Photo by Todd AW

Crystal Brook Tree Condition Surveys

November 2023 – October 2025

LANDSCAPE SOUTH AUSTRALIA NORTHERN AND YORKE

Project Context

Data is collected and evaluated in the context of the ‘Environmental and Cultural Flows’ project, which specifies the objectives of:

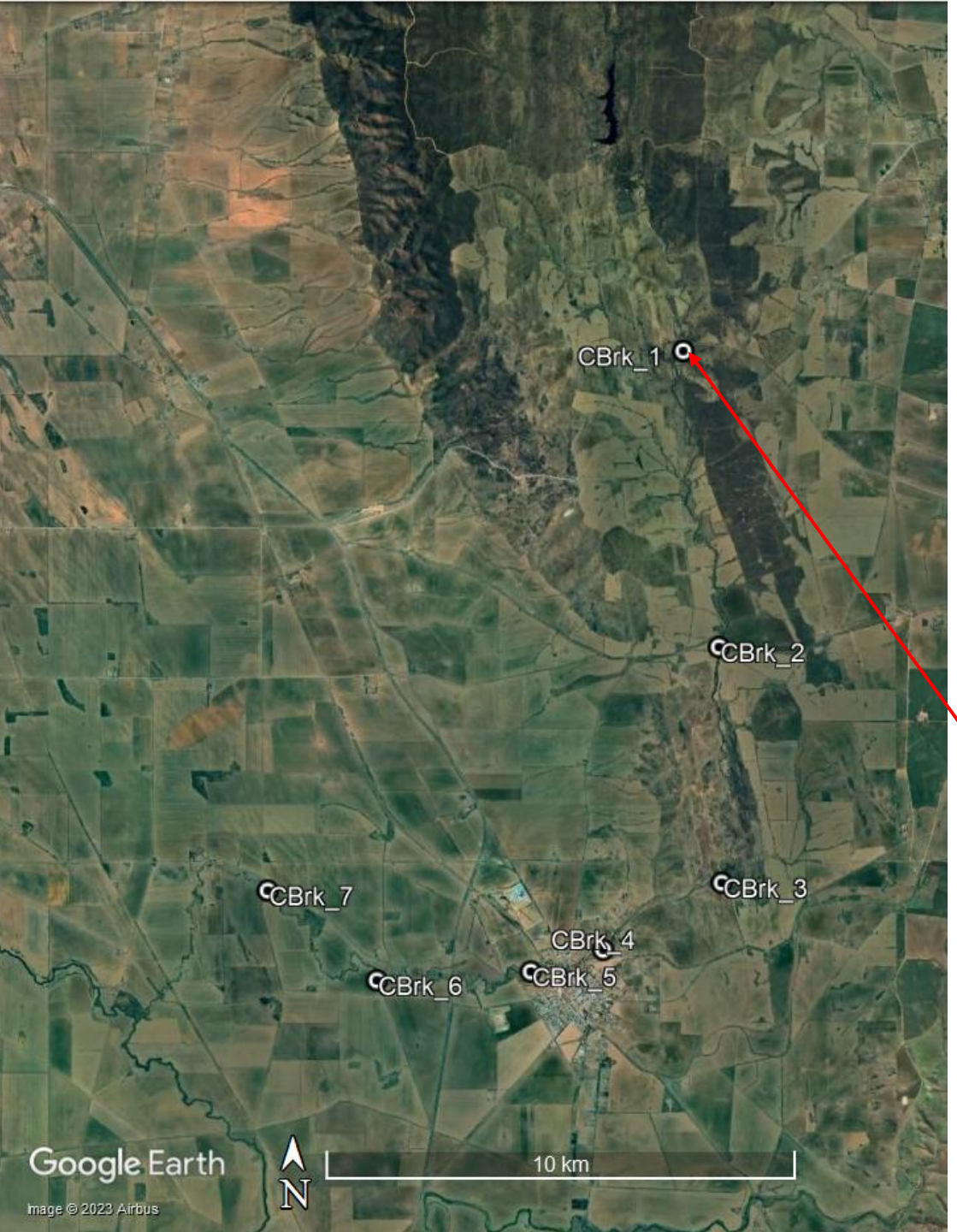
- ***Increased health of water-dependent ecosystems and cultural sites and values restored through scheduled water releases at Barossa, Baroota and Beetaloo***

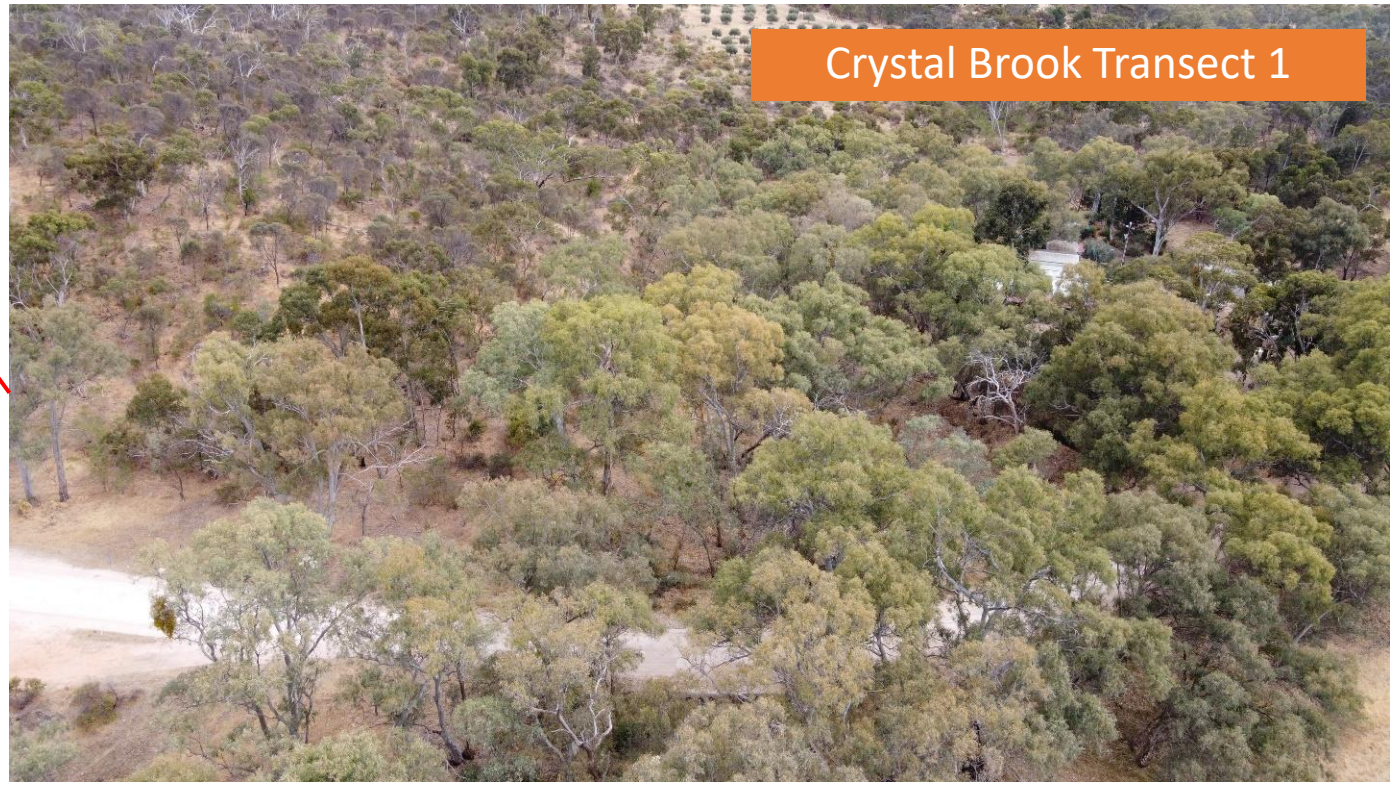
- ***Increased knowledge of hydrological requirements to maintain the health of these water-dependent ecosystems***

