

- Kintigh, K. W. 1988. The Effectiveness of Sub-Surface Testing: A Simulation Approach. *American Antiquity* 53(4):686–707.
- Kraker, J. J., Shott, M., and Welch, P. D. 1983. Design and Evaluation of Shovel-Test Sampling in Regional Archaeological Survey. *Journal of Field Archaeology* 10:469–480.
- Lane, S., and Sciusco, L. 1996. Keilor Park Drive Archaeological Survey and Subsurface Testing. Unpublished Report to Russell Kennedy and Melbourne Parks and Waterways, Melbourne.
- Lightfoot, K. G. 1986. Regional Surveys in the Eastern United States: The strengths and weaknesses of implementing subsurface testing programs. *American Antiquity* 51(3):484–504.
- Lightfoot, K. G. 1989. A Defence of Shovel-test Sampling: A Reply to Shott. *American Antiquity* 54(2):413–416.
- Lynch, B. M. 1980. Site artifact density and the effectiveness of shovel probes. *Current Anthropology* 21(4):516–517.
- Marshall, B. 1996a. Archaeological Investigations (Subsurface) along the proposed route for Sections 2 and 3 of the Northbourne Branch Sewer at Campbellfield. Unpublished report, Melbourne.
- Marshall, B. 1996b. Archaeological Investigations along the Merri Creek between Cooper Street and Barry Road Campbellfield. Unpublished report, Melbourne.
- Nance, J. D., and Ball, B. F. 1986. No Surprises? The reliability and validity of test pit sampling. *American Antiquity* 51(3):457–483.
- Nicholson, O. 1998. Sub-surface testing at the former CSIRO land, Maribyrnong. Unpublished report, Melbourne.
- Rhodes, D. and Murphy, A. 1994. Report on Archaeological Survey and Sub-Surface Testing at the BHP Property, Mickleham Road, Greenvale. Unpublished report, Melbourne.
- Richards, T. and Sutherland, P. 1995. Surface and Sub-surface archaeological survey of the proposed Wildwood Road Soil removal project near Deep Creek, Bulla. Unpublished report, Melbourne.
- Shott, M. 1985. Shovel-Test Sampling as a Site Discovery Technique: a Case Study from Michigan. *Journal of Field Archaeology* 12:457–468.
- Shott, M. 1989. Shovel-Test Sampling in Archaeological Survey: Comments on Nance and Ball, and Lightfoot. *American Antiquity* 54(2):396–404.
- Smith, A. 1995a. *Archaeological Survey Methods for Forested Environments Supplementary Study: the Post-Operational Survey. A report to Forestry Tasmania and the Australian Heritage Commission.* Australian Heritage Commission, Canberra.
- Smith, A. 1995b. *Archaeological Survey Methods for Forested Environments: an Assessment. A report to Forestry Tasmania and the Australian Heritage Commission.* Australian Heritage Commission, Canberra.
- Stein, J. K. 1986. Coring Archaeological Sites. *American Antiquity* 51(3):505–527.
- Stone, G. D. 1981. On artifact density and shovel probes. *Current Anthropology* 22(2):182–183.

Future Directions for Research into Open Sites and Rockshelters in the Inland Pilbara

By Ben Marwick¹

Introduction

Archaeological work on Aboriginal sites in the inland Pilbara has been going on for over 30 years. The purpose of this paper is to show that the research themes currently driving consulting work in the inland Pilbara are in need of updating and to suggest some future directions. To identify the criteria for assessments of archaeological significance I reviewed a random sample of twenty reports of archaeological cultural resource management work (including survey, salvage and excavation) from the last

ten years. These reports are held by the Western Australian Department of Indigenous Affairs. I looked at criteria used to assess archaeological significance in each report because these are the measures of the ability of a site to contribute to the discipline of archaeology and they indicate the issues that archaeologists consider relevant in their analysis of sites. Two new approaches are proposed (one for surface artefact scatters and one for excavated assemblages) to complement the existing approaches. This study does not include consideration of other measures of

significance such as aesthetic significance or spiritual and historical significance to Aboriginal people.

Current research themes

The review of reports revealed that there are three common research themes used to assess archaeological significance. Firstly, archaeologists are interested in testing previous syntheses of site distribution over different landscape types such as those suggested by Brown (1987) and Kee et al. (1985). In brief, these syntheses conclude that sizes and densities of archaeological sites increase in direct proportion to distance and permanence of water sources. This topic is especially relevant for surface surveys because it makes predictions about the distribution and density of sites that are useful for designing survey methods.

