

Bellevue

Eyre Peninsula Groundwater Dependent Ecosystems monitoring site

2020 Report Card

Summary

Type of site: Control site for Bramfield.

Status: **Green**, improving trends in the short term (2016 to 2020).
Improvement in condition (2020) likely due to early and regular rainfall.

Red Gums:



Condition
Good



Trend
Improving
Short term
(2016 to 2020)



Trend
More data required
Long term

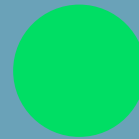
Ground water levels:



Trend
Declining
Short term
(2016 to 2020)

Climate: Above average maximum temperatures and decline in winter rainfall and recharge events.

This Report Card should be read in conjunction with the Overview, which provides information about Groundwater Dependent Ecosystem (GDE) monitoring and summary information for all monitored GDE sites.



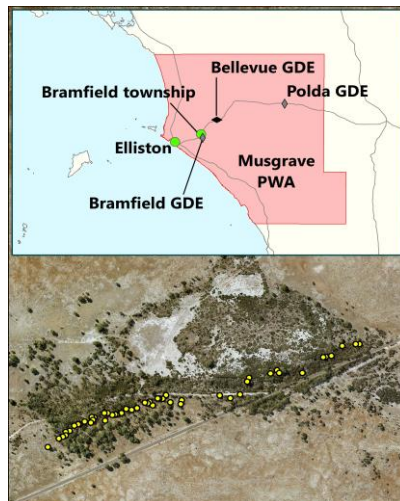
Adult Red Gum at Bellevue assessed as 'very good' condition in Oct 2020.

The **Bellevue** Groundwater Dependent Ecosystem (GDE) monitoring site is situated eight kilometres north-east of Bramfield, on the Birdseye Highway. The site includes a seasonal (ephemeral) wetland and a remnant patch (approximately 17 ha) of Red Gum (*Eucalyptus camaldulensis*) Woodland.

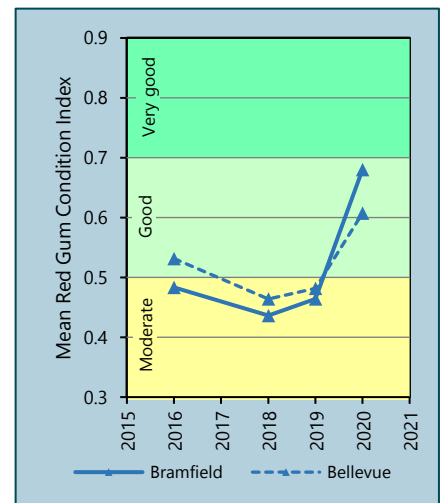
Amongst the Red Gum overstorey and midstorey grow native apricot (*Pittosporum sp.*) and sheoak (*Allocasuarina spp.*). The understorey is predominately intact and includes flax lily (*Dianella spp.*). Around the wetland proper is an extensive zone of honey-myrtle (*Melaleuca sp.*).

Bellevue is a control GDE Site, and is monitored to assess the impact of factors other than licensed extraction (e.g. climate) on GDE condition. It is located outside the zone of influence of any current or known historic licensed extraction.

While there is unlicensed extraction of water for stock and domestic purposes, this is assumed to be low compared to extraction for licensed consumptive purposes at other sites, and there is a low likelihood of it having any impact on the GDE.



Bellevue site map
(yellow dots represent 50 surveyed trees)



Graph 1 Change in Red Gum Condition Index at Bellevue (control site for Bramfield) and Bramfield from 2016 to 2020

Red Gum condition

Tree condition monitoring is carried out in late October to early November. First completed in 2016, monitoring has been repeated annually since 2018. In 2016 the average Red Gum Condition Index (RCI) score was 0.53. There was some decline in condition in 2018 and 2019, but condition improved in 2020, (average RCI score of 0.61). This shows an 8% improvement in Red Gum condition since 2016. The dataset is, however, too short to enable determination of any long term trends. The higher RCI measured in 2020 can be attributed to high levels of reproduction (flower and fruit) observed in the trees.

Groundwater and climate assessment

Although an improvement in Red Gum condition was evident in 2020, groundwater levels continued to decline at Bellevue (approx. 30 cm) (Graph 2).

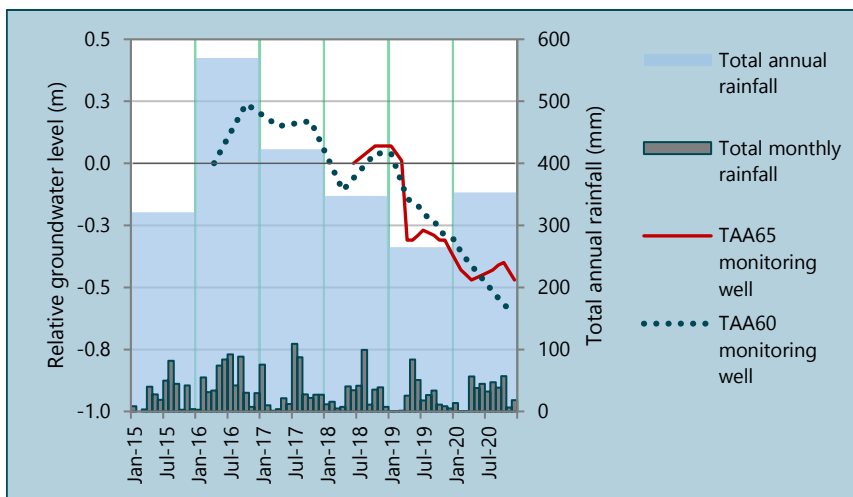
Bellevue is located outside the zone of influence of licensed extraction, thus the decline in groundwater can be attributed to factors other than licensed extraction, specifically reduced recharge, and increasing temperature.