What: Visual assessment of River Red Gum condition

Where: 7 condition monitoring sites downstream of reservoir

When: Nov 2023, Nov 2024, Oct 2025





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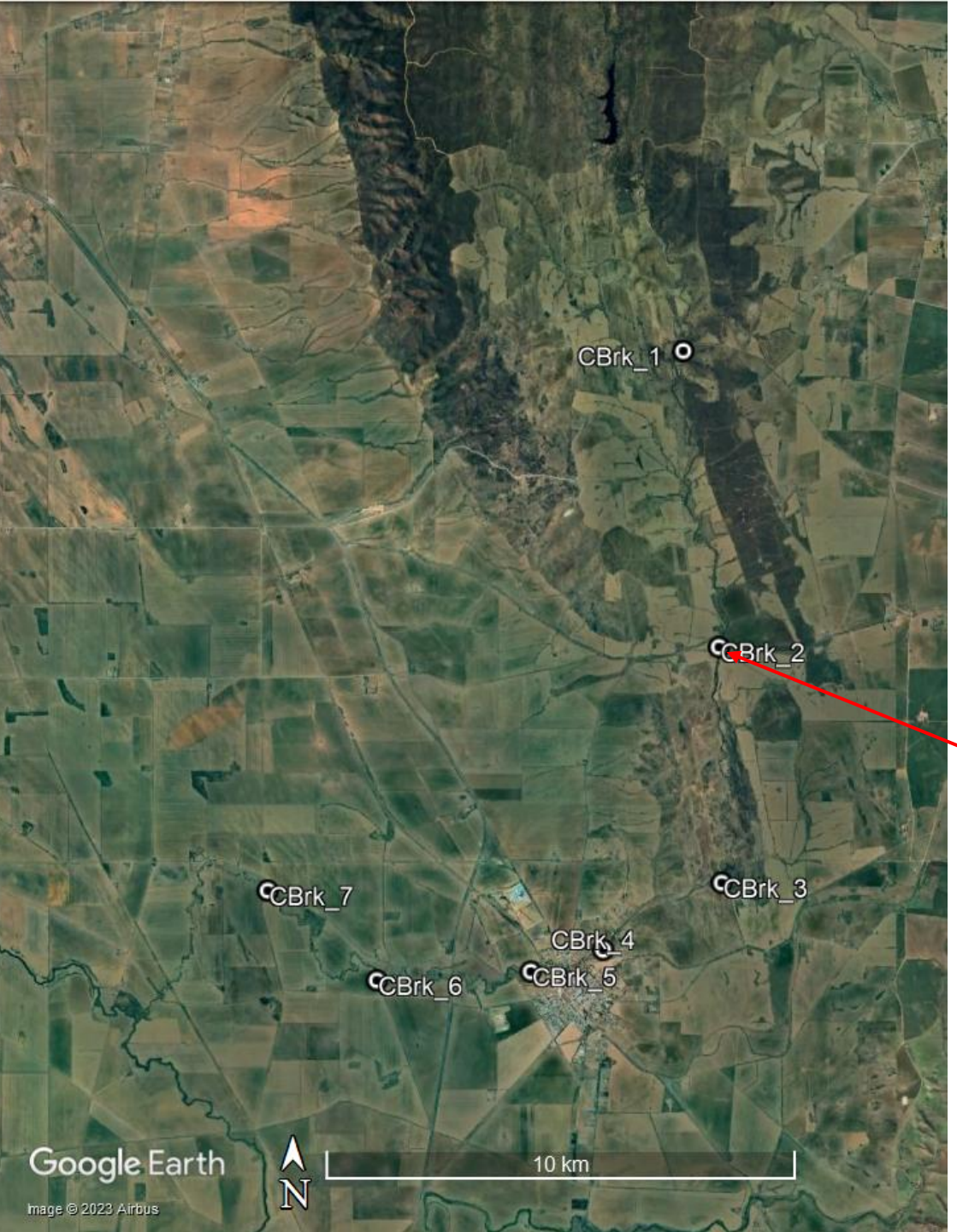

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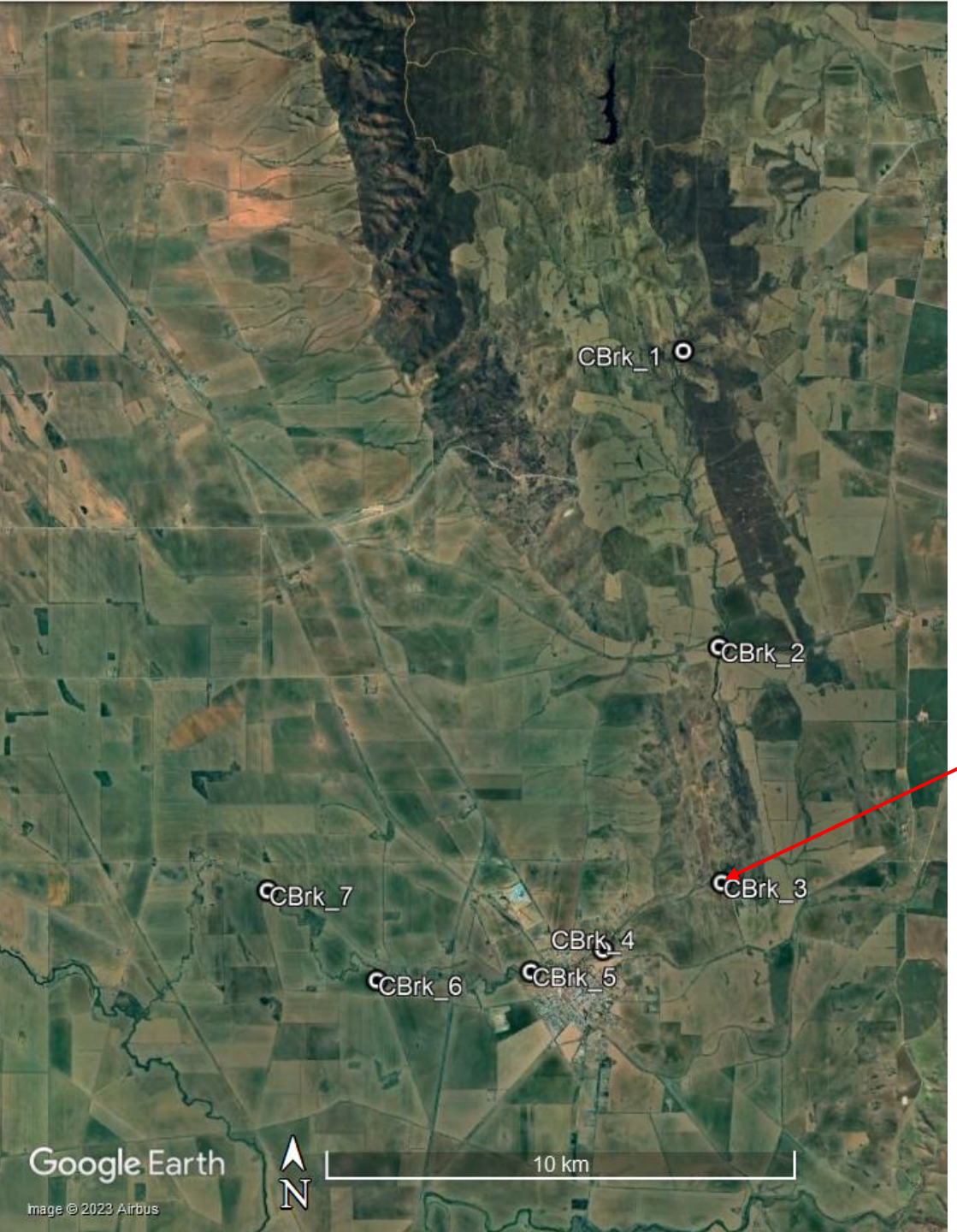

