rainfall station, number 21054, is located in the southern part of the Clare PWRA. |
| Annual total ¹ | 491 mm 108 mm (18%) less than the five-year average of 599 mm 151 mm (24%) less than the long-term (1900–2018) average of 642 mm |

¹ For the water-use year 1 July 2017 to 30 June 2018

Groundwater extraction

See Figure 4

| | |
|---|---|
| Allocated volume ^{2,3} | 2212 ML |
| Licensed groundwater extractions ^{2,4} | 885 ML |
| Extraction volume comparison | 83% greater than the previous year 7% greater than the five-year average |

Groundwater level

See Figure 5

| | |
|--------------------------|--|
| Five-year trend: 2014–18 | 27 out of 37 wells (73%) show rising trends, at rates of 0.01–0.67 m/y (median of 0.25 m/y); 1 of these wells shows its lowest level on record 3 wells (8%) are stable 7 wells (19%) show declining trends, at rates of 0.04–0.44 m/y (median of 0.15 m/y); 2 of these wells show their lowest level on record |
|--------------------------|--|

Groundwater salinity

See Figures 6 and 7

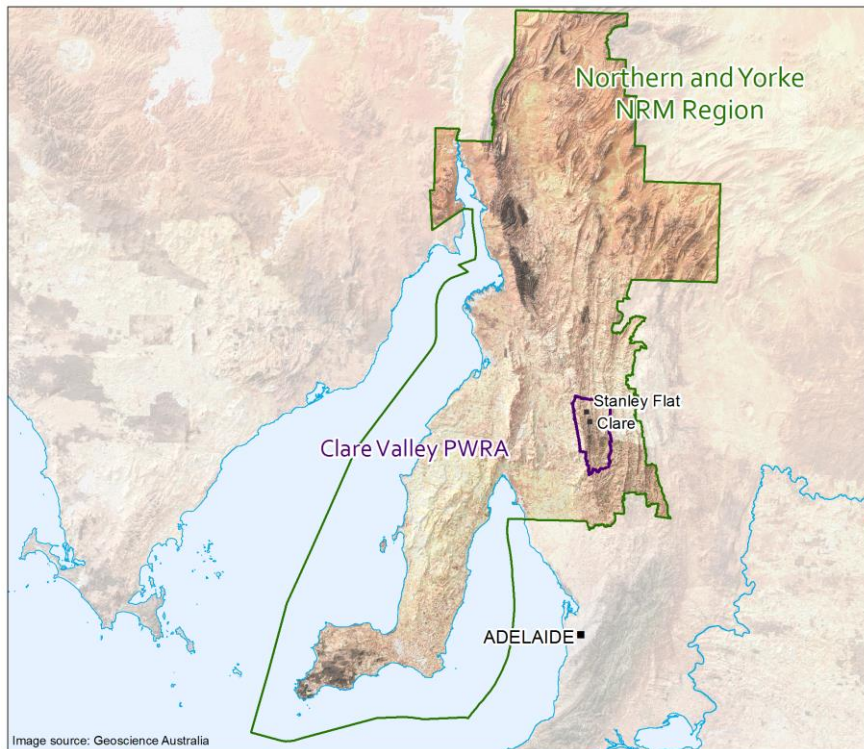
| | |
|--------------------------|--|
| 2018 salinity | 193–2778 mg/L (17 wells; median of 1116 mg/L) |
| Five-year trend: 2014–18 | 1 out of 13 wells (8%) shows a decreasing trend, at a rate of 53 mg/L/y 12 wells (92%) are stable |

² For the water-use year 1 July 2017 to 30 June 2018

³ Allocated volume does not include rollover, carry over or recharge allocations

⁴ 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* and a water allocation plan provides for their sustainable management.

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

The FRAs, 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 FRAs, 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 FRAs 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 (>40 m), low-permeability regional zone within which the size and spacing of fractures tends to decrease with depth.

Trends in groundwater levels and salinity 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 increased irrigation extractions, and both elements can cause the groundwater levels to decline and salinities to increase. Conversely, above-average rainfall can result in increases in recharge and decreases in irrigation extractions, which may cause groundwater levels to rise and salinities to stabilise or decrease.

