
CLARE VALLEY PWRA

FRACTURED ROCK AQUIFER

Groundwater Level and Salinity Status Report

2013



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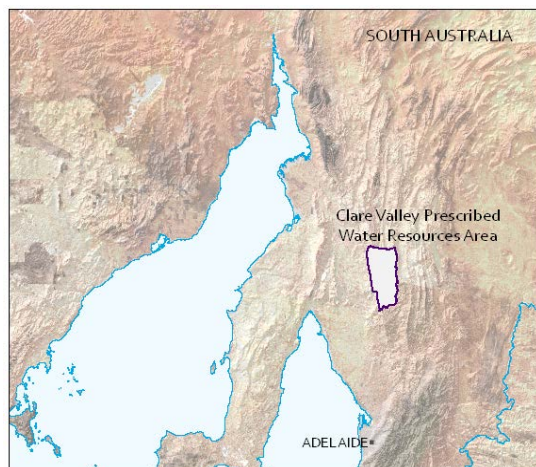
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2013 SUMMARY



The Clare Valley Prescribed Water Resources Area (PWRA) is located approximately 130 km north of Adelaide within the Mount Lofty Ranges. It is a regional-scale resource for which surface water and groundwater is prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan provides for sustainable management of the groundwater resources.

There are two aquifer systems within the Clare Valley region. A Quaternary alluvial aquifer occurring at shallow depths (<15 m) in valley floors which provides only a small portion of the groundwater resource (mainly in the vicinity of Stanley Flat). The Quaternary aquifer is underlain by an extensive Fractured Rock Aquifer which is the main aquifer system developed within the Clare Valley. Both aquifers are recharged by local rainfall.

The Fractured Rock Aquifer that provides groundwater for irrigation in the Clare Valley is composed of 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 Fractured Rock Aquifer, the fractures act as conduits for groundwater flow. The yield of groundwater from a particular well is dependent on the size and spacing between fractures and the orientation of fractures intercepted. The Fractured Rock Aquifer 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. The size and spacing of fractures tends to decrease with depth.

Metered groundwater extractions in 2012–13 within the Clare Valley PWRA totalled 849 ML, which represents an increase of 83 ML (11 %) from the previous water use year (Fig. 1). Nevertheless, this is the third lowest year in terms of usage out of the past 10 years, which can be partly attributed to above average late-spring rainfall in 2011 reducing irrigation demand.

The climate of the Clare Valley region is characterised by hot, dry summers and cool to cold, wet winters. Two rainfall stations, Calcannia (21075) and Watervale (21054), are located within the PWRA. The 2013 annual rainfall recorded at Watervale and Calcannia rainfall stations were 13.4 and 1.5 mm below the long term averages of 652.9 mm and 554.0 mm respectively. The long-term monthly average rainfall at Calcannia (Figure 2) and Watervale (Figure 3) is graphed in orange and the 2013 total monthly rainfall is graphed in blue. Rainfall was below average for two months at the start of the year over the summer and autumn period when peak demands on the groundwater resource occur. Higher than average rainfall was experienced from May to August, which is likely to impact on groundwater recharge.

The majority of the observation wells forming the monitoring network in the Fractured Rock Aquifer display declining water level trends from 1989 to 2009, followed by rising water levels in the subsequent period up to 2013, which is associated with higher than average rainfall conditions. Sufficient data to undertake analysis of water level trends from 2012 to 2013 is available for 68 of the observation wells. The majority of wells (60 %) show a rise in maximum recovered groundwater levels of up to 1.95 m. The remainder record declines of up to 2.07 m. The median change in water levels between 2012 and 2013 was an increase of 0.2 m. The slight overall increase in levels across the PWRA can be attributed to the wetter rainfall conditions, which appear to have generally compensated for the overall increased rate of extraction. Wells experiencing declining levels are located across the PWRA often in proximity to wells recording rising levels, supporting the historical pattern of water levels being affected by local variations in hydrogeological conditions and extraction regimes.

Groundwater salinity throughout the Clare Valley Prescribed Water Resources Area is generally below 1500 mg/L which is within the salinity threshold for grape growing, the primary use for irrigation water in the PWRA, however, it can reach up to 3000 mg/L in some locations. There are currently 26 observation wells monitoring the salinity of the Fractured Rock Aquifer. In 2013, 25 of these wells were monitored with 60 % recording salinity levels of under 1500 mg/L (Fig. 5). Sufficient data was available for 18 wells to allow an evaluation of salinity changes since 2012. 16 of these wells (89 %) show an increase in salinity when compared with the 2012 reporting period, while the remaining 2 wells (11 %) record a decline in salinity.