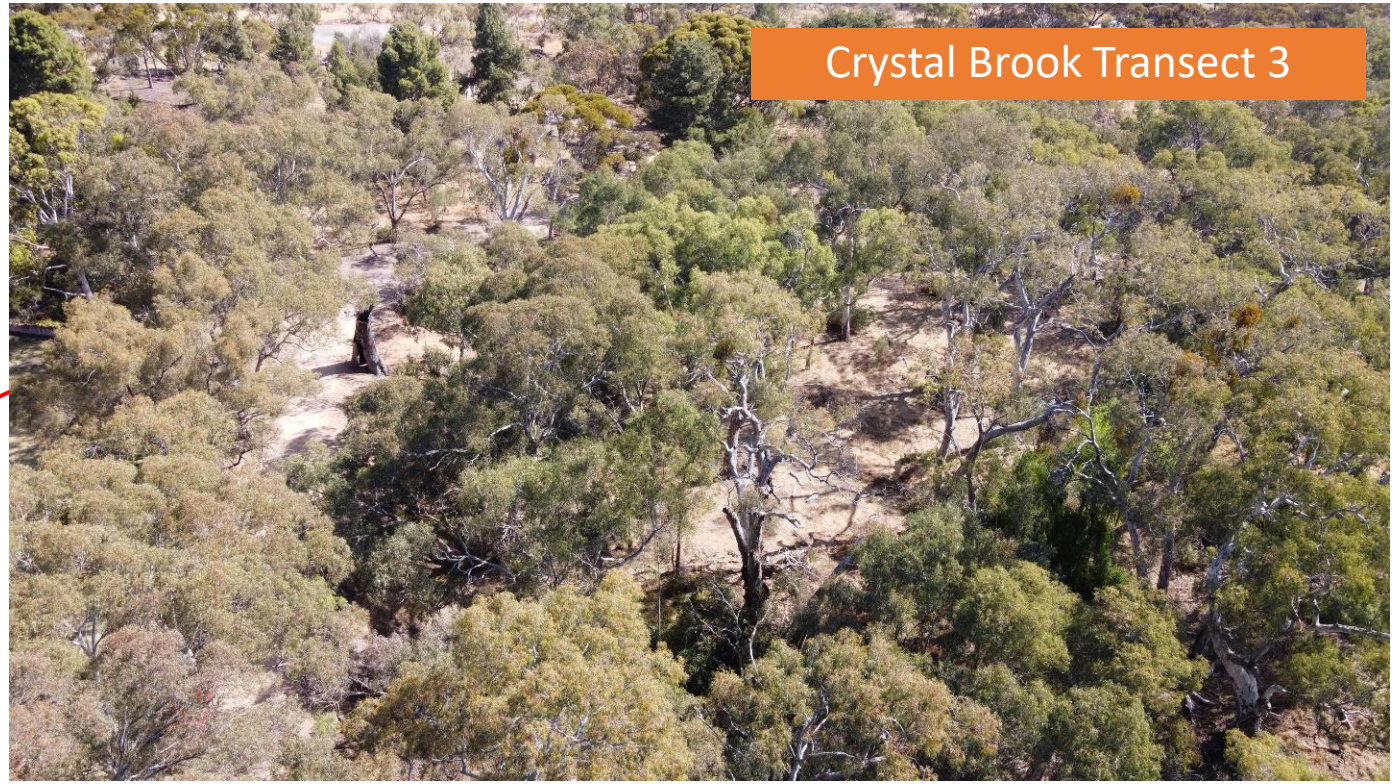

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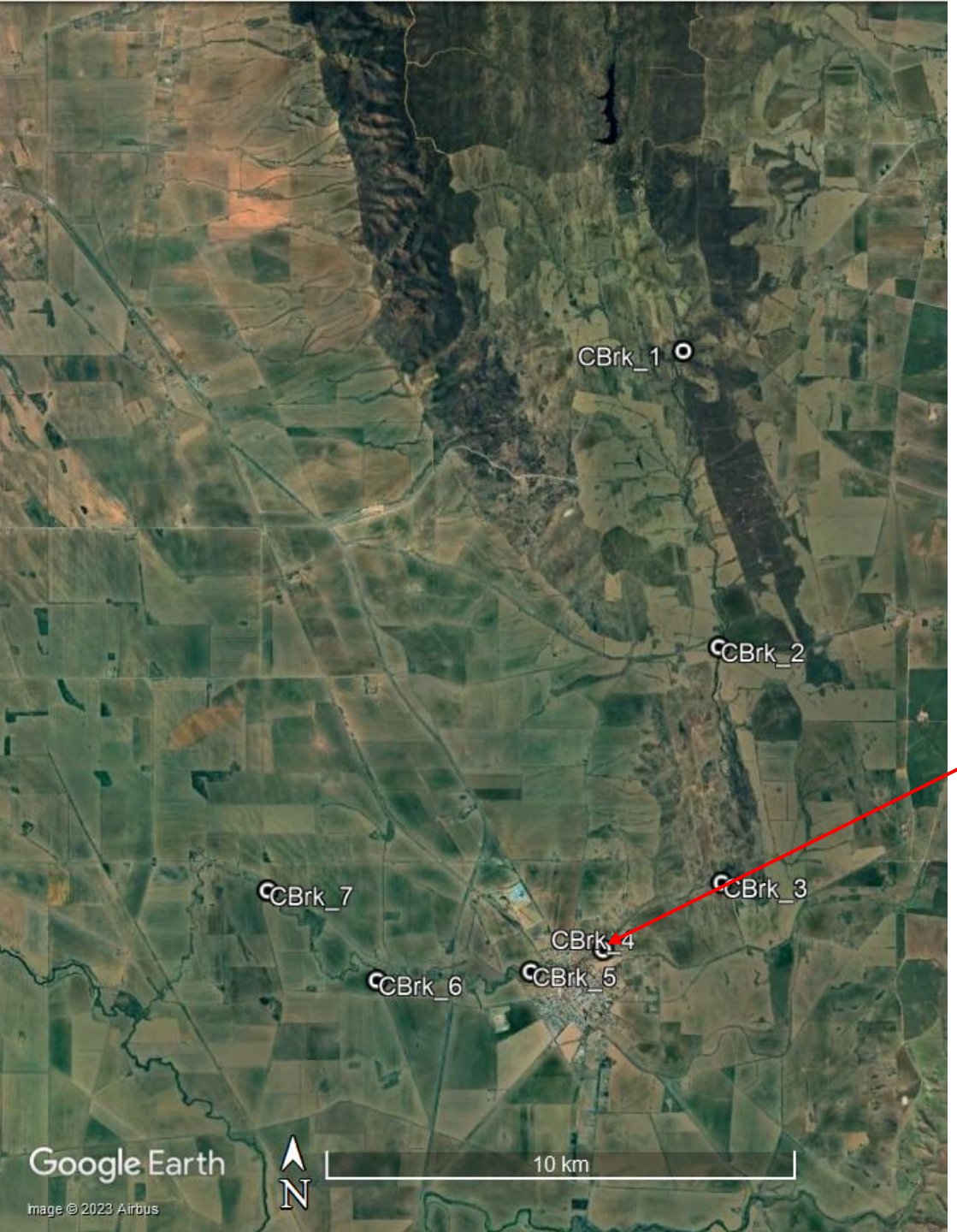

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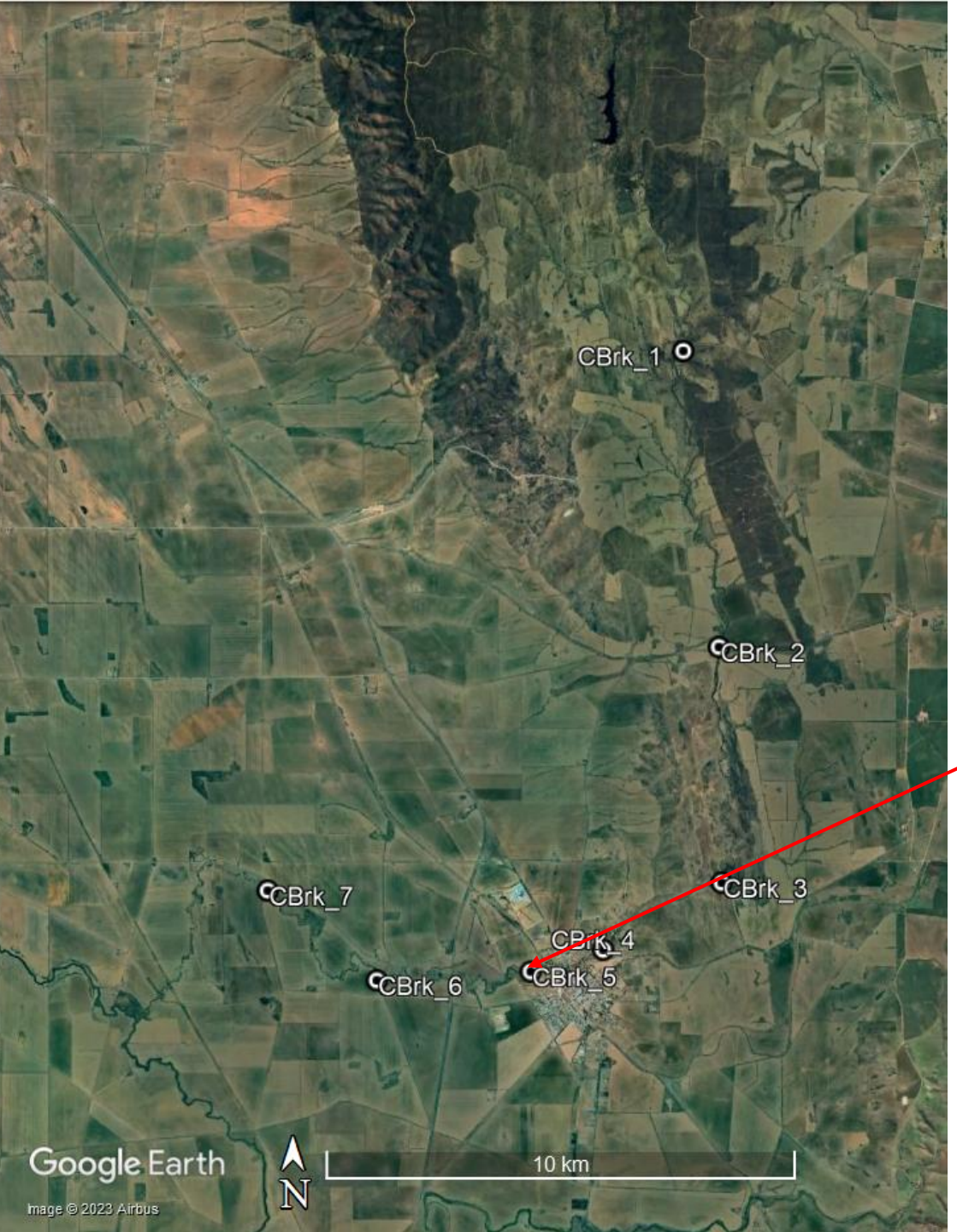