As detailed below, graphs on the right show climatic factors possibly contributing to groundwater decline, but also improving in Red Gum condition:

- Total annual rainfall increased from 265 mm in 2019 to 353 mm in 2020 (Graph 2), but remained 58 mm below the long term¹ mean annual rainfall.
- In 2020 there was no month with high total rainfall (Graph 2), as can generally be seen in the long term record¹. In addition, the maximum daily rainfall was 19% less than the long term¹ mean. The combination of these two factors, while not a direct measure of rainfall intensity and duration, are an indication that rainfall in 2020 was of lower than average intensity and duration.
- Temperatures remained hotter than usual, with the annual average of the daily maximum temperature 0.3°C above the long term¹ mean (Graph 3).

Rainfall intensity and duration, and not just volume, are important for groundwater recharge. Although total annual rainfall increased, it was probably of lower intensity and duration. This, combined with an increase in maximum temperatures, could result in water being available in the upper soil profile, but NOT infiltrating deeper to contribute to groundwater recharge. The increased water in the upper soil profile would be immediately available to the Red Gums, likely resulting in improved tree condition despite a decline in groundwater levels.

¹All long term averages are for the period 1 Jan 1889 to 31 Dec 2020

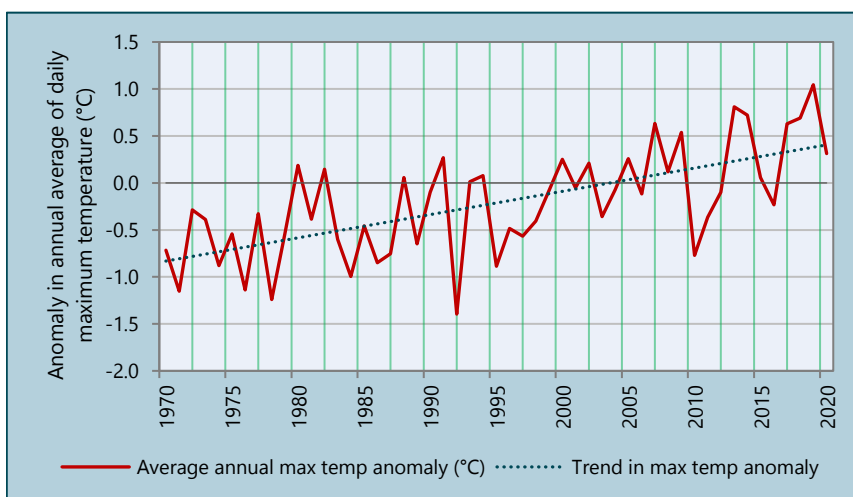


Graph 2 Total annual and total monthly rainfall^{^^}, and change in groundwater levels^{**} at two monitoring wells, TAA65 and TAA60

Notes:

^{^^}Rainfall data for 2016 to 2018 is obtained from the Bureau of Meteorology station, Bramfield Post Office (number 18003). Rainfall data for 2019 and 2020 is site specific data obtained from the rainfall gauge installed at the Bellevue GDE site.

^{**}For each monitoring well (TAA65 and TAA60), the groundwater levels shown are relative to the groundwater level at the start of the monitoring period, which is shown as zero.



Graph 3 Anomaly in annual average of daily maximum temperature[^] from 1970 to 2020

Note:

[^] This is the difference between the annual average of the daily maximum temperature for any one year and the long term¹ mean of the annual average of the daily maximum temperature. Maximum daily temperature is measured at the Bureau of Meteorology station, Bramfield Post Office (number 18003).

Monitoring into the future

Tree condition monitoring will continue on a yearly basis. As time goes on, more data will allow for the identification of any long term trends in the GDE condition.

New monitoring infrastructure was installed at Bellevue in 2019 to improve the site specific accuracy of data collection. Additions include:

- two additional monitoring wells;
- a water level data-logger at one well; and
- a rain gauge to measure rainfall intensity and amount.

For more information

Access the full report on assessment of Red Gum condition in 2018 [here](#):

Muller K. L., N.J. Souter and Australian Water Technology (2019). *Eyre Peninsula Groundwater Dependent Ecosystem Data Analysis: Red Gum tree condition data (five sites)*. A report for Natural Resources Eyre Peninsula, Department for Environment and Water, Port Lincoln, South Australia.

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