

Bellevue

Eyre Peninsula Groundwater Dependent Ecosystems monitoring site

2021 Report Card

Summary

Type of site: Control site for Bramfield

Status: **Green**, improving trends in the short term (2016 to 2021). Stable condition (2020-2021) likely due to ongoing good winter rainfall, and increasing groundwater levels.

Red Gums:



Condition
Good

Annual change
(2020-2021)
Improving



Short term
trend
(2016 to 2021)
Improving



Long term
trend
**More data
required**



**Groundwater
levels:**

Annual
change
(2020-2021)
Improving



Climate: Below average maximum summer temperatures and above average total annual rainfall, with good recharge events.

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



Adult Red Gum at Bellevue assessed as 'very good' condition in Oct 2021.

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 of Red Gum (*Eucalyptus camaldulensis*) Woodland (approximately 17 ha).

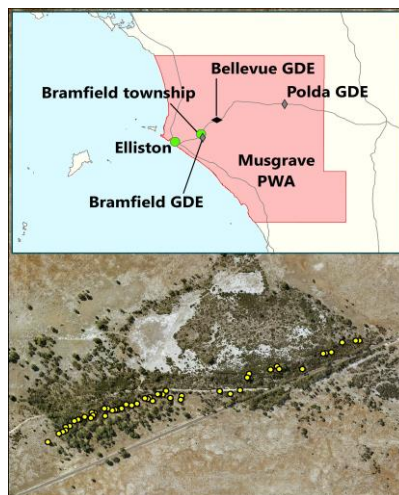
Native apricot (*Pittosporum sp.*) and sheoak (*Allocasuarina spp.*) grows amongst the Red Gum overstorey and midstorey. The understorey is predominately intact and includes flax lily (*Dianella spp.*). Around the wetland proper is an extensive zone of honey-myrtle (*Melaleuca sp.*).

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

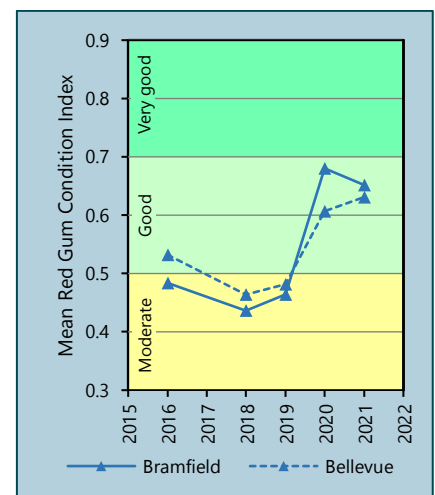
While there is unlicensed extraction of water for stock and domestic purposes, this is assumed to be low compared to extraction for licensed consumptive purposes at other sites, with a low likelihood of it having any impact on the GDE.

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 Red Gum condition was good, with an average Red Gum Condition Index (RCI) score of 0.53. In 2018 and 2019 the condition declined to moderate, before improving to good in 2020, (average RCI score of 0.61). In 2021 condition has remained good, with a 2% increase in average RCI score (0.63). This small change is not statistically significant, thus the condition can be considered stable for the period 2020 to 2021. The dataset is too short to enable determination of any long term trends.



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 2021

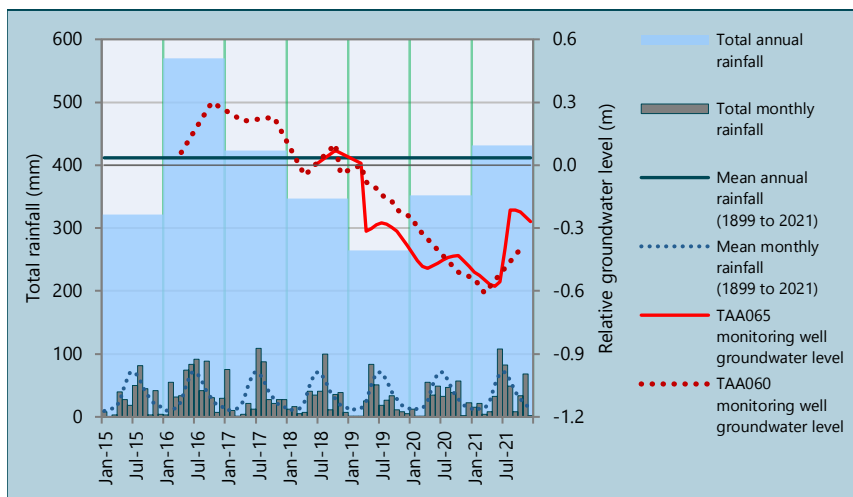
Groundwater and climate assessment

Red Gum condition remained good through 2021, with trees supported by increased groundwater levels, higher than average rainfall total annual rainfall, and cooler than average maximum daily temperatures.