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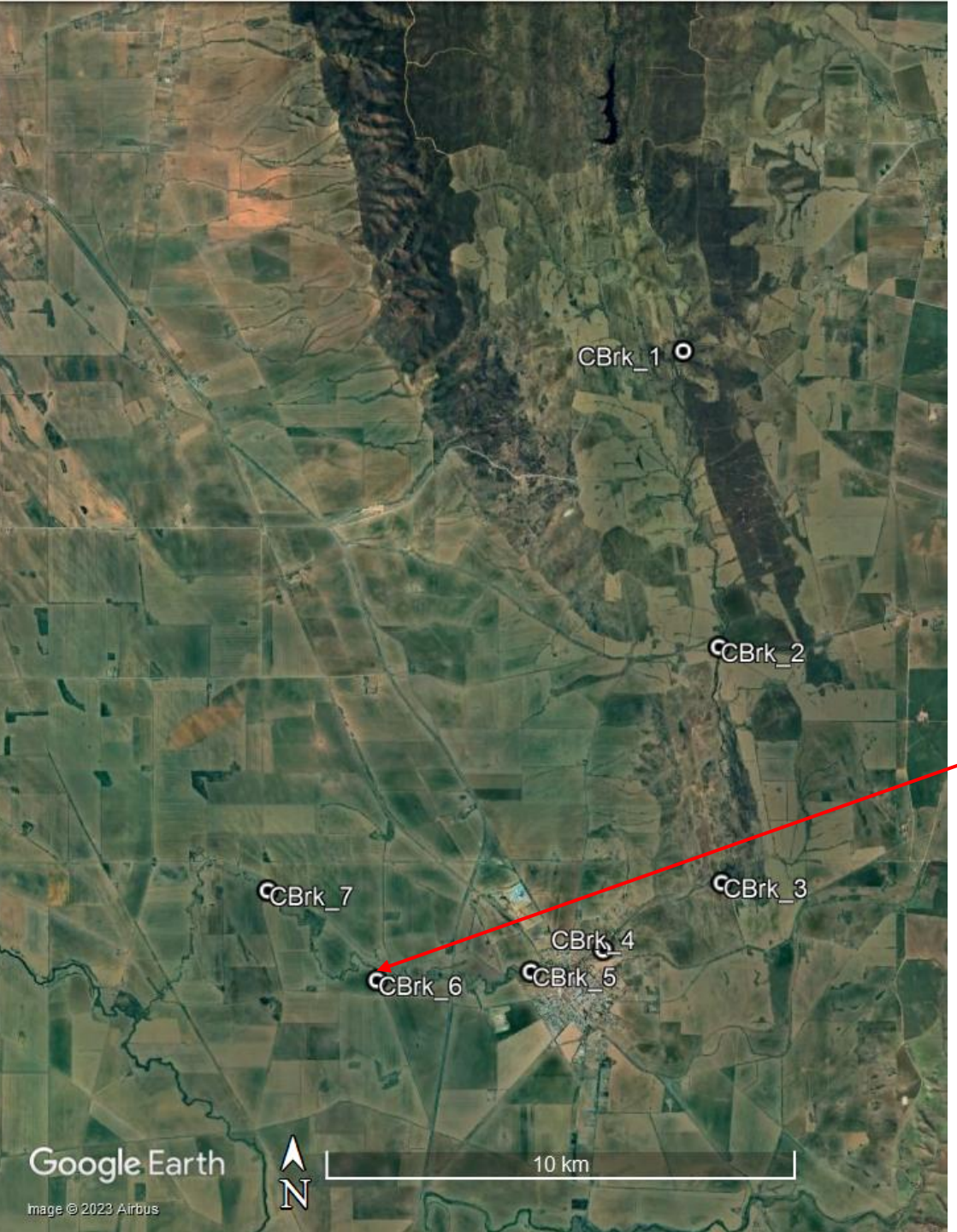

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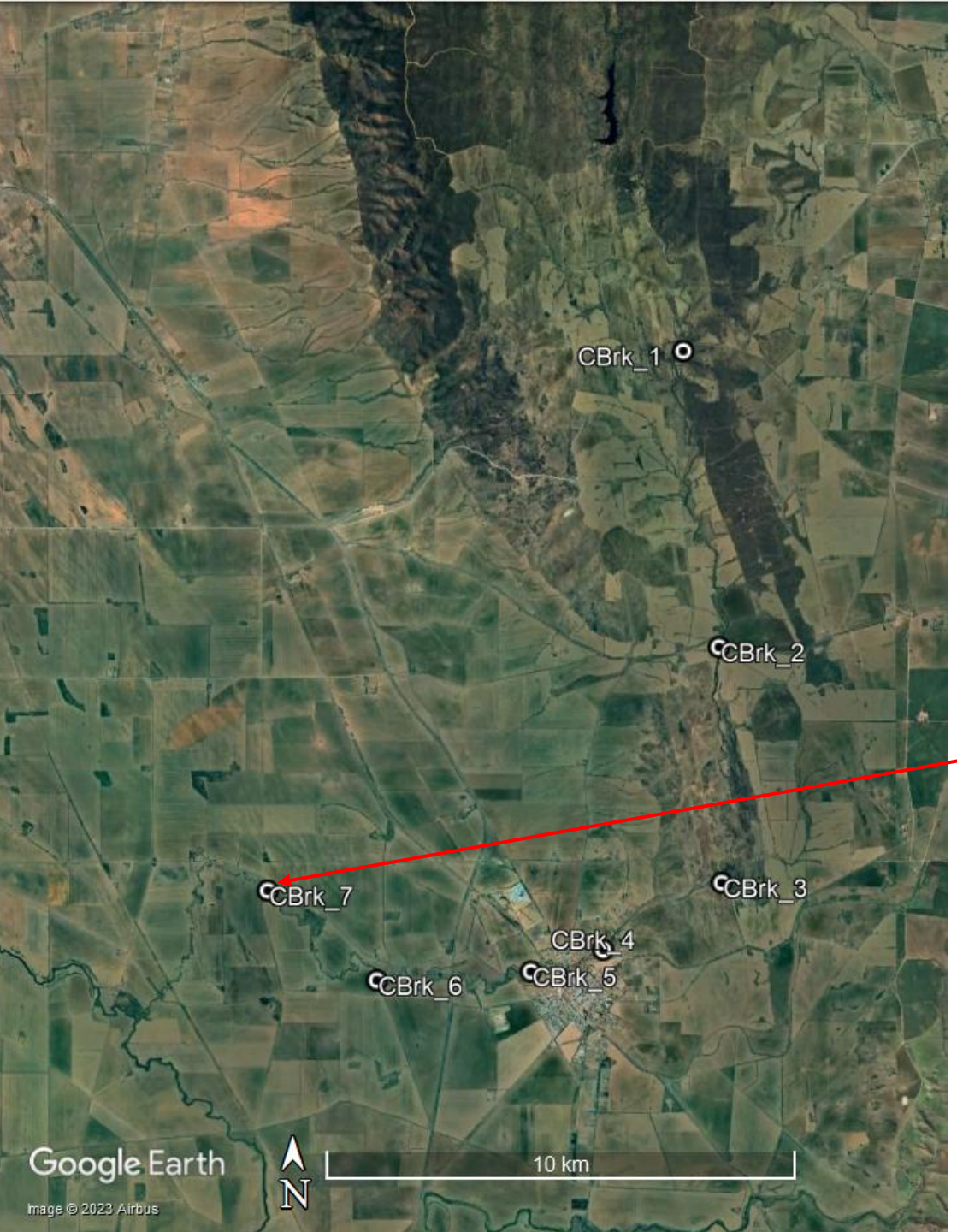

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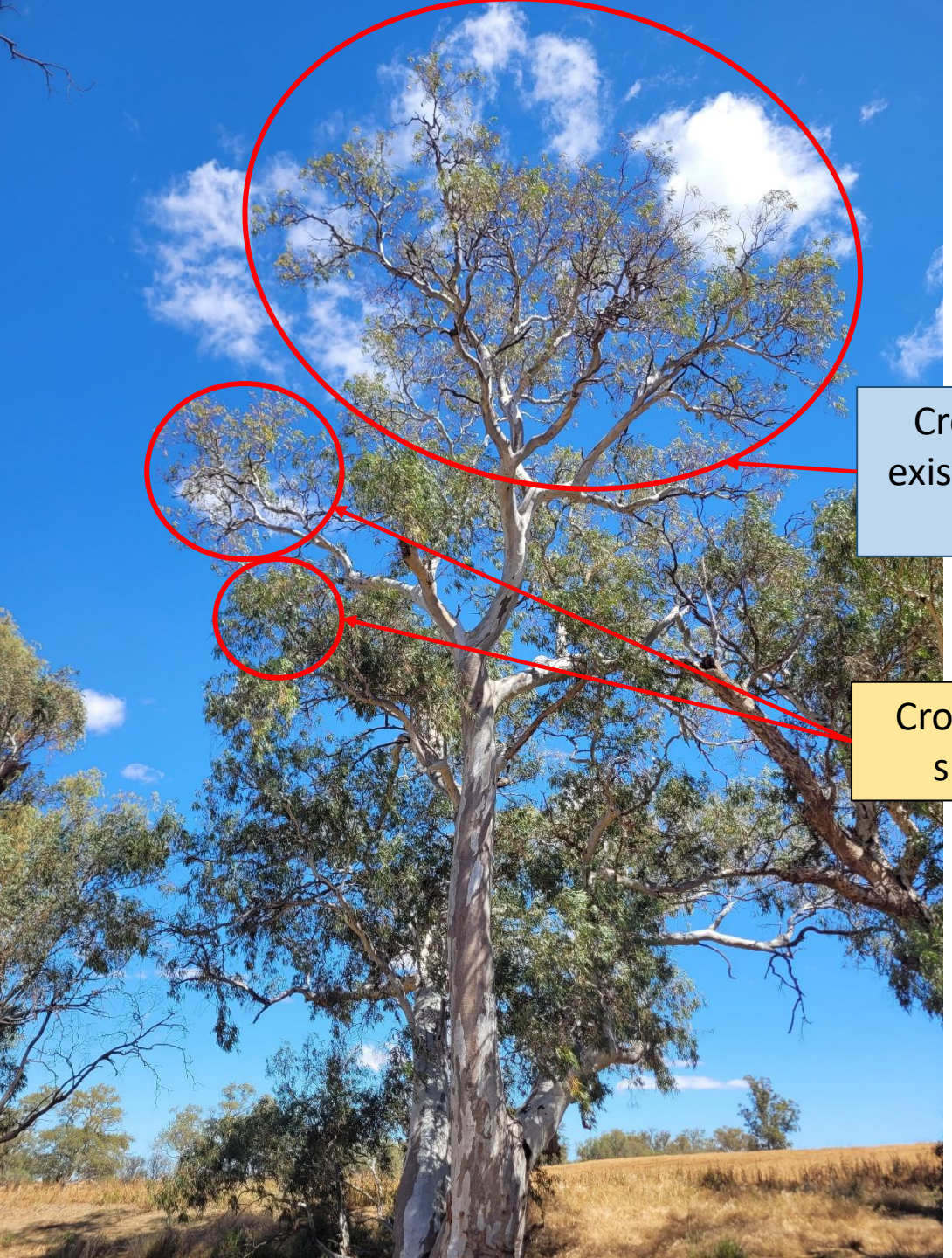