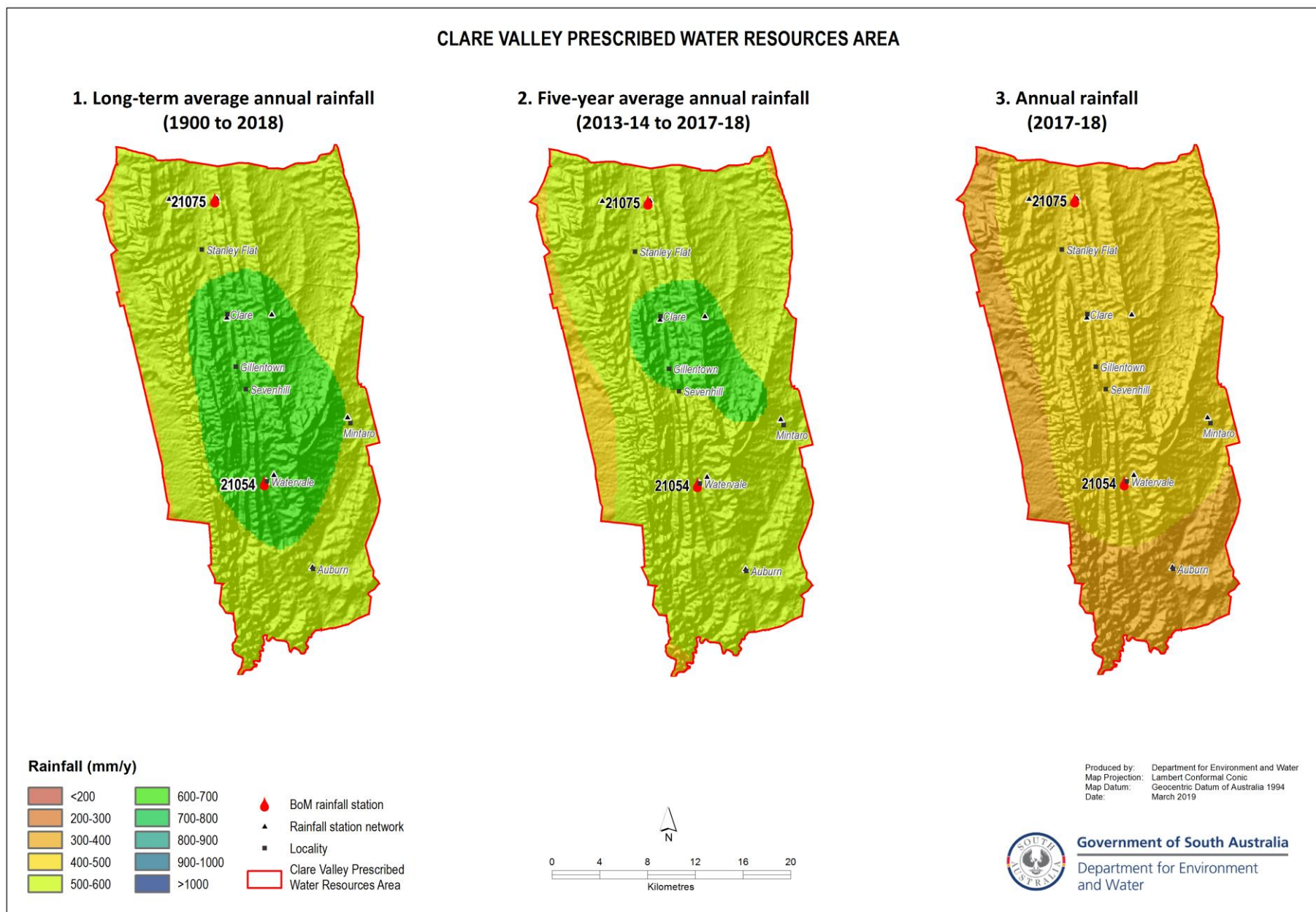


Figure 1. Spatial distribution of (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall⁵

⁵ Data sources: SILO interpolated point and gridded datasets available at <https://legacy.longpaddock.qld.gov.au/silo/> – see [More information](#)

