



DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

The Thirlmere Lakes Research Program

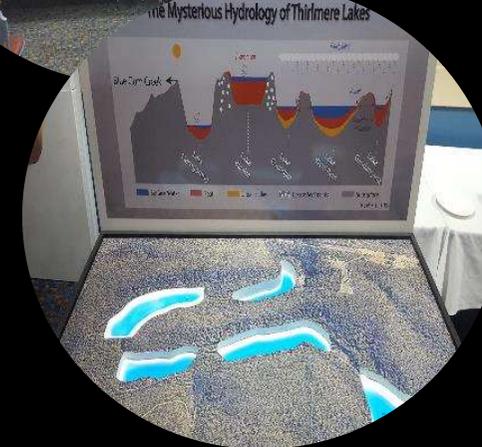
Where are we at February 2021?

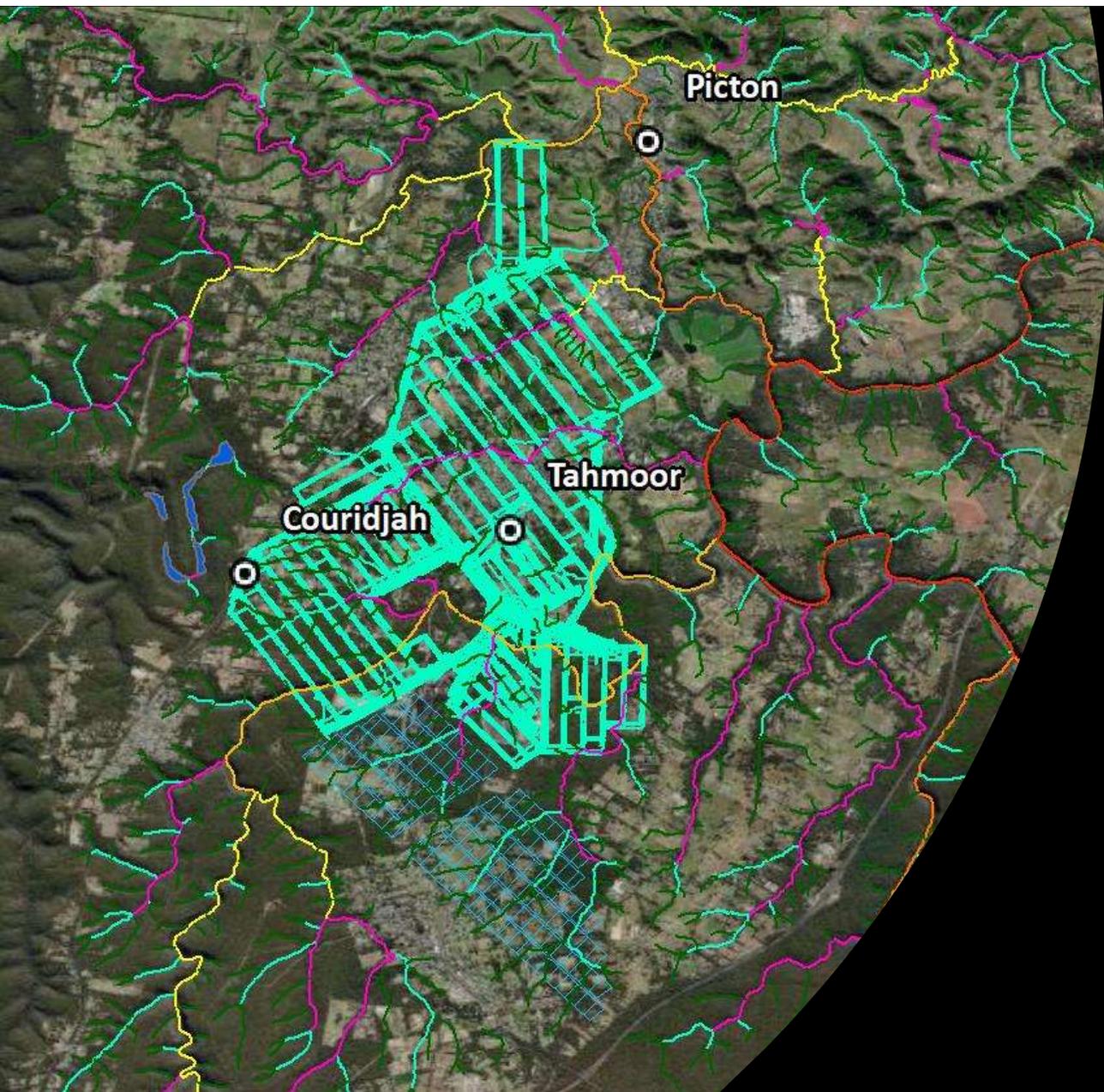




Thirlmere Lakes Research Program

- Instigation for program
 - Recent water level declines
 - Community concern
- OEHD/DPIE committed \$1.9million over 4 years to understand;
 - hydrological dynamics of the lakes system
 - Potential effects of mining activity and groundwater extraction
- Research partner collaborations with UNSW, UOW, ANSTO





Thirlmere Lakes & Proximity of Mining



Thirlmere Lakes Research Program

Five research themes include:

- Geology
- Environmental isotopes