How:
- 30 trees per site
- assessment of Crown Extent and Crown Density
- indicator of tree vigour

Crown Extent (CE) = % of existing branching structure supporting foliage

Crown Density (CD) = % of sky blocked by foliage

→ Tree Condition Index (TCI = CE + CD)

Why: Assess and report condition (change over time) relative to:
- Ecological Target,
- Asset Condition Limit, and
- Management Threshold for delivery of environmental water

Conceptual model of stress-recovery (state transition model) for riverine eucalypts

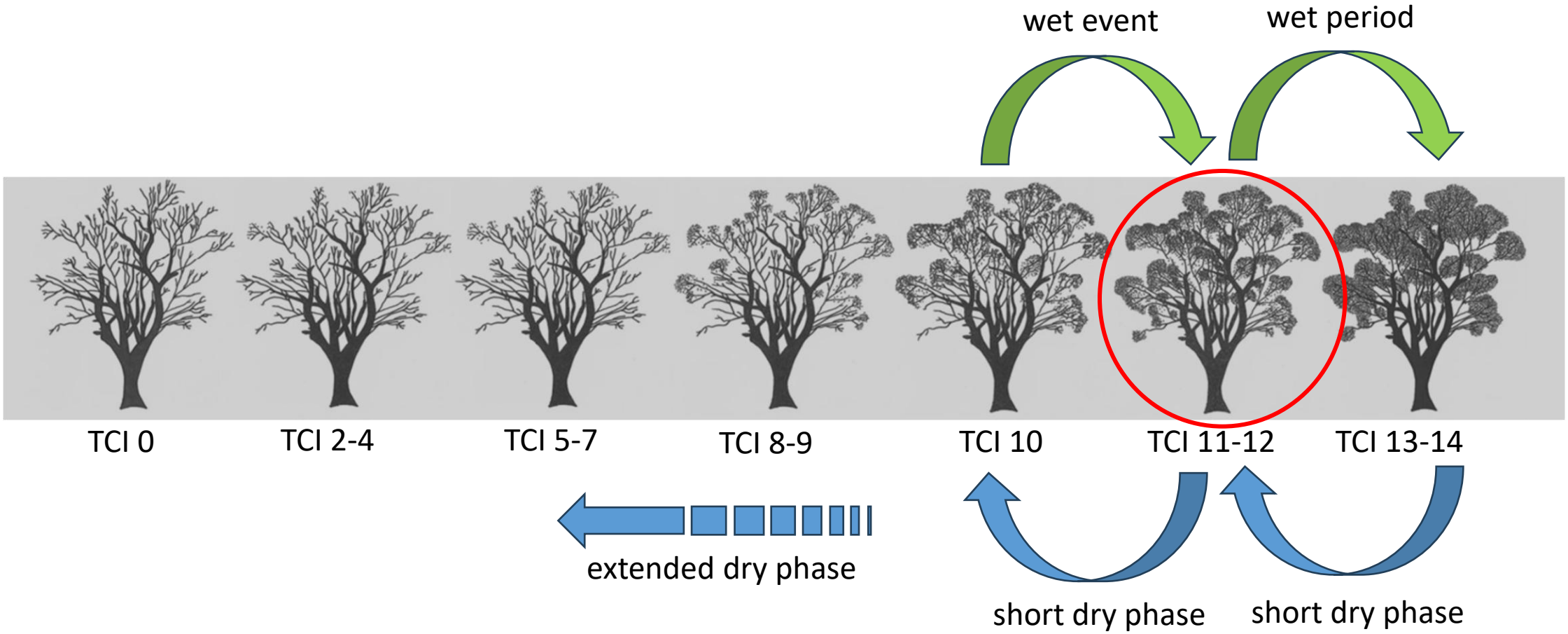
TCI 8-9 TCI 10 TCI 11-12 TCI 13-14

The benchmark condition for “desired” stable state is taken to be a TCI score of ≥12:

- a crown extent of ≥95% (CE score = 7)
- a crown density of ≥75% (CD score ≥5)

Tree images from Souter et al., (2010)

Conceptual model of stress-recovery (state transition model) for riverine eucalypts



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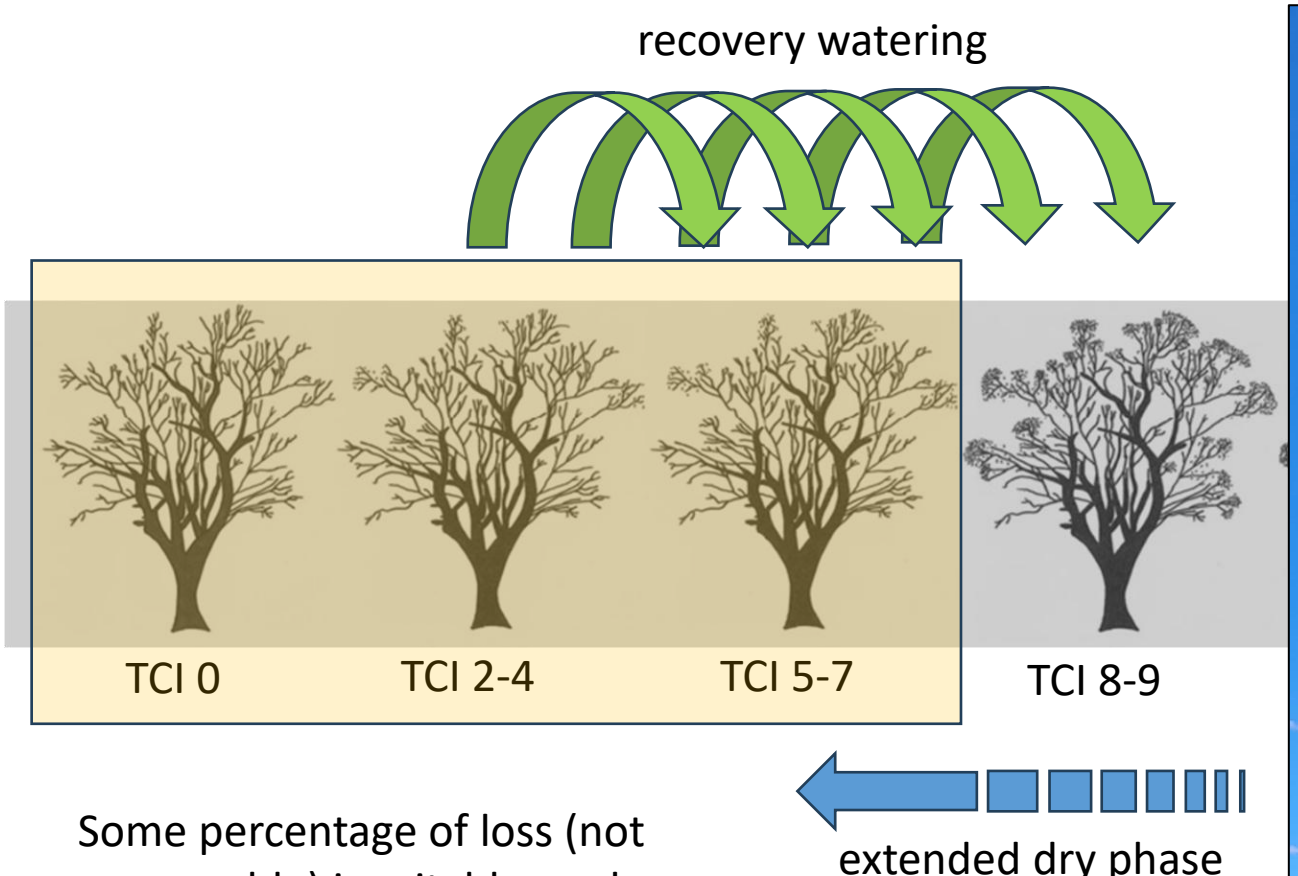