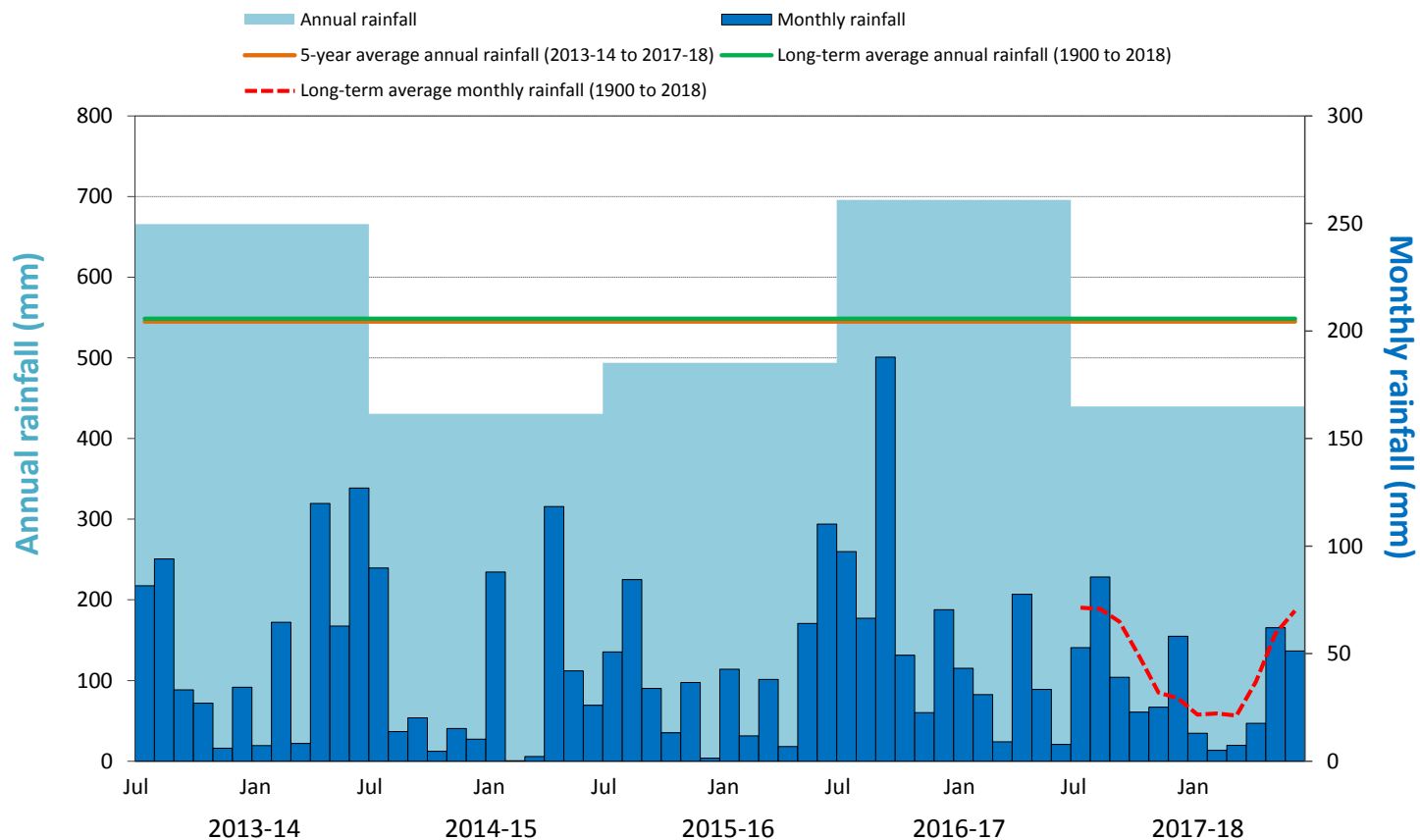


Figure 2. Annual and monthly rainfall for the past five water-use years recorded at Calcannia (BoM Station 21075)⁶

