

MAAR-VELOUS SEDIMENTS: UNEARTHING HOLOCENE HISTORIES IN WESTERN VICTORIA

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What do you get when a German, an Englishman, a Polish man, and some Australians decide to core several lakes? A lot of sediment!

In November 2023, a group of palaeoclimatologists and palaeolimnologists from the University of Bremen (Germany), the University of Gdańsk (Poland), the University of Adelaide, the University of Wollongong, and an ex-farmer from Nyah West headed out to the volcanic plains of western Victoria in search for laminated lake sediments. As a part of a project funded by the German Research Council (DFG) in 2021, a Future Fellowship, and DECRA, this trip aimed to obtain Holocene sediments from a series of lakes, including Lakes Bullen Merri, Purrumbete, Keilambete, and Gnotuk, to examine the potential for laminated sediments and to reconstruct Holocene climate, vegetation, and fire histories.

Obtaining sediments from lakes with an area >25 km² and in water depths of more than 60 m is a difficult task. The reincarnation of the old Monash coring pontoon, now a fully registered vessel, completed with a gantry and pulley system provided a stable platform for coring and made it possible to extract sediments through deep water. However, moving such a bulky pontoon across a lake 3.2 km in diameter provided another obstacle. Luckily, my dad, an avid fisherman and expert boat operator, was willing to join the team of international scientists and provide us a means to transport the pontoon to the middle of the lakes and make sure we were securely anchored.

Over a 7-day period, we set about obtaining 4 x UWITEC cores from the upper sediments of five lakes, 3 x 3 m cores of Holocene sediments, and water samples throughout the entire water column from Lakes Bullen Merri and Purrumbete, and plankton samples from Lake Bullen Merri. At the end of the trip all cores were shipped to the University of Bremen where they were CT scanned before being split and undergoing ItraxTM and magnetic susceptibility scanning.

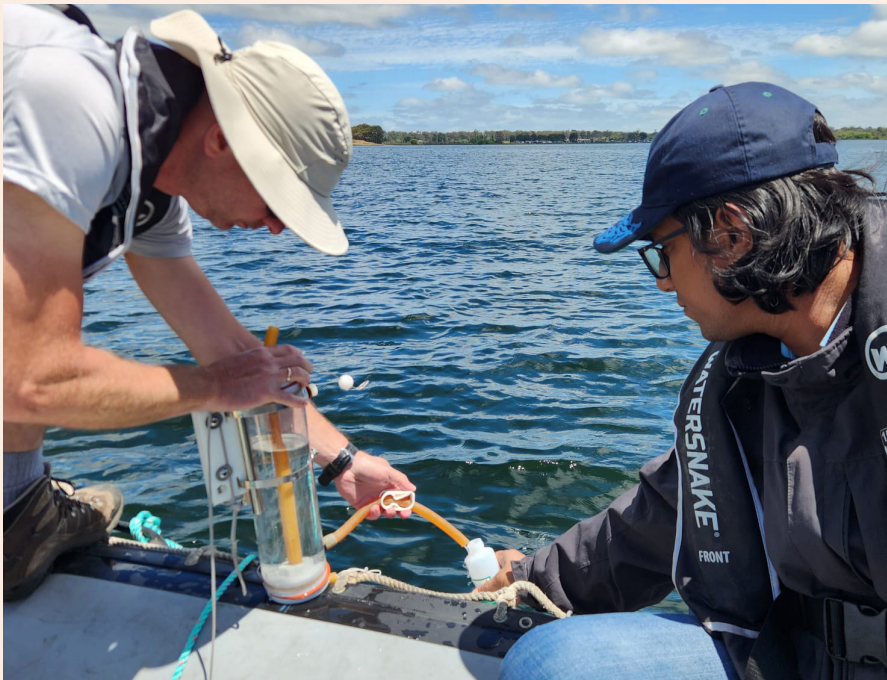
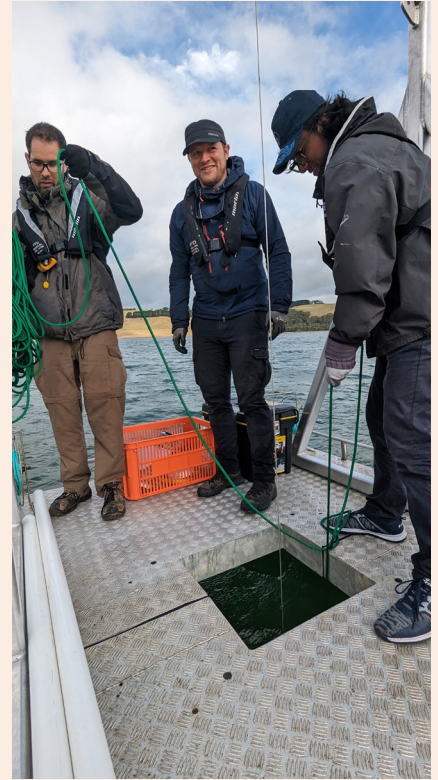
In April this year, Kym and Mahfuzur travelled to Bremen to sub-sample a series of the cores. The samples

(all together 2440!) from these cores have returned to Australia and will be subjected to radiocarbon dating, $\delta^{18}\text{O}$ analysis of diatoms, $\delta^{18}\text{O}$ and $\delta^2\text{H}$ of aquatic cellulose, pollen, charcoal, and GDGT analysis as a part of Jonathon Tyler's Future Fellowship and my DECRA project. The complex sedimentology and Pb-210 analysis of the sediments will be conducted at the University of Bremen and the University of Gdańsk, respectively. Together these projects will reconstruct past climates of the region across different Holocene time-periods and examine how the landscape, vegetation, and fire respond to changes in climate.



Top - Figure 1: The original Monash Pontoon during the collection of a sediment core from Lake Surprise, Budj Bim, July 2004. (Photo credit: Peter Kershaw).

Above - Figure 2: Almost 20 years after the coring of Lake Surprise, the resurrected Monash Pontoon is back in western Victoria waiting for its first voyage with its new gantry system. (Photo credit: Bernd Zolitschka).



Clockwise from top left:

Figure 3: Wojciech Tylmann, Theo Cadd, and Kym Edwards towing the pontoon out to the middle of Lake Purrumbete. (Photo credit: Haidee Cadd).

Figure 4 a & b: Coring fashion and safety requirements have changed a little over the past 20 years. Left: Coring of Lake Surprise in 2004 including David Tooth (Monash), Jim Neale (ANU), and Monash PhD student Chris White. Right: Alex Francke, Jonathan Tyler, and Mahfuzur Rahman coring Lake Bullen Merri. (Photo credit top: Peter Kershaw, bottom: Haidee Cadd).

Figure 5: The team from Adelaide University Mahfuzur Rahman, Kym Edwards, and Jonathan Tyler on Lake Bullen Merri. (Photo credit: Mahfuzur Rahman).

Figure 6: Wojciech Tylmann and Mahfuzur Rahman taking water samples from Lake Purrumbete. (Photo credit: Jonathan Tyler).

Figure 7: The resurrected Monash Pontoon anchored in the middle of Lake Bullen Merri ready for the next day of coring. (Photo credit: Mahfuzur Rahman).

Figure 8: Haidee Cadd, Bernd Zolitschka, Theo Cadd, and Wojciech Tylmann taking a UWITEC sediment core from the side of the boat. (Photo credit: Jonathan Tyler).

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