

ALL THE SMALL THINGS

The Refinement of Foraminiferal Analysis to Determine Site Formation Processes in Archaeological Sediments

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Table 1. Samples analysed and foraminiferal densities per 100g (all samples).

Site	Sieve Fractions Sorted	XU/Unit	Weight of Sediment (g)	No. of Taxa	Description	MNI	Density (MNI/100g)
The Granites	All	Upper	30.26	1	Cultural	3	9.91
The Granites	All	Lower	39.36	2	Cultural	5	12.70
Square C	All	XU4	29.11	1	Cultural	1	3.44
Square C	All	XU6	33.44	1	Cultural	1	2.99
Square C	All	XU19	30.53	0	Cultural	0	0
White Patch	All	Unit I	20.04	2	Natural	239	1192.61
White Patch	All	Unit Ila	11.26	3	Natural	2425	21536.41
White Patch	All	Unit III	29.47	9	Natural	21285	72225.99
A7	All	XU3	35.62	0	Cultural	2	5.61
A7	250µm	XU5	31.99	1	Cultural	2	6.25
A7	250µm	XU7	35.46	2	Cultural	3	8.46
A7	All	XU10	33.04	2	Mixed	8	24.21
A7	250µm	XU12	33.35	2	Natural	684	2050.97
A7	All	XU14	38.91	2	Natural	599	1539.46
Total	-	-	431.84	-	-	25257	-

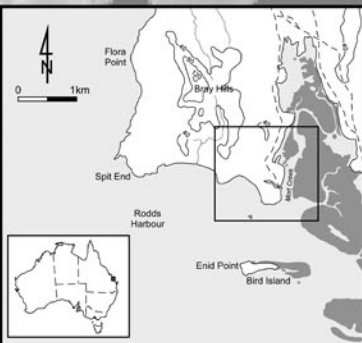


Figure 1. Mort Creek Site Complex, Rodds Peninsula.



Figure 2. Clockwise from top left: The Granites, Squares A-D, A7 and White Patch.

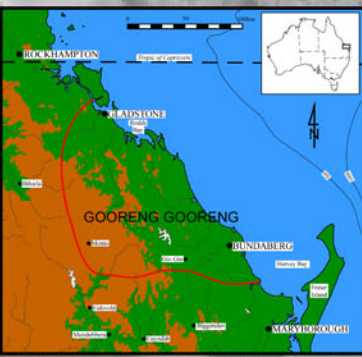


Figure 3. Gooreng Gooreng Cultural Heritage Project study area.

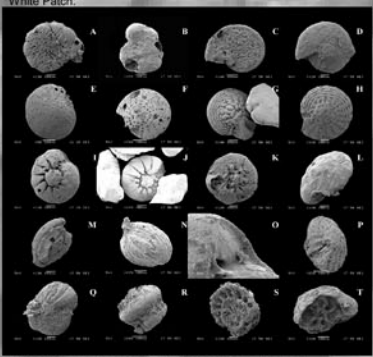


Figure 4. Foraminifera from the Mort Creek Site Complex.

Key Findings

- Methods were successfully refined from the earth sciences to suit archaeological sediments.
- Palaeoenvironmental data was obtained through foraminiferal taxa analysis, which demonstrated relative stability in local marine environments over the last 3,000 years.
- Foraminiferal densities can successfully differentiate between natural and cultural marine shell deposits.
- Foraminiferal analysis enabled a re-evaluation of the site formation processes at the Mort Creek Site Complex.

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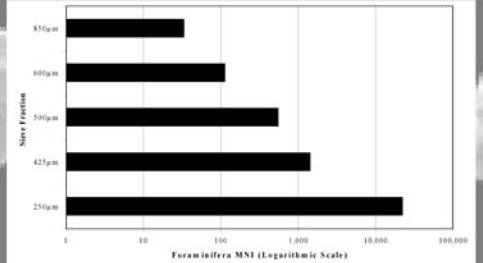


Figure 5. Foraminifera recovery rates by sieve fraction, all samples. The graph demonstrates that more than 90% of all foraminifera were recovered in the 250µm sieve fraction.

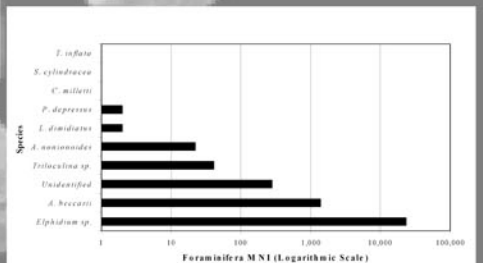


Figure 6. Foraminifera species representation. The dominance of *Elphidium sp.* (92% of the total assemblage) is indicative of shallow water, marginal marine environments, such as tidal estuarine ecosystems.



Figure 7. Foraminiferal density, A7. Two distinct demarcations in foraminiferal densities are present, representing a definitive cultural layer on top of a natural shell deposit.

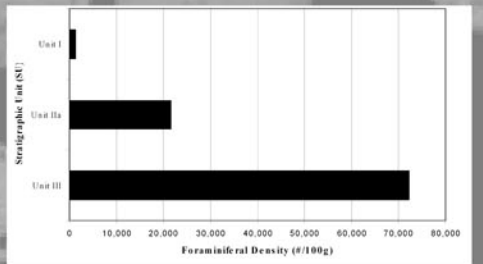


Figure 8. Foraminiferal density, White Patch. A dramatic increase in foraminiferal densities is evident with depth, possibly resulting from the percolation of the small foraminifera towards the base of the deposit.

Procedures

Foraminiferal analysis techniques in previous archaeological studies have been adapted from the earth sciences; however, the methods used have not been refined for archaeological applications, raising concerns about appropriate sampling and analysis procedures. This research refined laboratory techniques to suit archaeological sediments that may present an absence or low density of foraminifera within the sediment matrix. Refined methods include: sample size and selection, sieve sizes, taxa analysis, sorting, quantification, mounting and photography. Each of these areas are described below.

Sampling and Sieving

Fourteen sediment samples (Table 1) were analysed using the following procedure:

- 50g sediment samples were selected to maximise data from sediments that have an unknown foraminiferal content.
- Samples were separated using eight sieve fractions: 1mm, 850µm; 650µm; 500µm; 425µm; 250µm; 125µm; and a base plate to retain sediments.
- Foraminifera were sorted using low power microscopy on a glass petrie dish and put into a picking tray using an 00-000 artists brush.

Photography and Identification

- Samples were photographed using a JEOL Analytical Scanning Electron Microscope (SEM).
- Foraminifera were identified using a range of foraminifera reference texts.

Quantification

Each taxon of foraminifera was quantified by establishing minimum number of individuals (MNI). To facilitate comparative analysis of all deposits analysed, densities are reported as the number of foraminifera per 100g of sediment

Contribution to Methods

Foraminiferal analysis was successfully applied to the study of site formation processes and the assessment of integrity of coastal sediments. The application of procedures to the Mort Creek Site Complex case study enabled methods to be further refined to suit the shallow marginal marine environments of the central Queensland coast. Figures 5-8 and Table 1 demonstrate the contribution that the foraminiferal analysis of the Mort Creek Site Complex had to the development of archaeological techniques.

References

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