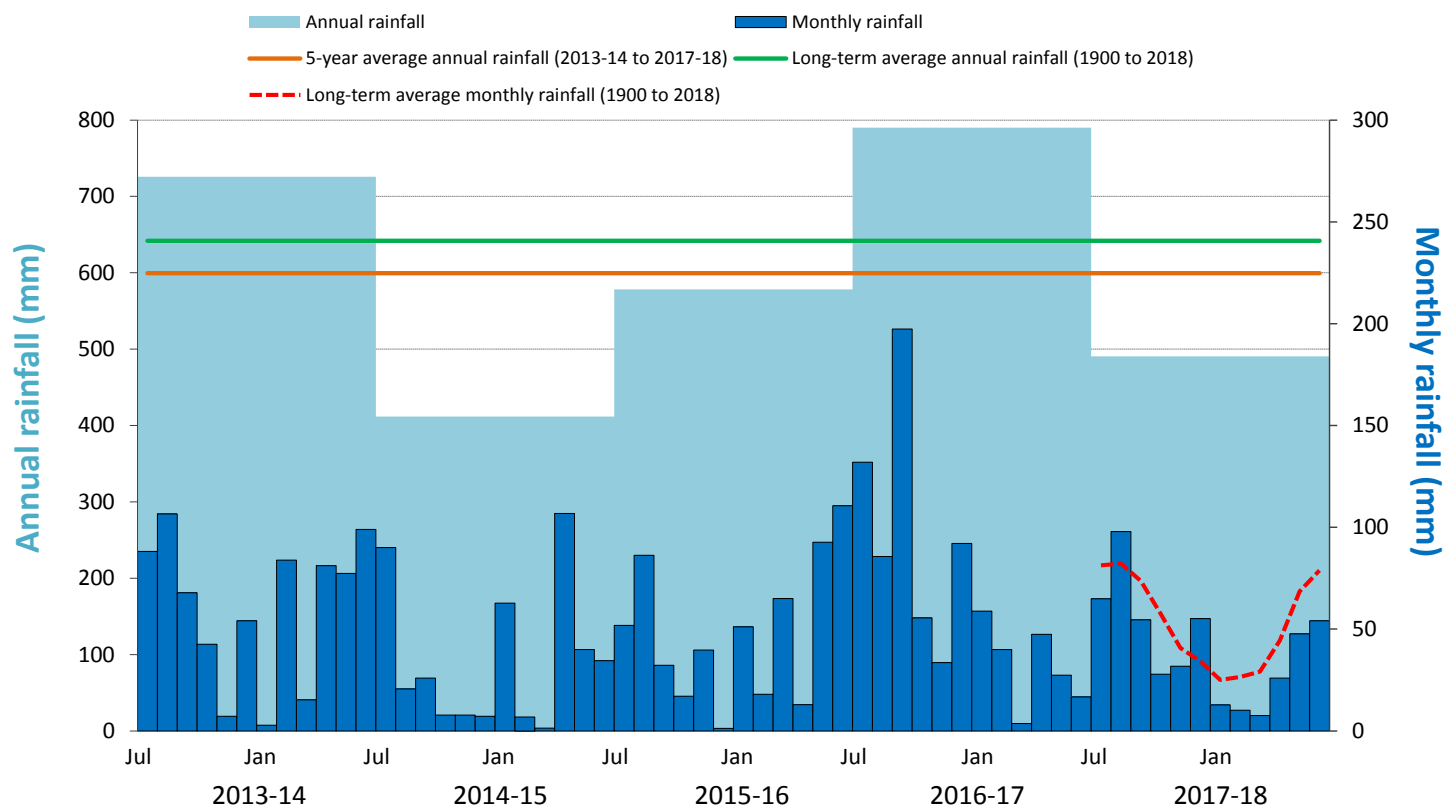


Figure 3. Annual and monthly rainfall for the past five water-use years recorded at Watervale (BoM Station 21054)⁴

⁶ Data source: SILO Patched Point Dataset, available <https://legacy.longpaddock.qld.gov.au/silo> – see [More information](#)

