Refitting a Past:

a comparative study of LGM and post-LGM technological strategies at Lake Mungo, south-western New South Wales, Australia

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1. Aims and Significance:

The purpose of this research project is to examine the various technological strategies employed at Lake Mungo (Figure 1) when its water levels were fluctuating during 25-18,000 BP, compared to conditions subsequent to lake retreat some time after 18,000 BP. The goal of this research is to understand how stone technology articulated with other aspects of people's lives, for example the form in which stone material was carried to the lunette, how it was worked, which tool-blanks were fashioned, which types of tools were used, how tools were maintained, and the form and context in which they were discarded.

Existing descriptions of the stone technology from the Willandra Lakes Region World Heritage Area (WLRWHA) conflate assemblages of different age and context, and this is largely the result of an absence of an effective methodology for analysing surface stone artefacts scattered across extensive landforms that accumulated over large time spans. Previous studies also yield little information on the technological strategies employed by Aboriginal people both during and after the Last Glacial Maximum (LGM).

2. Lake Mungo: Location and Stratigraphy

Lake Mungo is located in the semi-arid zone of south-western New South Wales (Figure 1). It is one of seventeen presently dry lakes, collectively known as the Willandra Lakes, which were once fed by the Willandra Creek - a distributary of the Lachlan River in the Murray-Darling drainage system (Bowler et al. 1970; 2003; Bowler 1998).

A series of lunettes – sandy clay or clayey sand aeolian transverse dunes – have developed on the eastern margins of the Willandra Lakes, including Lake Mungo (Figures 2 and 3). They represent fossil or relict dunes from when the lakes were last active (Bowler et al. 1970: 40).

As a result of his research into the complex history of late Quaternary hydrologic change for Lake Mungo, Bowler (Bowler et al. 1970; 2003; Bowler 1971; 1976; 1998) has identified five successive units representing different hydrological phases: Golgol, Lower and Upper Mungo, Arumpo and Zanci (Table 1; Figure 4).

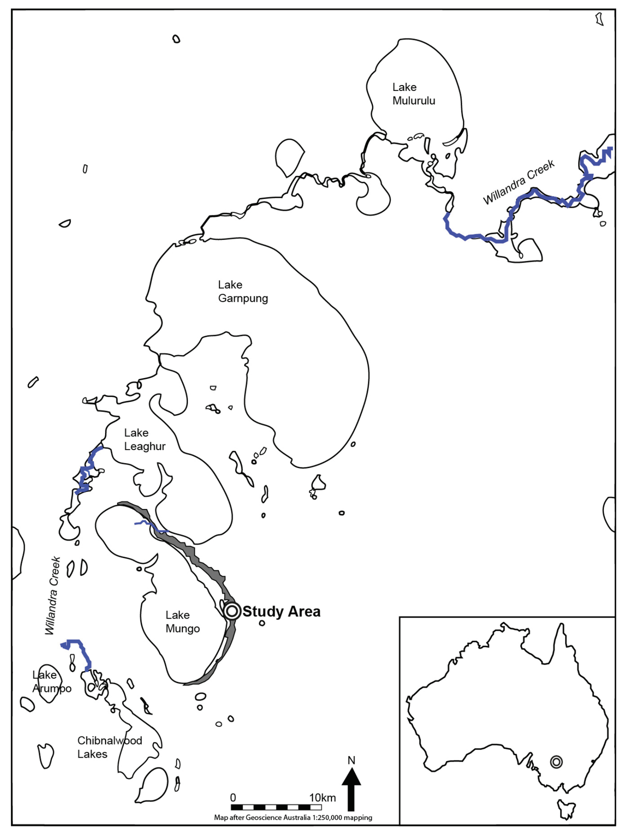

Figure 1. Map of Willandra Lakes

Figure 2. Eroded Foredune Section of the Mungo Lunette

Figure 3. Mobile Sand Dunes on the Eastern Side of the Mungo Lunette

Unit	Age Estimates (ka)	Typical Appearance	Hydrologic and Environmental Conditions
Golgol	>130,000	Deep red calacareous palaeosol	Deflation origin from earlier phase of drying following major lacustral phase
Lower Mungo	60-55,000 BP	Clean quartz beach sands and gravels with equivalent dune components	Lake full phase
Upper Mungo	55-40,000 BP	Grey to dark or ashen grey clayey sands	Fluctuating lake levels
Arumpo	40-22,000 BP	Grey sandy clays with laminar bedding, dominated by pelletal clay facies and with associated soil development	Substantial episode of water level oscillations
Zanci	22-19,000 BP	Finely laminated, unconsolidated pelletal sandy clays	Major drying phase, followed by deflation and regional dune building downwind of the lunettes