The Fractured Rock Aquifer of the Clare Valley PWRA has been assigned a yellow status for 2013:

2013 STATUS ● "Gradual adverse trends, indicating a low risk to the resource in the medium term"

This means that gradual adverse trends in resource status have been observed over the reporting period. Continuation of these trends is unlikely to negatively impact the beneficial use (i.e. drinking water, irrigation or stock watering) of the resource for at least 15 years. The 2013 status for the Fractured Rock Aquifer is supported by:

- An increase in salinity in most of the monitored wells when compared to 2012 salinity data.
- The assessment takes into consideration the overall rise in maximum recovered groundwater levels observed in 2013 when compared to 2012 levels.

To view the *Clare Valley PWRA Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, location of rainfall stations and relevant groundwater dependent ecosystems, www.waterconnect.sa.gov.au.

For further details about the Fractured Rock aquifer please see the Water Allocation Plan for the [Clare Valley Prescribed Water Resources Area](#).

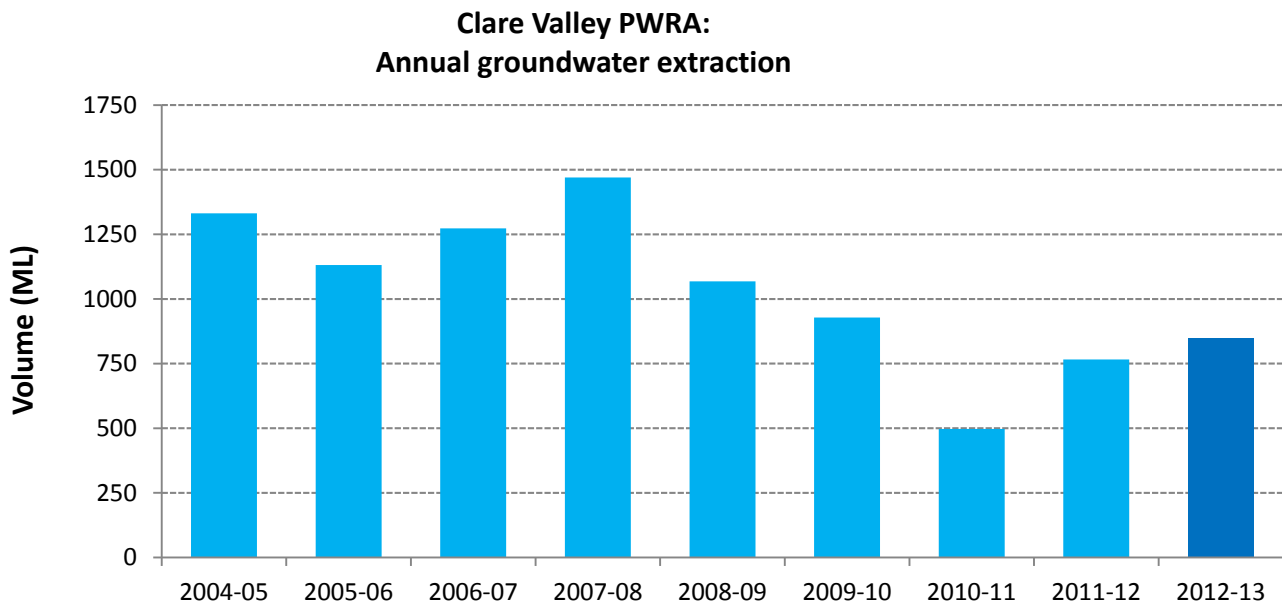


Figure 1. Historical licensed groundwater use in the Clare Valley Prescribed Water Resource Area.