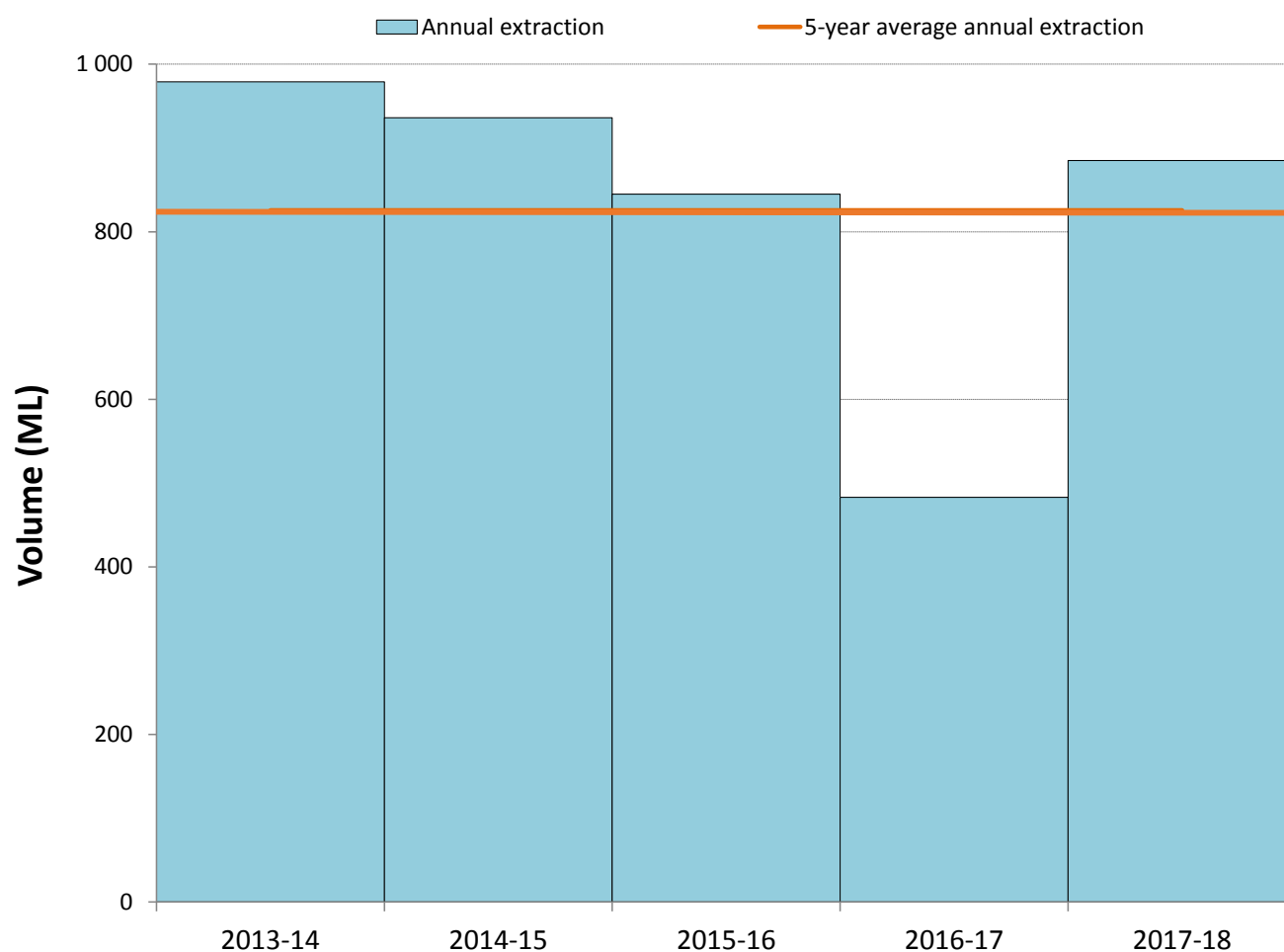
