Wanilla

Eyre Peninsula Groundwater Dependent Ecosystems monitoring site

2022 Report Card

Summary

Type of site: Licensed extraction monitoring site

Status: **Orange**, improving trends in the short term (2016 to 2022). Declining condition (2021-2022) likely due to medium term low groundwater levels.

		Annual change (2021-2022)	Short term trend (2016 to 2022)	Long term trend		Annual change (2021-2022)
Red Gums:	Condition **Good**	**Declining** ↙	**Improving** ↗	**More data required** ?	**Groundwater levels:**	**Improving** ↗

Climate: Below average maximum summer temperatures and above average May to July 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 Wanilla assessed as in 'moderate' condition in Oct 2022.

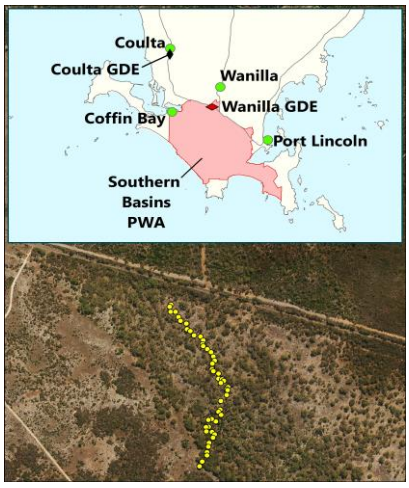
The **Wanilla** Groundwater Dependent Ecosystem (GDE) monitoring site is situated four kilometres east of the Coffin Bay road turn off on Flinders Highway. The site is part of a large remnant patch of Red Gum (*Eucalyptus camaldulensis)* Woodland. Amongst the Red Gum overstorey and midstorey grows native apricot (*Pittosporum sp.*), coast beard-heath (*Leucopogon sp.*), hop-bush (*Dodonaea sp.*) and sheoak (*Allocasuarina spp.*).

The Wanilla GDE site is monitored to assess the impacts of licensed water extraction from the Uley-Wanilla groundwater lens in the Southern Basins Prescribed Wells Area. There are a number of users (including SA Water) who hold licenses to extract water for town water supply, domestic use, and other private commercial purposes. Licensed water extraction from the Uley-Wanilla lens has however been declining, going from 164 ML in 2017-2018 to 33.8 ML in 2021-2022.

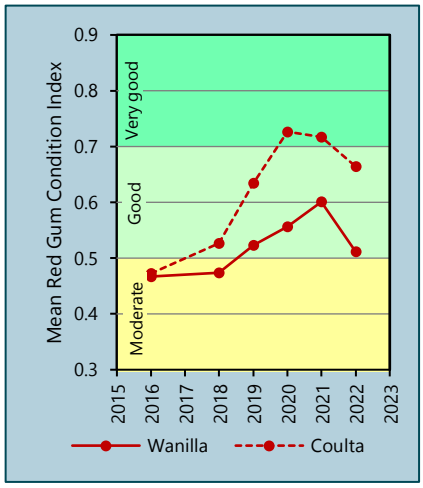
While there is unlicensed extraction of water for stock and domestic purposes, this is assumed to be low compared to extraction for licensed consumptive purposes at other sites, and there is a low likelihood of it having any impact on the GDE.

Red Gum condition

Tree condition monitoring is carried out in late October to early November. In 2016, when the monitoring commenced, the Red Gum condition was moderate, with an average Red Gum Condition Index (RCI) score of 0.47. There was a steady improvement in Red Gum condition until 2021 (average RCI score of 0.60) totalling 13%. However condition has declined in 2022 by 9% (average RCI score of 0.51). This decline in RCI can be attributed to decline in health indicators factors that are assessed to determine the RCI. Most specifically it can be attributed to increased cracking of bark, and increased leaf die-off, indicating decline in tree health. The dataset is too short to enable determination of any long term trends.



Wanilla site map
(yellow dots represent 50 surveyed trees)



Graph 1 Change in Red Gum Condition Index at Wanilla and Coulta (control site for Wanilla) from 2016 to 2022

Groundwater and climate assessment

Red Gum condition declined significantly through 2022, with trees supported by stable groundwater levels, higher than average rainfall, and cooler than average maximum daily temperatures.

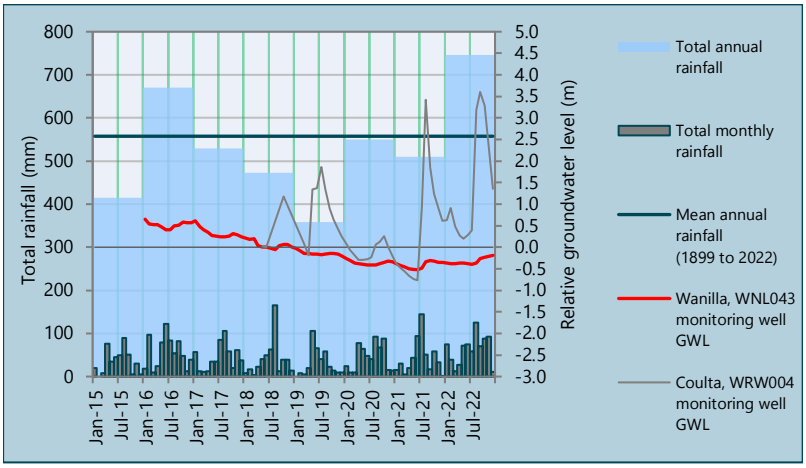
As detailed below, Graphs 2 and 3 shows climatic factors contributing to groundwater medium term decline, and associated Red Gum condition short term decline:

- Total annual rainfall increased from 510 mm in 2021 to 746 mm in 2022, 189 mm above the long term[1] mean annual rainfall (557 mm) (Graph 2).
- Through the summer months of 2022, levels in monitoring well WNL043 continued to fall. This decline was, however, followed by recharge of groundwater from August to the end of December, caused by the higher than average rainfall during these months.
- Temperatures were cooler than usual, with the monthly average of the daily maximum temperature 0.5°C below the long term[1] mean (Graph 3). These cooler temperatures could result in improved groundwater recharge, with less evaporation occurring after rainfall events. The impact of cooler temperatures on Red Gum condition is possibly mixed. They can also contribute to improved Red Gum condition, with the trees being impacted less by heat stress, but could also result in less vigour in the trees, and might have contributed to a small degree to the decline in Red Gum RCI during 2022.

Red Gum condition at Wanilla had improved every year since 2016, with a net 13% improvement in conditions from 2016 to 2021 (Graph 1). However condition has declined in 2022 by 9% resulting in a net improvement of 4%. The net improvement in Red Gum condition at Coulta (control site for Wanilla) for the same period is, however, much higher (14%). A longer data set is however required to determine whether these differences are statistically significant, and what may be causing them if they are.

Monitoring into the future

Tree condition and groundwater level monitoring will continue on a yearly basis. A study is also going to be undertaken in 2022-2023 to confirm definitively whether the Wanilla and Coulta Red Gums are using local groundwater. This will be done by looking at stable chemical isotopes that occur in the local groundwater, and which are a "signature" for a groundwater source, and comparing these to the isotopes occurring in tree sap.

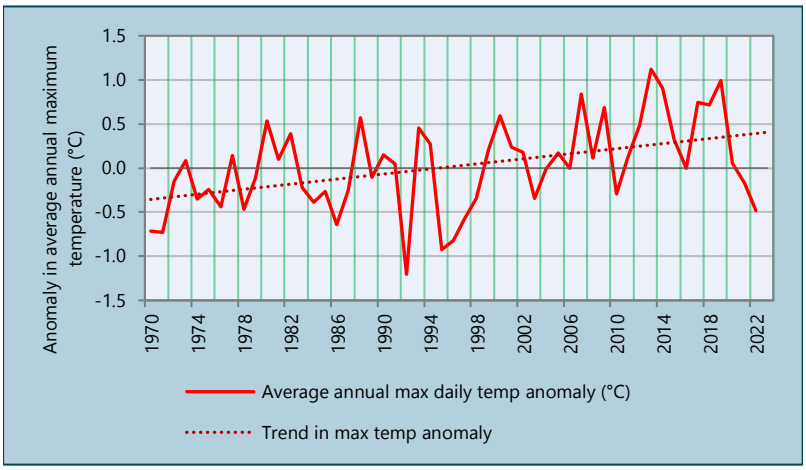


Graph 2 Total annual and total monthly rainfall^^, and change in groundwater level** at monitoring wells at Wanilla, WNL043 (6028-1605), and at Coulta, WRW004 (5929-0737).

Notes:

^^Rainfall data for 2016 to 2018, June 2020 to June 2021, and June 2022 to January 2023 is patched SILO data for the Bureau of Meteorology station, Port Lincoln (Big Swamp) (number 18017). All other rainfall data for 2019 to 2022 is site specific data obtained from the rainfall gauge installed at the Wanilla GDE site.

**For all monitoring wells the groundwater levels shown are relative to the groundwater levels in that well at June 2018, which are shown as zero.



Graph 3 Anomaly in annual average of daily maximum temperature^ from 1970 to 2022

Note:

^ This is the difference between the annual average of the daily maximum temperature for any one year and the long term[1] mean of the annual average of the daily maximum temperature. Maximum daily temperature is measured at the Bureau of Meteorology station, Big Swamp (number 18017).

[1]All long term averages are for the period 1 Jan 1899 to 31 Dec 2022.

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.

Access the 2022 *Overview and Red Gum GDE Condition Summary* and other specific site (Coulta, Bramfield, Bellevue, and Polda) report cards here.

For groundwater status and long term water extraction information:
DEW (2021). *Musgrave and Southern Basins Prescribed Wells Areas. 2019-20 water resources assessment*. DEW Technical Note 2021/15.
DEW (2021). *Southern Basins Prescribed Wells Area. 2019-20 groundwater status overview*.

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