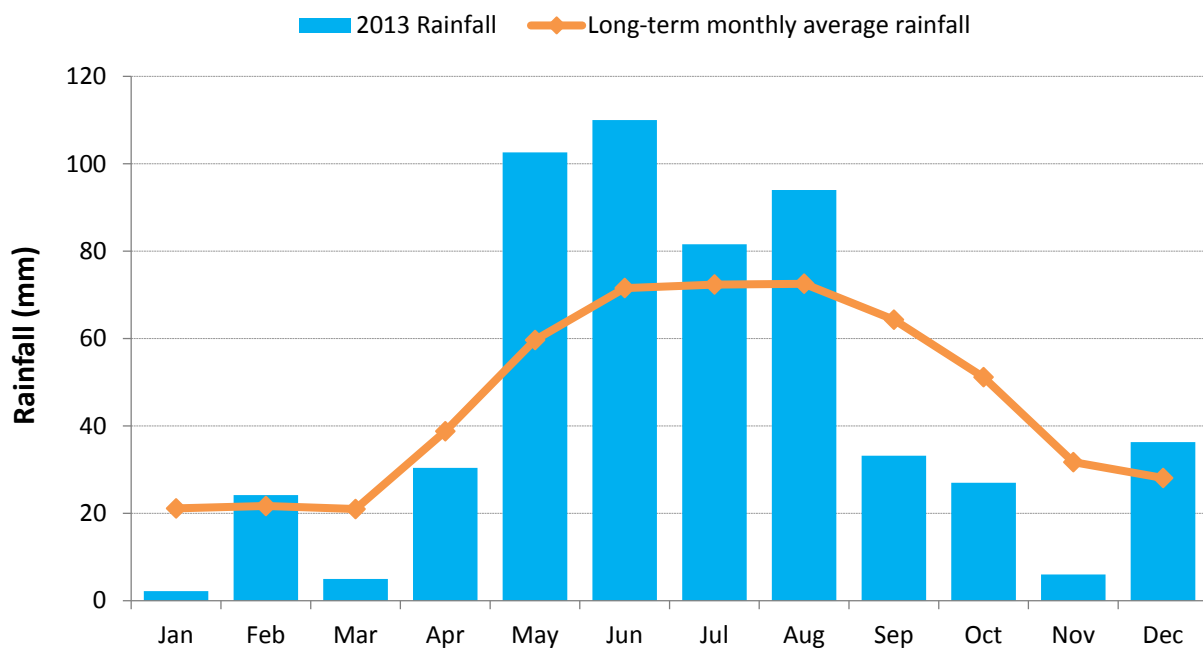


Figure 2. Monthly rainfall (mm) for 2013 and the long-term average monthly rainfall (mm) at the Calcannia rainfall station (21075) in the Clare Valley Prescribed Water Resource Area.

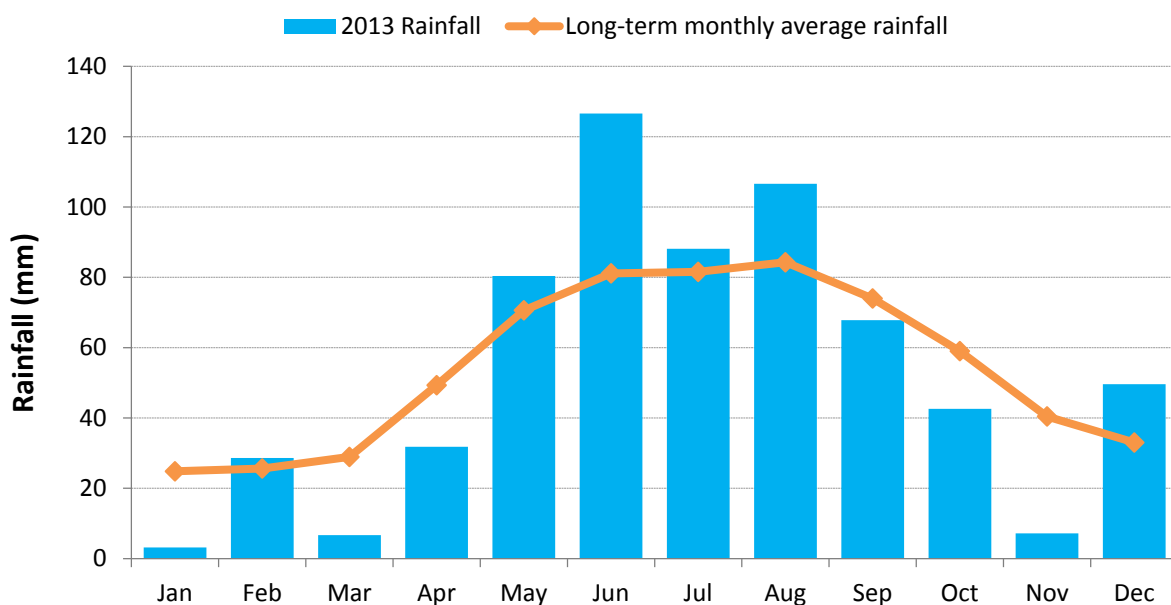


Figure 3. Monthly rainfall (mm) for 2013 and the long-term average monthly rainfall (mm) at the Watervale rainfall station (21054) in the Clare Valley Prescribed Water Resource Area.