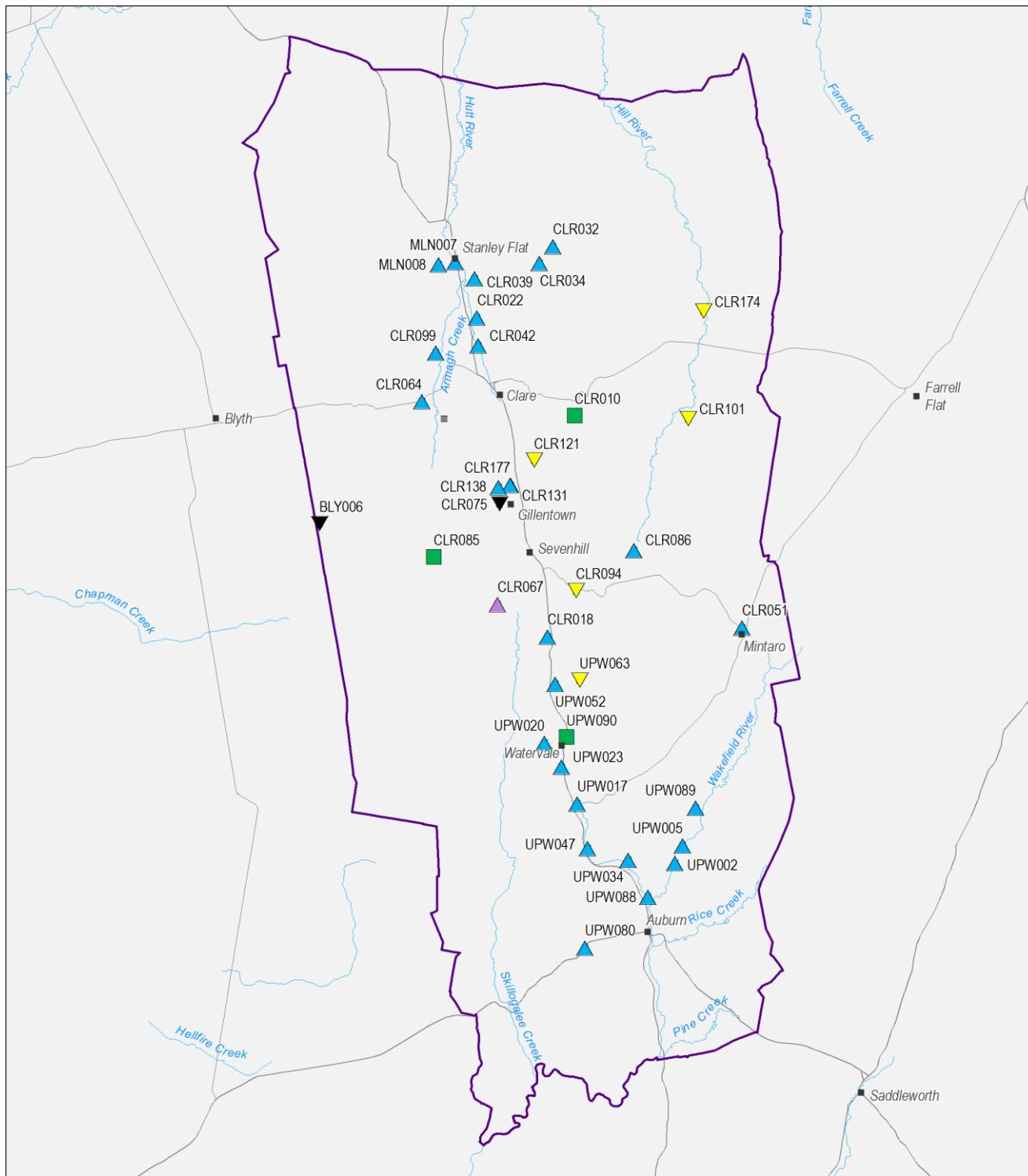