Some percentage of loss (not recoverable) inevitable, and a decline in functional habitat; semi-permanent inability to achieve benchmark condition

Rating of condition of individual sites

Environmental Target: 90% of the river red gum trees need to maintain a TCI of ten or greater

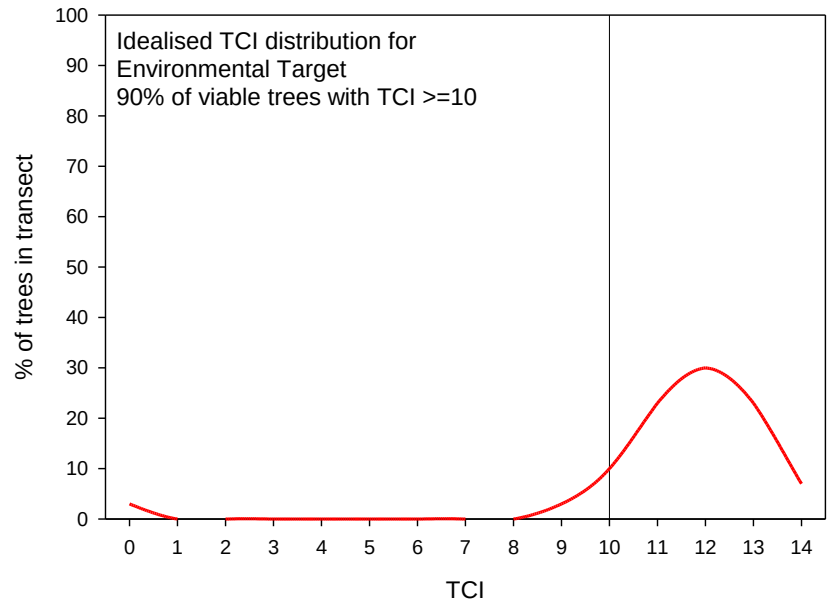
If the trees are failing the target, then additional watering should be considered

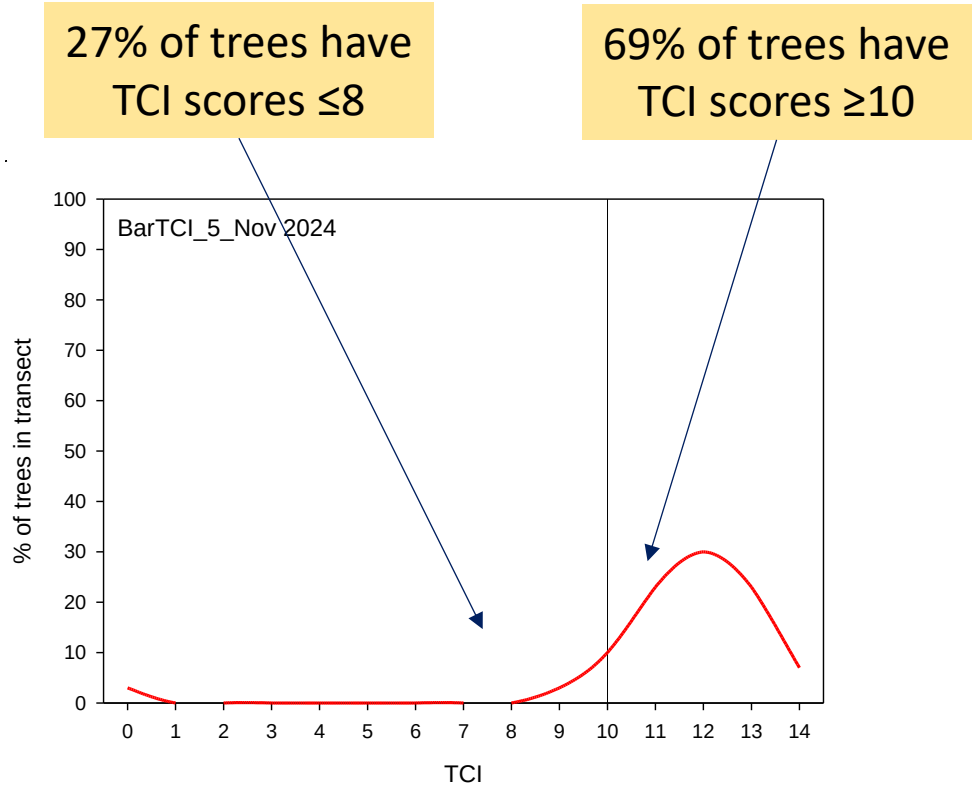
Asset condition limit: At least 80% of the trees to have a TCI of greater than eight

Should this limit be breached, the time since previous inundation or watering event is irrelevant and an EWP should occur by the end of the following winter (NYLB 2022).

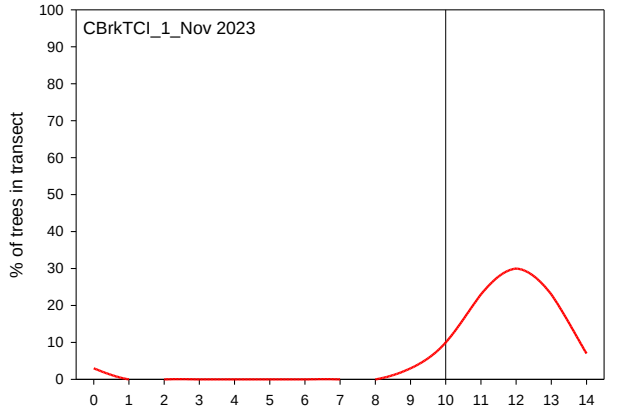
Management Threshold: More than 10% of established viable trees with DBH > 10 cm receive TCI scores ≤8

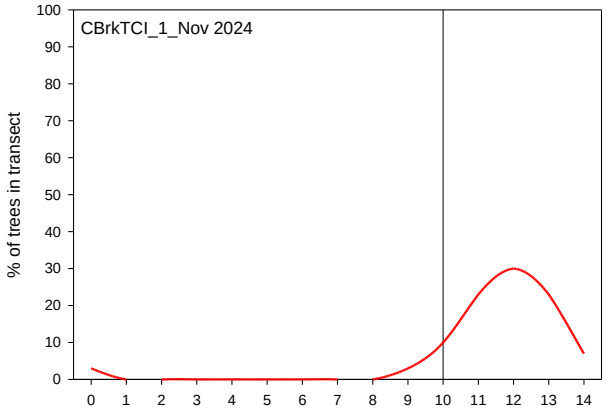
Threshold that triggers earlier action, to limit the potential for long-term or potentially irreversible damage, and improve the potential to achieve, and subsequently maintain the Ecological Objective

