River red gum response to Beetaloo environmental water release

A trial environmental water release from Beetaloo Reservoir along Crystal Brook Creek in late 2021 has led to monitoring to assess the impact on river red gum health.

Background

The health and condition of centuries-old river red gum trees along the length of Crystal Brook Creek has caused concern for some time. Hydrology changes since the opening of the Beetaloo Reservoir in 1890 has seen a decline of these trees, many estimated to be more than 500 years old.

Between 2009 and 2016, the former Northern and Yorke NRM Board supported river red gum monitoring by Dr Anne Jensen. This monitoring recorded high levels of stress in the form of reduced leaf canopy, low levels of recovery, shown by a lack of canopy growth along the length of branches ('epicormic' growth), and low recruitment by new saplings and seedlings.

In September 2021, the Minister for Environment and Water approved a trial water release from the Beetaloo Reservoir along Crystal Brook Creek in response to community concern. It was jointly run by the Northern and Yorke Landscape Board, SA Water and the Department for Environment and Water from 27 September to 21 November 2021.

The trial, which released more than 700 megalitres of water, aimed to gather information about surface water hydrology, groundwater hydrogeology, and any changes in the health and condition of the river red gums. An additional benefit was the opportunity for the local and visiting community to enjoy the benefits of water in the creek, and to be involved in the program. The results and lessons from this trial, plus weather information will be used in any decision-making for potential future releases.

Trial water release results

To monitor the impact of the trial release, the Northern and Yorke Landscape Board again contracted Dr Anne Jensen to conduct a baseline survey in October 2021 at eight sites along the Crystal Brook Creek. Six sites were part of the 2009-2016 monitoring program, and two new sites were included in the downstream zone.

This was followed by a second survey in December 2021 to detect immediate changes in the health and condition of the trees, which may have been triggered by the presence of the water. In April 2022, months after the water receded, a final survey was conducted to detect sustained post-summer changes in the trees.

The surveys aimed to track any observable changes of the gums along the creek, both within the water release zone, and further downstream. Potential changes include new canopy growth or the presence of buds, flowers or fruit.

The results showed a measurable improvement from October 2021 to April 2022 in the trees' condition at both watered (CB001, CB004, CB007, CB008) and non-watered sites (CB003, CB009-11), with improvements in the non-watered sites likely due to large rainfall events in November 2021 and January 2022 *(Figure 1)*. Over the three surveys there was a clear and consistent trend of improving canopy condition.

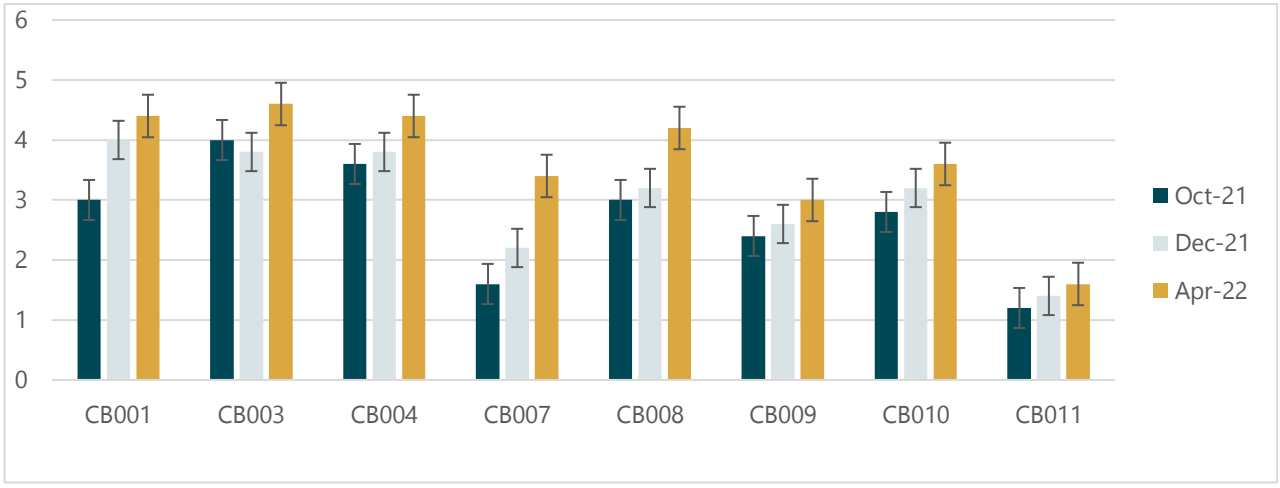

Figure 1: River red gum condition scores by site, showing consistent improvement over the survey period. Improvements at non-watered sites (CB003, CB009-11) likely due to large rainfall events.