As detailed below, graphs on the right show climatic factors contributing to groundwater recovery, and associated stable Red Gum condition:

- Total annual rainfall increased from 352 mm in 2020 to 432 mm in 2021, 20 mm above the long term¹ mean annual rainfall (Graph 2).
- Rainfall in June and July was 53% and 16% higher than the long term¹ monthly means (Graph 2). This is indicative of rainfall events of good intensity (how hard the rain falls) and duration during these months, both of which are important for groundwater recharge.
- Through the early summer months of 2021, levels in monitoring TAA065 continued to decline and by May were the lowest since monitoring of this well commenced in June 2018. This decline was, however, followed by rapid recharge of groundwater in June and July, caused by the higher than average rainfall during these months. Groundwater levels increased by over 0.36 m during this period (Graph 2).
- Even though groundwater levels again declined after this recharge occurred, levels have recovered such that in late December 2021 they were the highest observed in WAD039 in any December since March 2019 (Graph 2).
- Temperatures were cooler than usual, with the monthly average of daily maximum temperature for the summer months (November to March) 1.2°C below the long term¹ mean (Graph 3). These cooler temperatures could result in improved groundwater recharge, with less evaporation occurring after rainfall events. They can also contribute to improved Red Gum condition, with the trees being impacted less by heat stress.

The Bellevue Red Gum GDE site is located outside the zone of influence of licensed

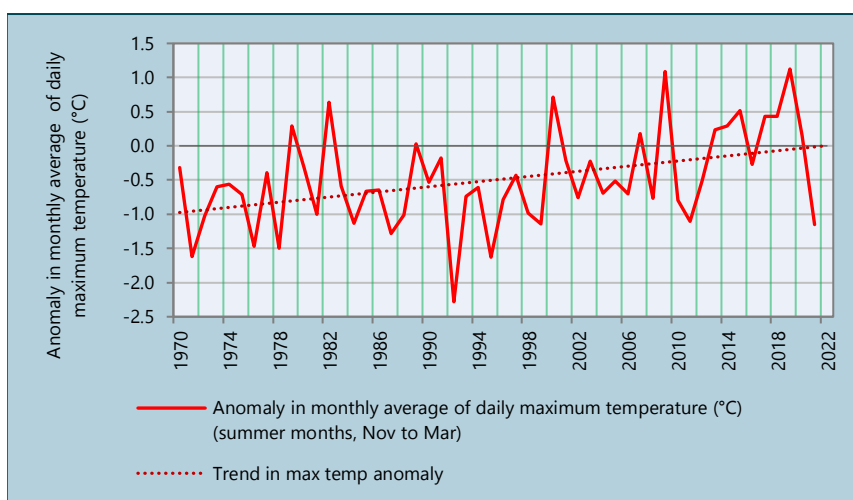


Graph 2 Total annual and total monthly rainfall^{^^}, and change in groundwater levels^{**} at two monitoring wells, TAA065 and TAA060

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 2021 is site specific data obtained from the rainfall gauge installed at the Bellevue GDE site.

^{**}For monitoring wells TAA065 (5930-1531) and TAA060 (5930-0006) the groundwater levels shown are relative to the groundwater levels at June 2018, which are shown as zero.



Graph 3 Anomaly in annual average of daily maximum temperature[^] from 1970 to 2021

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).

extraction from the Bramfield groundwater lens. The increase in groundwater levels observed at Bellevue during 2020-21 therefore indicates that, in the absence of licensed extraction, during 2020-21, an increase in groundwater levels should have been observed in most other wells on the Bramfield groundwater lens. Similarly, Red Gum condition at other Red Gum GDE sites should at least have remained stable, if not improved, during 2020-21.

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.

¹All long term averages are for the period 1 Jan 1899 to 31 Dec 2021.

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 (DEW), Port Lincoln, South Australia.

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