- Geomorphology
- Surface water-groundwater interactions
- Water balance budgets





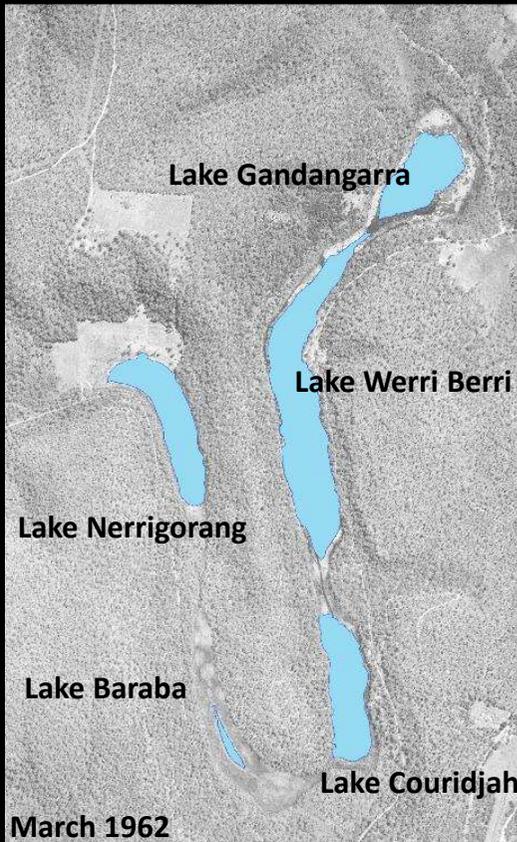
2020 Achievements

- Geology – Seismic transects Lake Nerrigorang & Lake Gandangarra
- Environmental isotopes – additional isotope sampling around Lake Baraba
Spring 2020 and intensive rainfall and runoff sampling program during February 2020 rain event
- Geomorphology – Deep Drilling Lake Nerrigorang Track and Dry Lakes Road
- Surface water-groundwater interactions – Extensive surveying of piezometer network by UNSW surveying students to obtain accurate AHD levels
- Water balance budgets – Successful surface water budget modelling together with calibration with isotope data