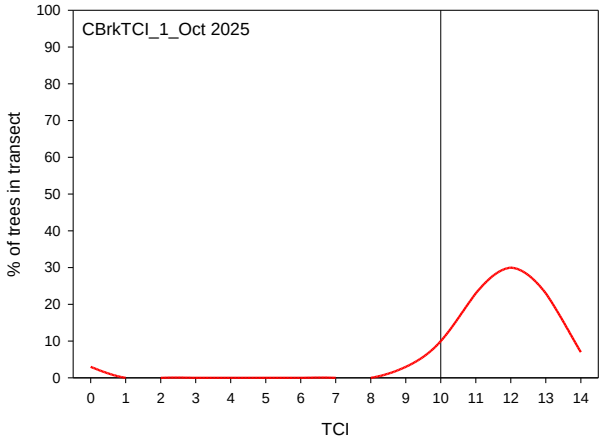




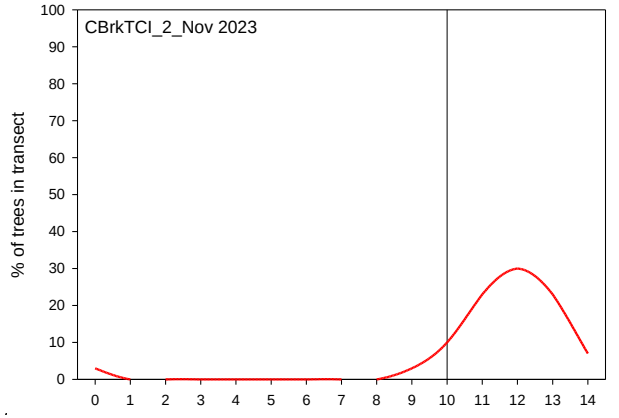
Crystal Brook Transect 1

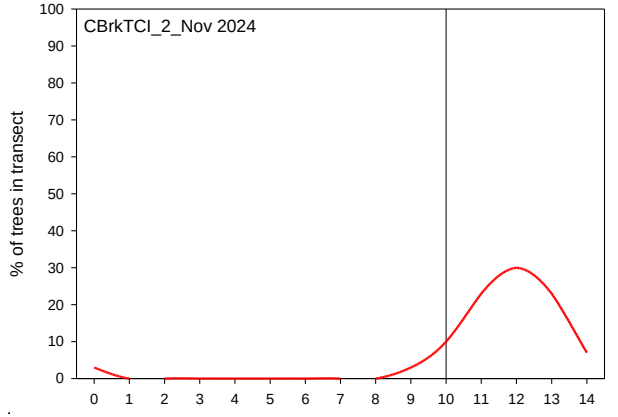


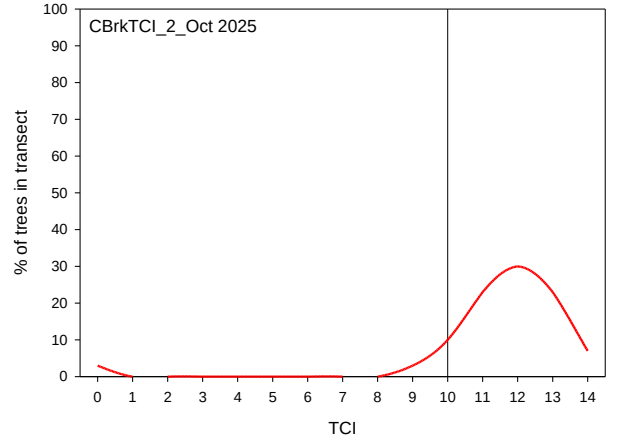




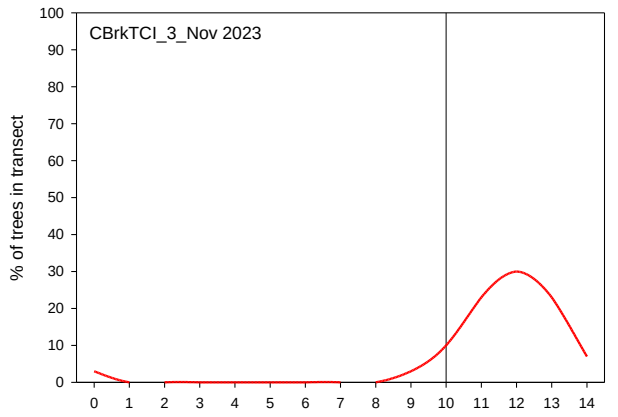
Crystal Brook Transect 2

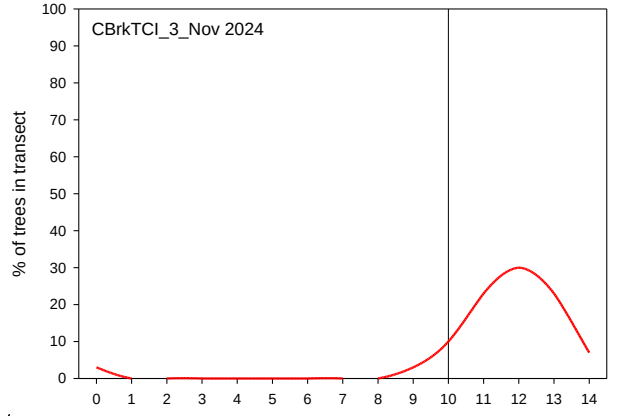


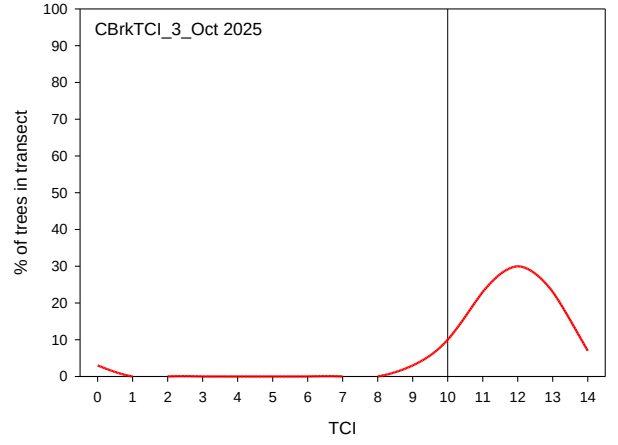




Crystal Brook Transect 3







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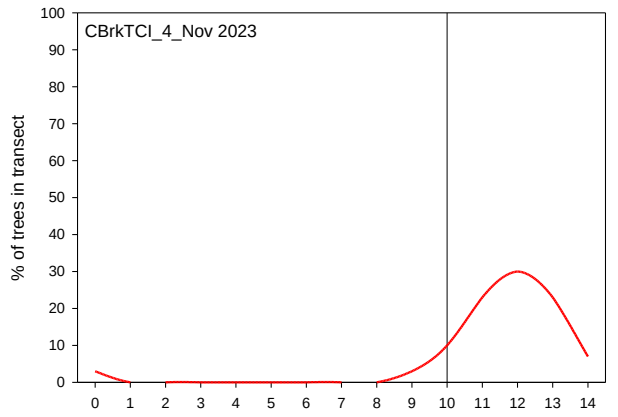

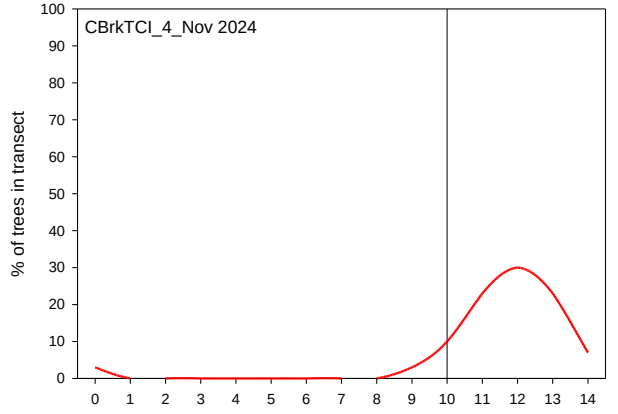

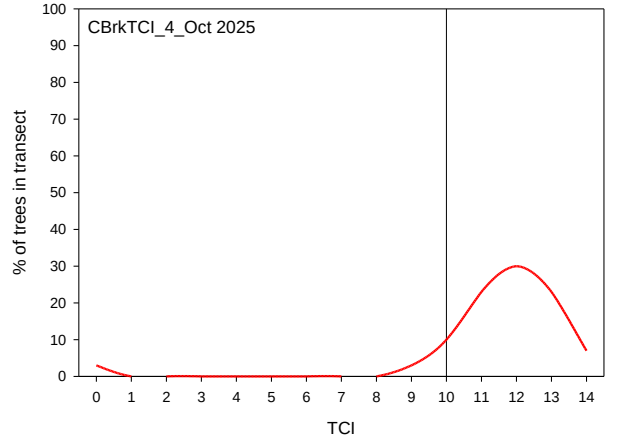

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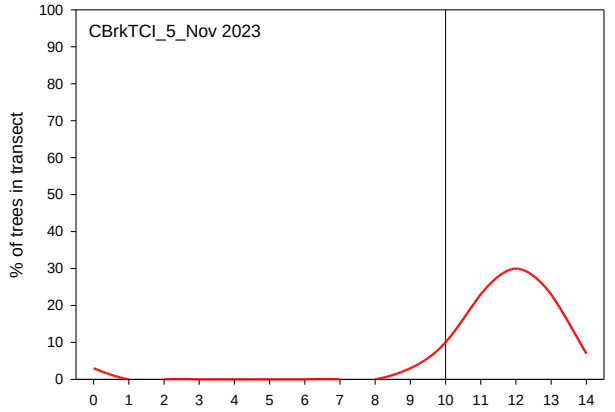

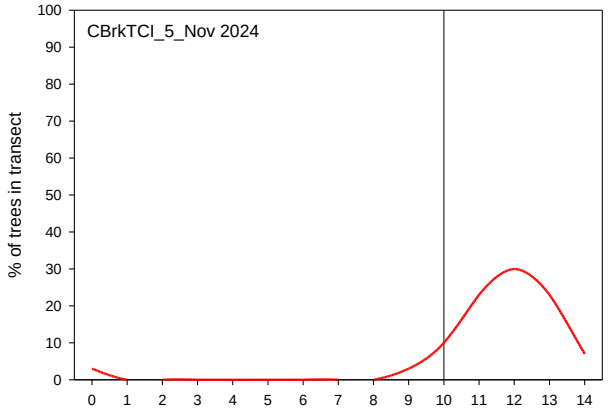

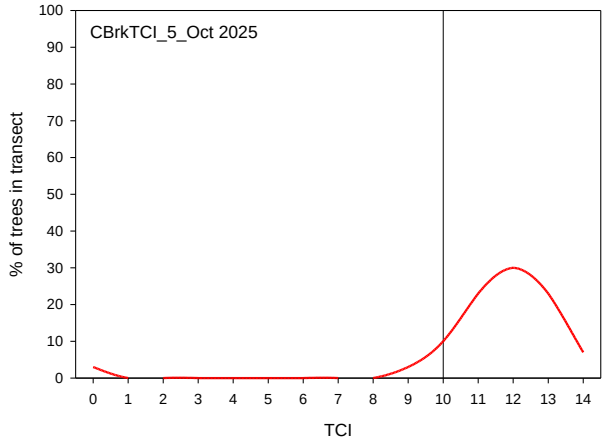

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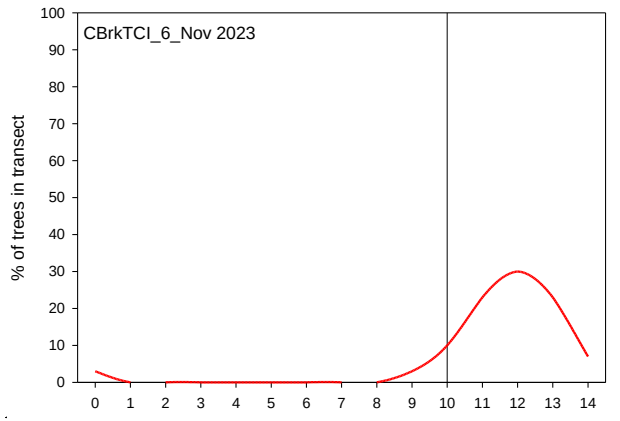