Figure 4. Licensed groundwater extraction volumes⁷ for the past five water-use years

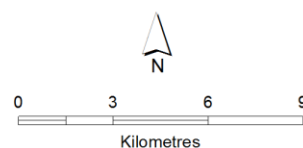
⁷ Total licensed extractions are subject to change as extraction data have not yet been verified in full – see [More information](#)



2018 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
- Locality
- Watercourse
- Road
- Clare Valley Prescribed Water Resources Area

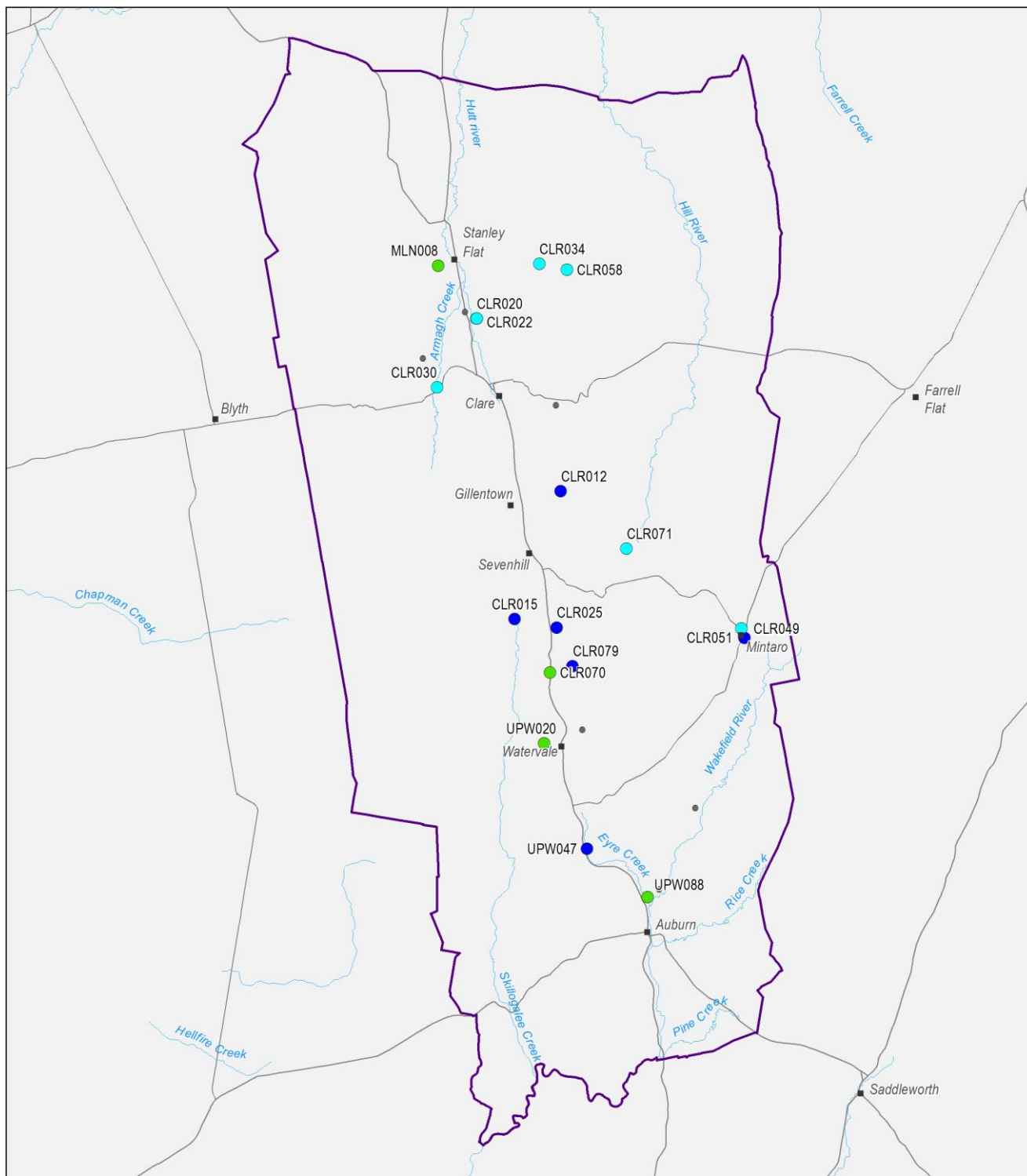


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 Map Datum: Geocentric Datum of Australia 1994
 Date: March 2019



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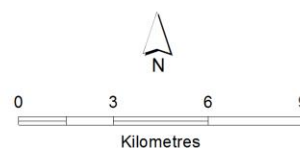
Figure 5. Five-year trends (2014–18) in groundwater levels: fractured rock aquifers



2018 salinity (mg/L)