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.

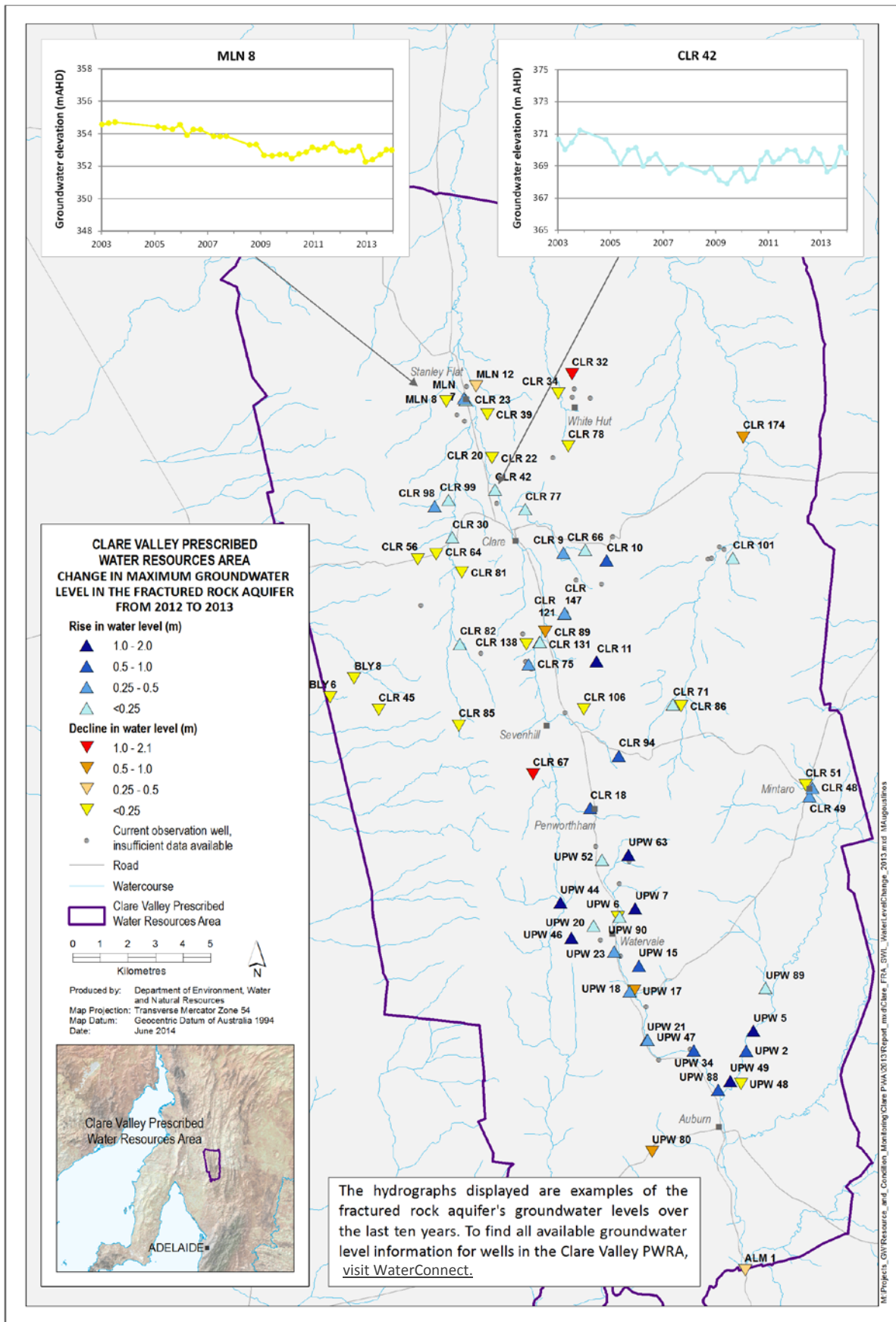


Figure 4. Overall changes in maximum groundwater levels in the Fractured Rock aquifer of the Clare Valley Prescribed Water Resource Area from 2012 to 2013.