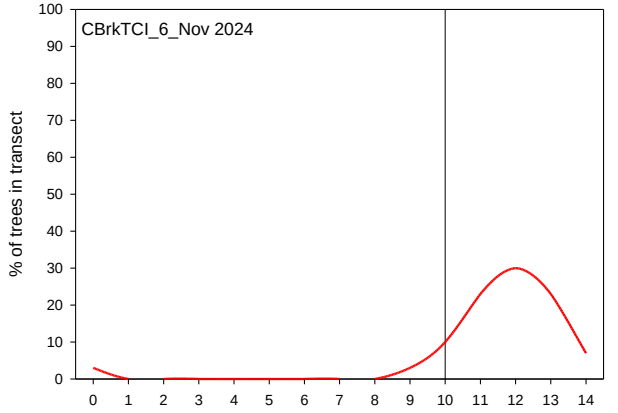

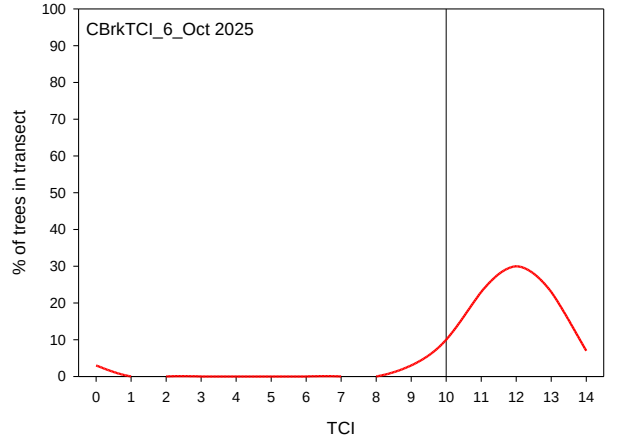

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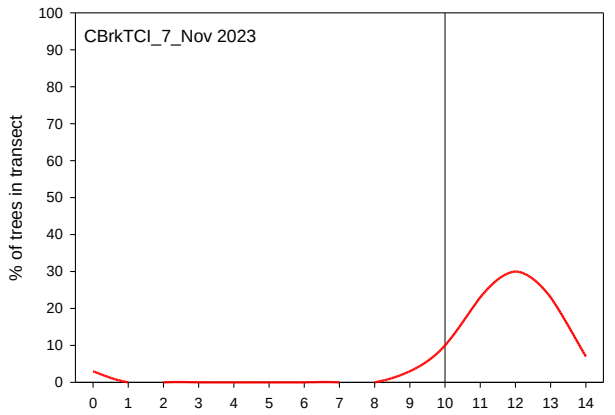

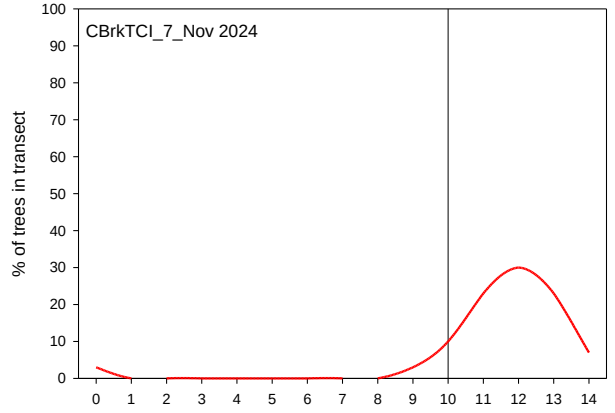

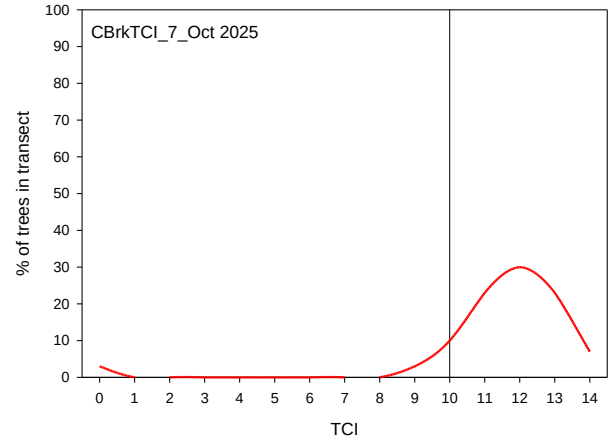

Environmental Target: 90% of the river red gum trees need to maintain a TCI of ten or greater

If the trees are failing the target, then additional watering should be considered

Transect	Nov-23	Nov-24	Oct-25
CBrkTCI_1	88	100	100
CBrkTCI_2	79	83	90
CBrkTCI_3	86	93	93
CBrkTCI_4	79	86	86
CBrkTCI_5	100	100	100
CBrkTCI_6	93	93	93
CBrkTCI_7	97	100	97

Asset condition limit: At least 80% of the trees to have a TCI of greater than eight

Should this limit be breached, the time since previous inundation or watering event is irrelevant and an EWP should occur by the end of the following winter (NYLB 2022).

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CBrkTCI_1	100	100	100
CBrkTCI_2	100	100	100
CBrkTCI_3	100	100	100
CBrkTCI_4	93	97	97
CBrkTCI_5	100	100	100
CBrkTCI_6	97	97	97
CBrkTCI_7	100	100	100

Management Threshold: More than 10% of established viable trees with DBH > 10 cm receive TCI scores ≤8

Threshold that triggers earlier action, to limit the potential for long-term or potentially irreversible damage, and improve the potential to achieve, and subsequently maintain the Ecological Objective

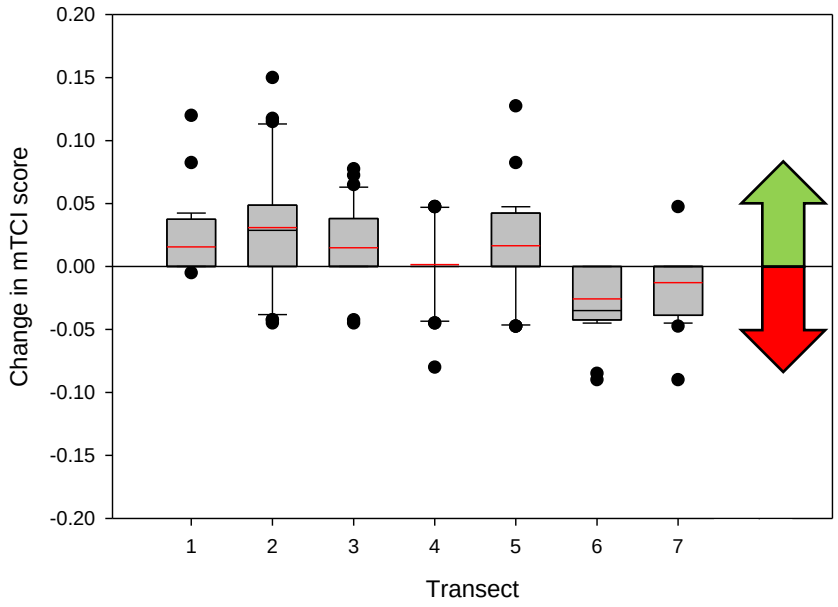
Transect	Nov-23	Nov-24	Oct-25
CBrkTCI_1	0	0	0
CBrkTCI_2	3	0	0
CBrkTCI_3	4	4	0
CBrkTCI_4	10	7	7
CBrkTCI_5	0	0	0
CBrkTCI_6	7	7	7
CBrkTCI_7	0	0	0

No tree mortality in 2023, 2024 or 2025

Next steps

- Flows have been effective
- Evidence of tree growth (diameter)
- Note crown “thinning” at sites 6 and 7 between 2024 and 2025
- Why is site 4 different (not meeting target)?
- Support recruitment flows:
  - no trees <50cm DBH at sites 6 and 7
  - flowering noted in November 2024
  - bud formation in October 2025

Trajectory: change in mTCI scores for trees between 2024 and 2025 surveys



Acknowledgments

"I acknowledge First Nations people as Australia's first ecologists. They made observations, formed theories, and experimented to understand the relationships between climate, chemistry and biology, and found ways to care for our unique country for thousands of generations. I respect elders past and present and appreciate the deep value of their knowledge."

Nukunu people – care of country, site access, participation in training workshops
Landholders - site access
Jennifer Munro – Project Management
Dr Eddie Banks – project cross-over and collaboration

LANDSCAPE SOUTH AUSTRALIA NORTHERN AND YORKE

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