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

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

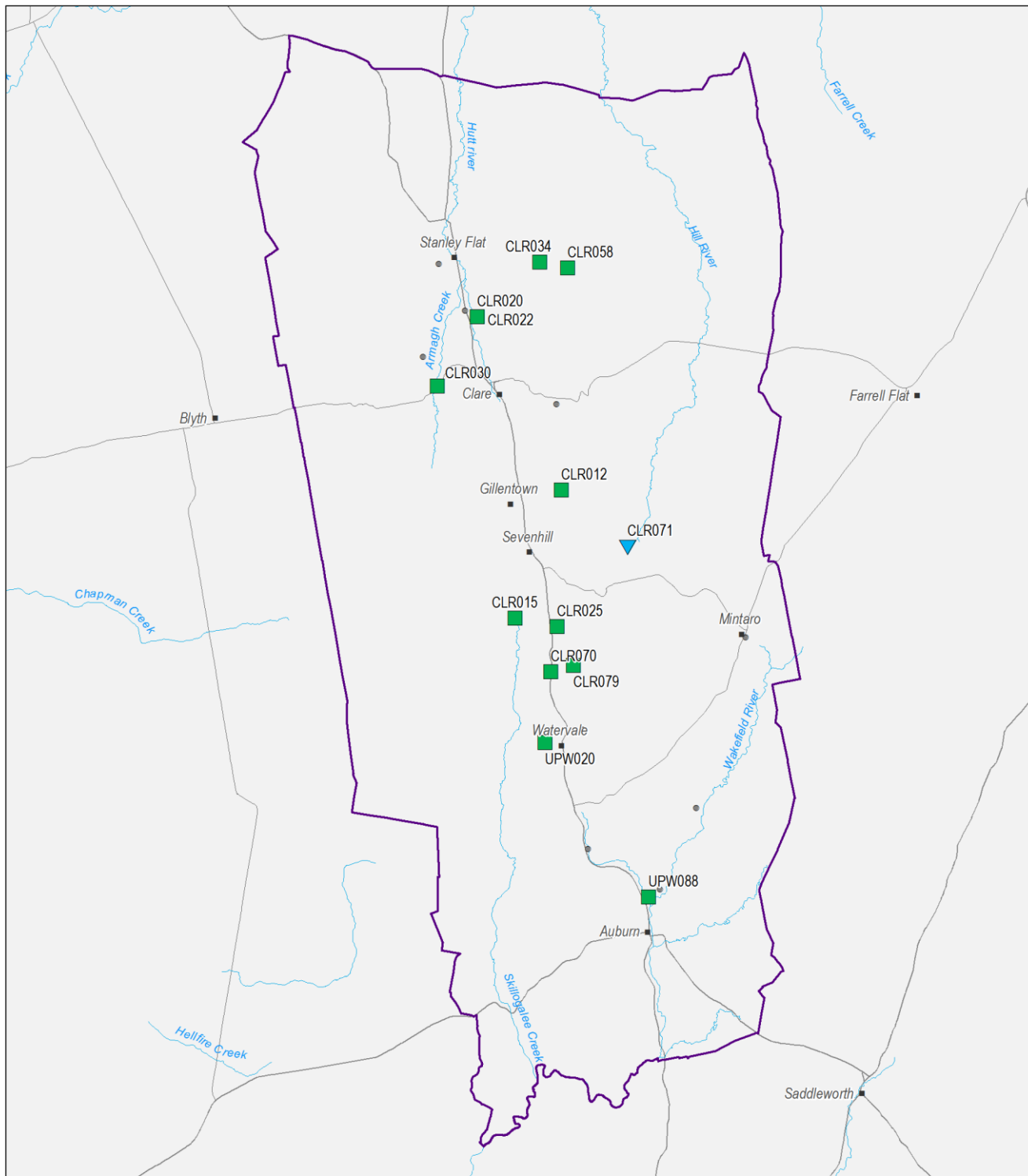


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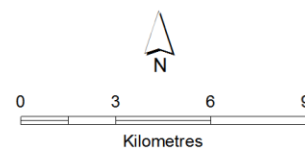
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Figure 6. 2018 groundwater salinities: fractured rock aquifers



2018 salinity status

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



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Figure 7. Five-year trends (2014–18) in groundwater salinities: fractured rock aquifers

More information

To determine the status of the FRAs for 2018, the trends in groundwater levels and salinities over the past five years (2014 to 2018, 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, 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 extraction for the 2017–18 water-use year is based on the best data available as of February 2019 and could 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 are sourced from the SILO interpolated point and gridded datasets, which are calculated from BoM daily and monthly rainfall measurements and are available online at <https://legacy.longpaddock.qld.gov.au/silo/>.

To view the *Clare PWRA groundwater 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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