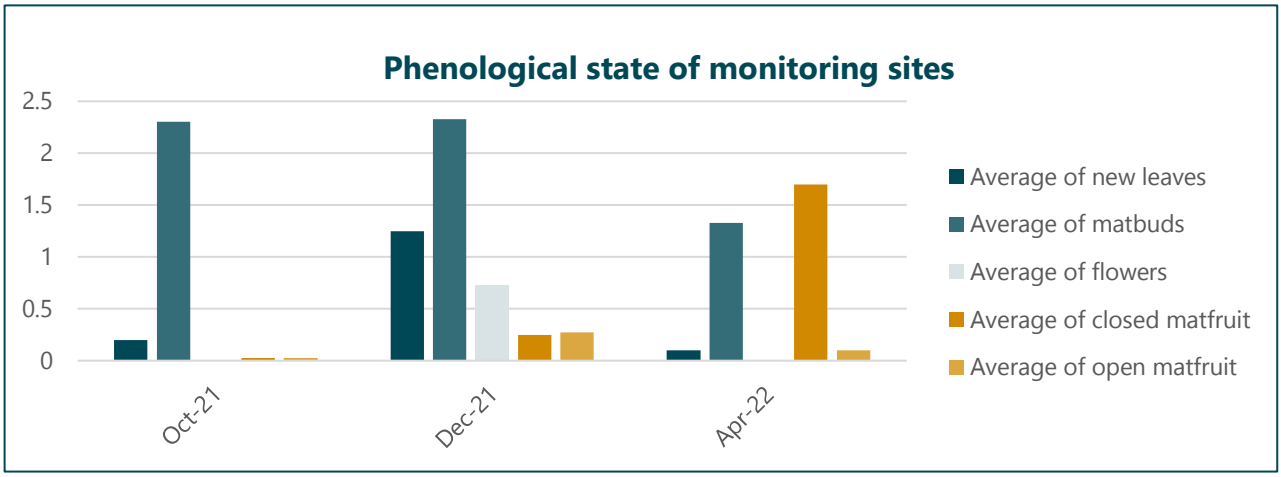

Figure 2: Plant features (phenology) showing mature buds dominant in October to December 2021, new leaves and flowering evident in December 2021 and closed mature fruit with seeds developing in April 2022.

It is also interesting to note that improvements in tree condition *(Figure 1)* within the watered sites appear to increase with time following the water release, compared to the non-watered sites which didn't show the same level of improvement.

Monitoring of plant features in October 2021, showed that the trees were displaying normal flowering activity, with mature buds the most obvious feature, as expected for river red gums in spring. In the December 2021 survey, there was a significant increase in new leaves and an observed increase in flowers and fruit as per the normal flowering season, which indicates that the trees were healthy enough to reproduce. Finally, the April 2022 survey showed that the trees successfully completed their reproductive cycle and recorded a further strong increase in seed-containing mature fruit *(Figure 2)*, which is a promising sign for the next generation of trees.

What's next?

While the surveys showed improvements in the trees condition, possibly due to the water, overall the general health of trees along Crystal Brook Creek remains below average, with the leaf canopy cover less than expected for healthy trees. This is indicative of the longer-term water stress they have experienced, with the severity increasing with distance downstream.

Follow-up environmental watering will be required to maintain the improvements within the watered sites, and to prevent further declines within the non-watered sites.

However, the possibility of future water releases depends on climatic conditions, as it is necessary to have a series of high rainfall years to ensure an adequate level of water in the reservoir. The 2021 trial release was only possible due to the accumulation of multiple years of inflows into the reservoir.

Heavy rains during winter and spring of 2022 replaced the reservoir water used in 2021,

making a top-up water release possible. Released in November 2022, it capitalised on the high natural flows that reached far into the downstream sections of the creek.,

The Northern and Yorke Landscape Board will continue to work with its water release partners and the local community to seek and progress future water releases. In addition, the Board is keen to support local groups with their on-ground efforts, potentially through grant funding. Projects that promote successful regeneration of seedlings and saplings will support the next generation of trees and ensure the future of this unique river red gum community.

More information

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