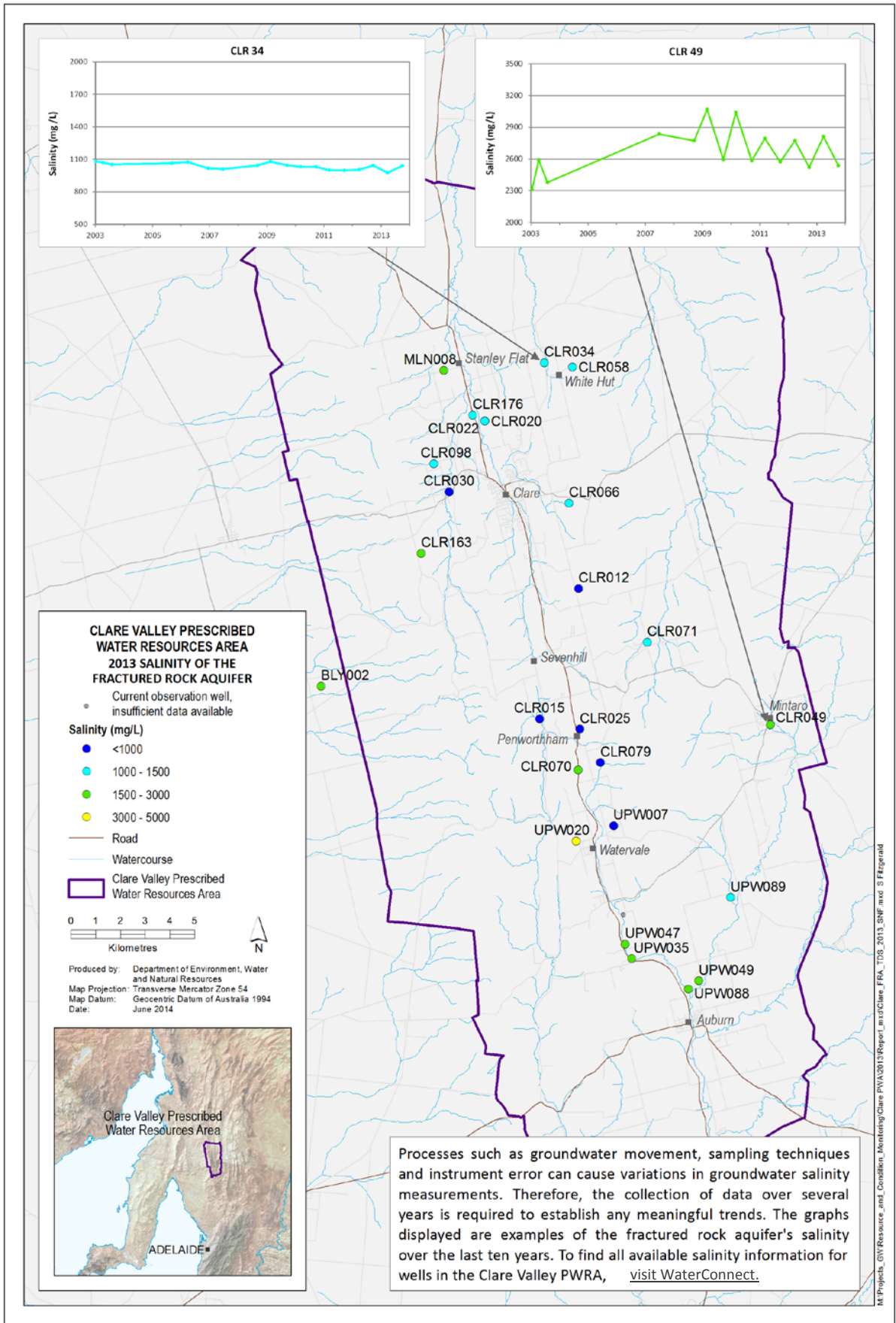


Figure 5. Groundwater salinity of the Fractured Rock aquifer of the Clare Valley Prescribed Water Resource Area for 2013.