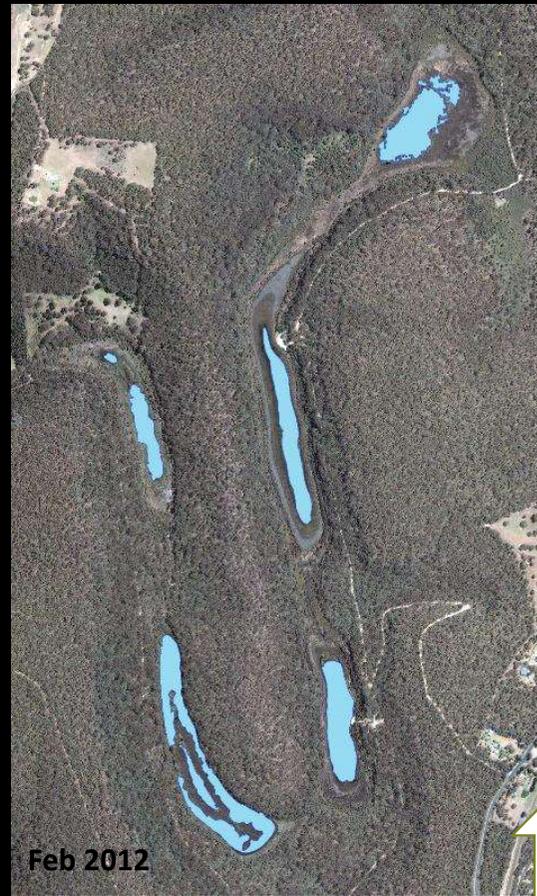


A Pictorial History of Lake Water Levels





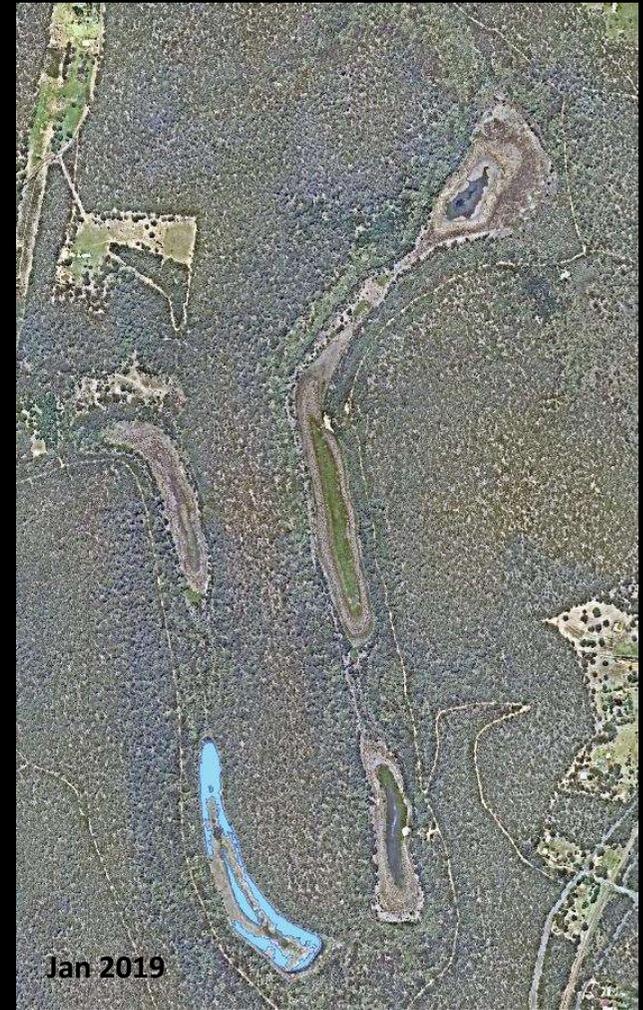
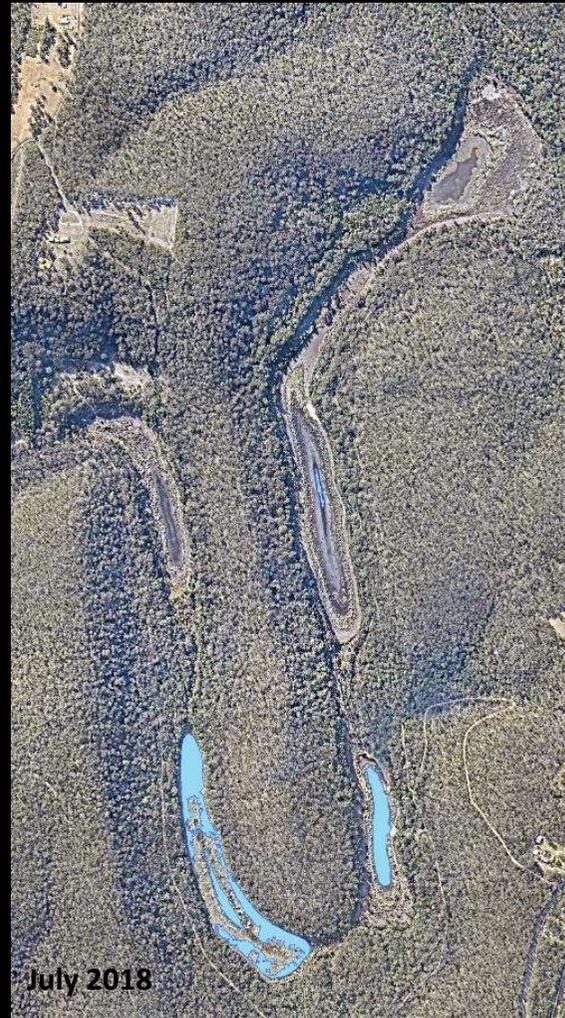
A Pictorial History of Lake Water Levels