Table 1. Lake Mungo Stratigraphic Unit Summary (based on Bowler et al. 1970; 2003; Bowler 1998)

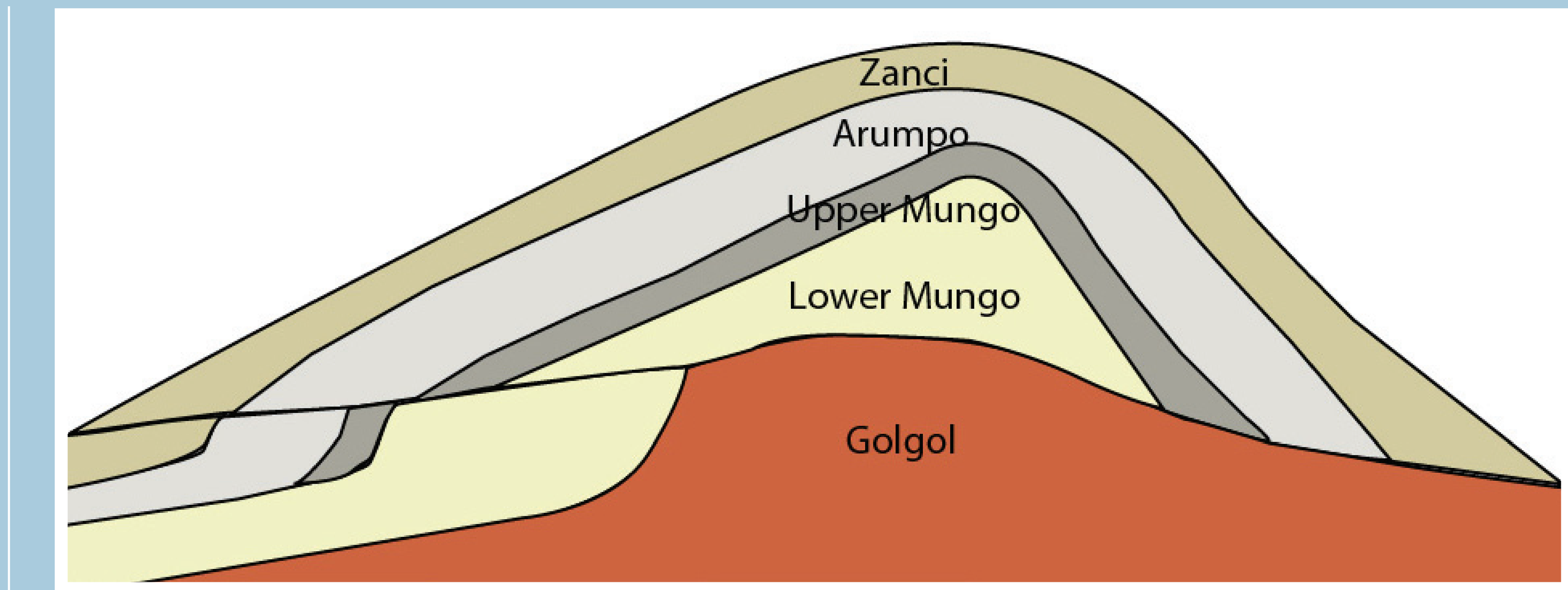

Figure 4. The Stratigraphy of the Mungo lunette (adapted from Bowler 1998)

3. Towards a New Understand of LGM and Post-LGM Stratigraphy:

Two sedimentary units in the upper part of the Lake Mungo lunette - 'Laminar Sands' and 'Unconsolidated Sands' - are being investigated for this research project (Table 2). These two units correspond most closely with Bowler's upper stratigraphic units, the Arumpo and Zanci, and possibly aeolian reactivation of these units subsequent to lake drying.

Investigation of these two sedimentary units presents the opportunity to gain a more detailed understanding of hydrologic change and environmental conditions after 25,000 BP, as well as people's technological responses to these changes.

Unit	Age Estimates (ka)	Typical Appearance	Hydrologic and Environmental Conditions
Laminar Sands	25-18,000 BP (based on recent OSL dating)	Predominantly laminar sands, with some interbedded alternating clayey sands	Fluctuating lake levels
Unconsolidated Sands	Some time after 18,000 BP (OSL samples currently being processed)	Well-sorted, unconsolidated (and potentially reactivated) sands, with some soil horizons	Alternating local aridity and environmental stability

Table 2. Proposed LGM and Post-LGM Stratigraphic Unit Summary

4. Methodology:

A systematic foot survey of a 1.5km² section of the Mungo lunette was undertaken during June to October 2010, as well as July and September 2011, with one 50m² square being surveyed at a time (Figure 5).

Selected surface stone artefact clusters with unambiguous stratigraphic origin, which could be placed within a precise palaeotopographic setting, were photographed, mapped and recorded during the survey (Figure 6).

Discrete surface clusters, representing individual knapping episodes, were successfully identified through a combination of artefact grouping (based on similarities in raw material type, texture and colour) and refitting.

All work was carried out on the Mungo lunette, and no stone artefacts were removed from the lunette throughout the entire process.

Figure 5. Surveying the Mungo Lunette

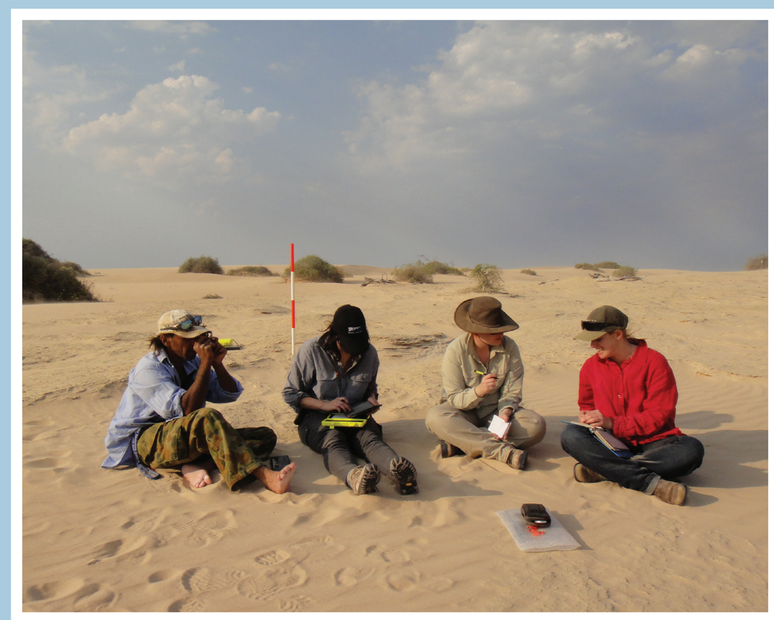

Figure 6. Stone Artefact Analysis on the Lunette

5. Results:

A total of 184 discrete surface clusters were studied during the survey, comprising 1,525 stone artefacts.

Three-quarters of these discrete surface clusters contained artefacts that refitted, and each refit set contained up to ten refitting artefacts (Figures 7, 8 and 9).

The remaining quarter of the discrete surface clusters did not contain any refitting artefacts, but nonetheless appeared to have been knapped from the same core based on similarities in raw material type, texture and colour. These discrete clusters contained up to 44 artefacts.

Figure 7. Medium-grained Silcrete Nodule Refit

Figure 8. Nine Flakes Refit onto a Micro-blade Core

Figure 9. Steep-edged Scraper Refit

6. Preliminary Observations

The majority of artefacts, both during and after the LGM, were manufactured on fine-grained silcrete. Quartzite is the second most commonly utilised raw material after the LGM, however it is virtually absent from the LGM assemblages. Given that silcrete sources are numerous and easily accessible in the WLWHA, but quartzite sources are rare and not easily accessible, this suggests that Aboriginal people were more mobile following lake retreat in the WLRWHA.

The core to whole flake ratio is higher for the post-LGM assemblages, which indicates that raw material was conserved more once the Willandra Lakes dried out.

Flake production, tool blank selection and tool production appear to be fairly unstandardised both during and after the LGM. However, it is likely that while some tools were made and used expediently, other more heavily curated tools were also produced and then taken away from the lunette.

Further descriptive and inferential statistical analysis of the primary data for this research project is currently being undertaken, and will ultimately result in the first comprehensive description of the stone technologies employed at Lake Mungo both during and after the LGM.

Figure 10. Northern View of the Mungo Lunette

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Acknowledgements:

Elders Council of the Traditional Tribal Groups of the Willandra Lakes World Heritage Area

School of Historical and European Studies and Faculty of Humanities and Social Sciences, La Trobe University

Dr. Nicola Stern, Dr. Kathryn Fitzsimmons and Prof. Colin Murray-Wallace (Chief Investigators of the ARC Discovery Project 'Human Responses to Long-Term Landscape and Climate Change in the Willandra Lakes World Heritage Area' 2010-2012)

NSW National Parks and Wildlife Service

Daryl Pappin

Rudy Frank and Paul Kajewski

Bek Kurpiel, Jacqui Tumney, Heather Bice, Amanda Goldfarb, Liz Foley, Stephanie Vick, Will Truscott, Craid Reid, Louisa Roy, Erica Weston, Ryan McLean, Sarah Hibberd, Rhiannon Stammers, Meredith Filihia, Caroline Wright-Neville, Katrina Lolicato

Naomi Slater