Real time water level monitoring starts 2014

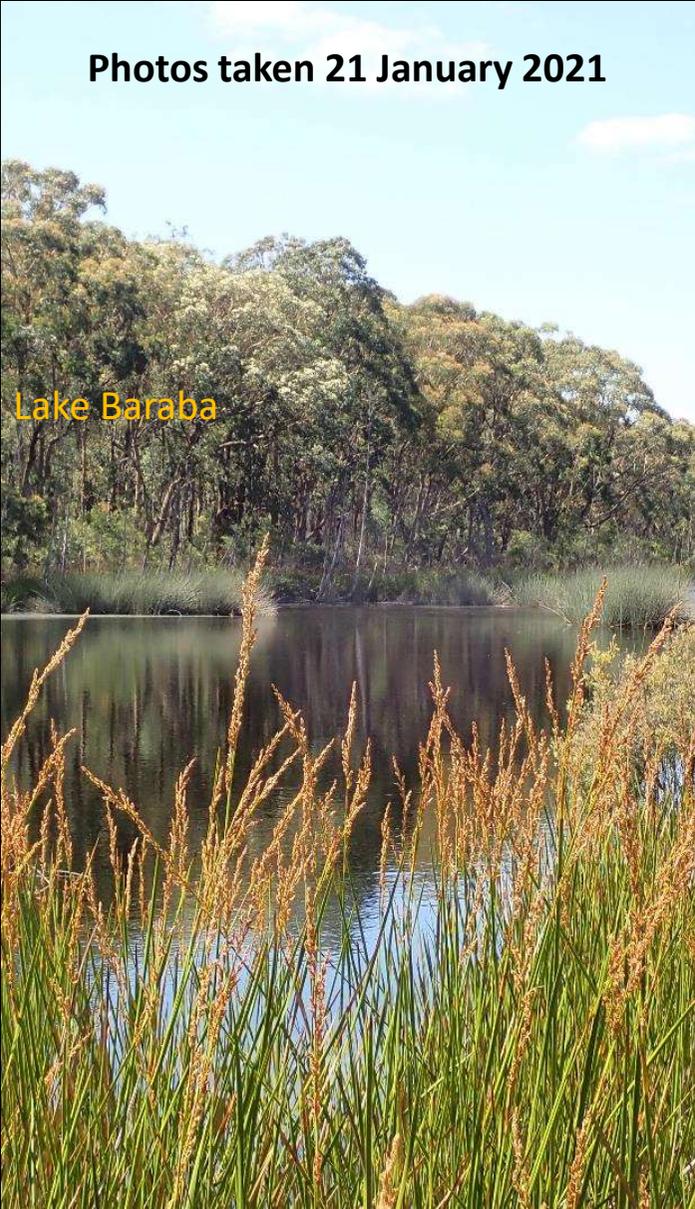


A Pictorial History of Lake Water Levels



Photos taken 21 January 2021

Lake Baraba



Lake Nerrigorang



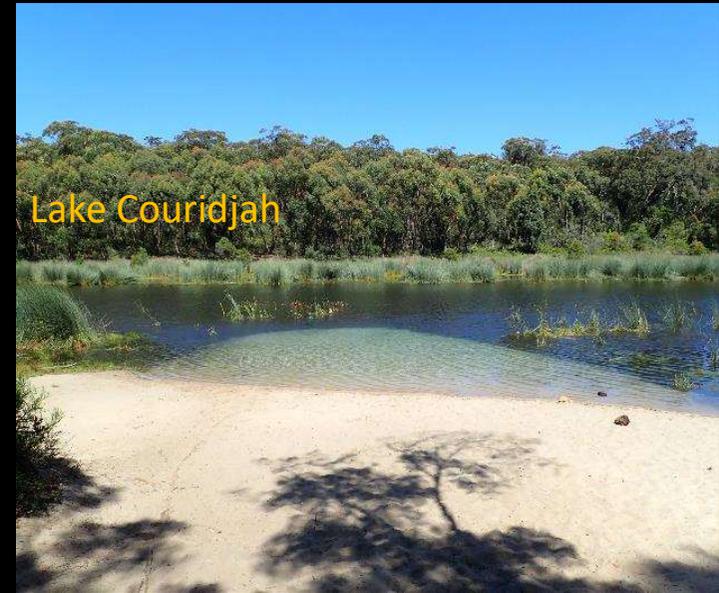
Lake Werri Berri



Lake Gandangara



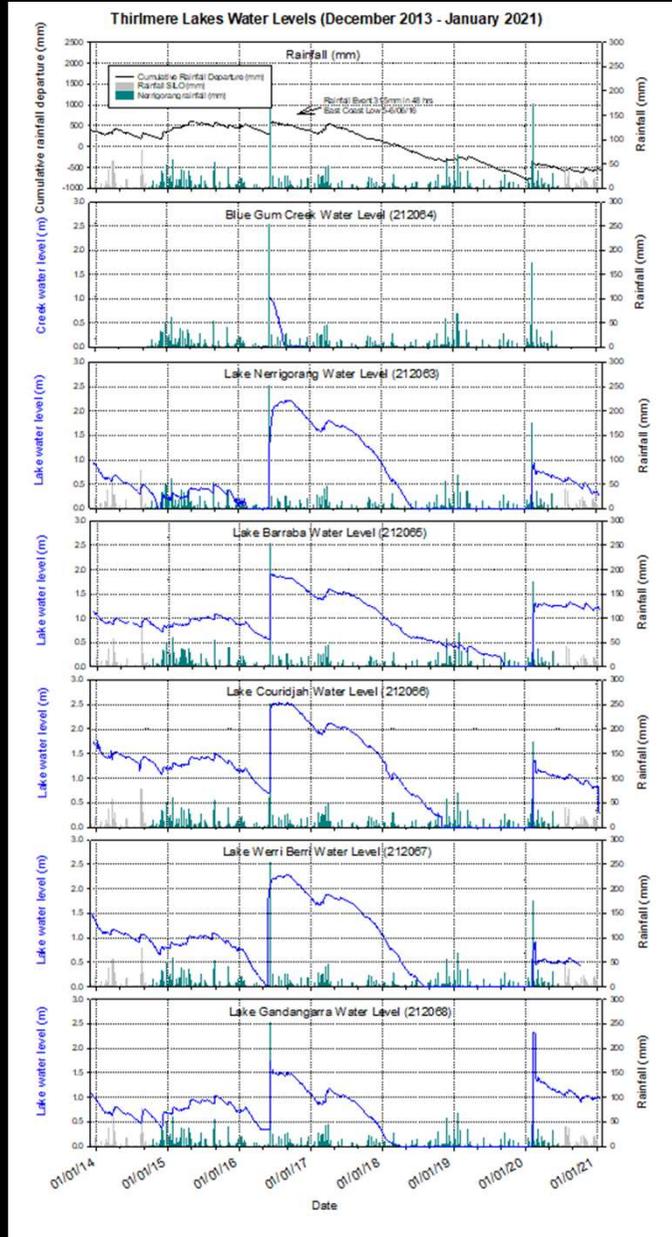
Lake Couridjah





After reasonable rain events in the lead up to Christmas 2020, Thirlmere Lakes continues to hold water and the vegetation and fauna appear to be in relatively good condition. Nevertheless, the lakes could still do with more water.

Whilst the COVID-19 situation presented some barriers to fieldwork, further research continued to be undertaken in Spring 2020 and lake water levels continue to be monitored.



Water Levels Over the Last 12 Months

After water dried out at the surface towards the end of 2019, the February 2020 rain event saw a rise in water levels to over 1m in most lakes. Since that time there has been a continuing decline in water levels and the margin of the lakes are again retreating.

Lake Baraba, however, is again doing things slightly different to the other lakes and has had relatively stable water levels for the last few months (about 1.2m above the recording instrument).

Lake Baraba is somewhat unusual!



Further water samples were undertaken by ANSTO Towards the end of 2020 and we now have up to 60 different field parameters, isotopic ratios or chemical analytes measured, with well over 10,000 results above detection limits.

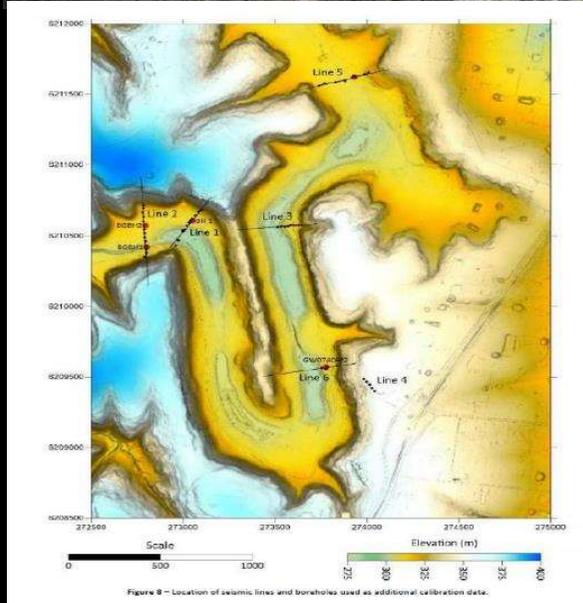
The individuality of the lakes is demonstrated in the behaviour of water stable isotopes in each lake and the length of the hydroperiod (the time the lakes held water); Baraba Lake being the most resilient, reaching desiccation before the February rainfall events and approximately 20 months later than, for example, Lake Gandangarra (Cendon et al 2020). The resilience of Baraba Lake is associated with a number of unique characteristics identified in the geochemical analysis.



Deep Drilling and Seismic Surveys



One of the long standing questions in regards to Thirlmere Lakes has been exactly how deep the bedrock is underneath the sediments in the valley. This was addressed by the University of Wollongong research team recently by undertaking some deep drilling along the Lake Nerrigorang Track and Dry Lakes Road. This was complimented by seismic surveys undertaken with the help of Drs Peter Hatherly and Christian Anibas.



Whilst analysis of the cores and data collected is ongoing, the short answer is that unweathered bedrock in the valley was found at ~30-40m below ground level. The depth of unconsolidated material was greatest at the Lake Nerrigorang end of Thirlmere Lakes (30-40m; 268-282 m AHD). At the Dry Lake/Lake Gandangarra sill the depth of fill was ~15m (295 m AHD).

A net western gradient in the underlying bedrock is suggested, presumably representing past river gradients of the valley prior to uplift and prior to the formation of the lakes (Cohen et al 2020).



Citizen Science verification of wetland vegetation API

As part of the wetland vegetation monitoring program, members of Friends of Thirlmere Lakes (FOTL) trialled the method in 2020 and surveyed on 21/7/20, 28-29/7/20, 8/8/20, 12/8/20 and 12/9/20. These survey locations were mapped. The project was uploaded onto the NSW SEED Citizen Science Hub.

As part of the survey, frog audio also recorded the Common Eastern Froglet (*Crinia signifera*) on 19/6/20, 20/7/20, 21/7/20, 28-29/7/20.

One of the major findings of the wetland vegetation project was that since 2014 terrestrial species such as the flaky-barked tea tree (*Leptospermum trinervium*) are encroaching into the historically inundated area where only wetland species such as the grey sedge *Lepironia articulata* occur.



Field	Value
Location:	150°32'43.239"E 34°13'1.739"S
FID	57
Shape	Point
FieldProgr	Thirlmere Lakes monitoring
date	28/07/2020
StartTime	11:26:00 AM
laty	-34.217217
longx	150.545427
FieldStaff	PR
OtherField	JW
SiteID	Gandangarra
altitude	329
accuracy	5
WaterLevel	Edgeofwater
PlantsMost	Lepironiaarticulata
PlantsOthe	Noplants
comments	

Where to Next?

- Due to the ongoing COVID-19 issues, the Annual Science Day originally planned for February 2021 has been postponed to June 2021 (details will be available closer to the date).
- Most of the researchers have or are currently finalising their final research reports.
- These reports will then be peer reviewed.
- The Final Report for the Thirlmere Lakes Research Program is currently scheduled to be finalised by mid 2021.





Acknowledgements

- EES: Tim Pritchard, Martin Krogh, Kirsten Cowley, Adam McSorley, Sarsha Gorissen, Renkin Sioni, Sarah Klistorner, Glenn Meade, Ben Owers
- WaterNSW: Ben Mulhearn, Simon Dunn, Ryan Park and many others
- Expert Review Panel: Phillip Pells, George Gates, Neil Saintilan, (Wendy Timms)
- Inter-Agency Working Group: OEH/EES, CSE, WaterNSW, DPIE Water
- Many researchers and organisations who have unselfishly shared their knowledge, expertise and data
- The Thirlmere Lakes Research Program Partners: UNSW, UoW and ANSTO
- The Traditional Custodians who have cared for the lakes for tens of thousands of years
- **The local Community who care so much about the Lakes**