Secondly and similarly, archaeologists are interested in testing the models of Veth (1993) and Hiscock (1988) which predict, among other things, that sites will be larger and more diverse when they are closer to larger and more reliable sources of water and stone. The appeal of this second theme is also enhanced by its relevance to site distribution and survey methods. Thirdly, archaeologists are interested in questions about the timing of events and changes previously documented in surrounding regions or on a continental scale. These include the first human occupation of the region, the response to the Last Glacial Maximum, the timing of the introduction of new varieties of stone tools and the timing of changes in population dynamics.

Problems with current research themes

These themes were well suited to the initial phases of research when few details were understood about how culture, technology and economics changed over time in the inland Pilbara and how people used the landscape. They were also well suited to methods of site and artefact recording that were generally less detailed than they are now. Now that we have moved on from the initial phases and there are more detailed data about how people lived in the inland Pilbara, these themes no longer lead to substantial contributions to our understanding of human behaviour and are not well suited to available archaeological evidence from the inland Pilbara.

Although important to begin with, the first and second current research themes provide only a coarse-grained understanding of how people used the landscape in the past. The first and second current research themes are popular because they are relevant to survey methods.

However they now have been tested and generally confirmed by a large body of survey work from the last ten years (e.g. Hook and Jackson 1998, 2000; Hook et al. 1998a; Jackson 1994, 1999, 2000; Jackson and Di Lello 1999; Jackson and Martin 1998; Jackson and Fry 2000; Jackson, Fry and Martin 1999; Jackson et al. 2000). We now need to go beyond questions of where people were in their environment to look at questions about *what* people were doing in these environments or *how* they were doing it. The third current research theme, questions about the timing of events, can only be answered if there is evidence of these events. The majority of previously excavated rockshelters in the inland Pilbara date to the middle and late Holocene and have little or no recoverable cultural material (e.g. Hook et al. 1998b, 2000). This means that generally there is not enough information from excavations to answer questions related to the first human occupation of the region, the response to the Last Glacial Maximum, the timing of the introduction of new varieties of stone tools and the timing of changes in population dynamics.

Future research themes

This survey of 20 consultant reports and recent syntheses of inland Pilbara archaeology (Marwick 2002; Veth 2003) suggest that there are now enough data from the inland Pilbara to update these themes. In addition, new methods and interpretative frameworks have appeared since the formulation of the three current research themes. Some archaeologists working in the inland Pilbara are routinely recording information such as debitage and flake attributes which is not being fully utilised by the current research themes. The current research themes generally only use density and diversity data from stone artefact scatters and do not fully utilise the more detailed metric and technological data that is currently being collected by many archaeologists working in the inland Pilbara. Two approaches are proposed here that will more fully utilise the data that are being collected and provide more substantial contributions to our understanding of inland Pilbara archaeology and better assessments of the significance of sites.

Firstly, to get the most out of the current methods I propose an approach to inland Pilbara stone artefact assemblages that focuses on technological strategies and reduction sequences. This kind of *chaîne opératoire* approach involves understanding the processes of stone tool manufacture, use, maintenance and discard at a site through the analysis of technological and metric attributes (Andrefsky

1998: 110–135; Odell 2000; Shott 1994). Recent work employing this approach at Australian sites in Tasmania and New South Wales has been published by Moore (2000a, 2000b). The four main processes of a reduction sequence are generally as follows: (1) procurement of raw material (obtaining raw material), (2) primary reduction techniques (flake production), (3) secondary reduction (secondary working), and (4) use and discard. This approach provides insights into the choices made by people who used the sites, because it is based on the study of the sequence and processes at work within a stone artefact assemblage.

The first step in using this interpretive framework involves recording the choices made for each of the four main processes of stone tool reduction. The analysis starts from a consideration of the choice of raw material and proceeds through the techniques of flaking (collection of data on metrics, platform type and surface, overhang removal, dorsal flake scars, termination and cortex from flakes and cores), secondary working (retouch on flakes) and use and discard (microscopic analysis of use wear and chemical analysis of residues). A new technique in development that may speed the collection of metric data involves the capture of digital images of artefacts in the field, followed by automated shape and size analysis using image analysis software such as Image Pro Plus or Sigma Scan Pro (cf. McPherron and Dibble 1999). The second step is comparing different assemblages to identify qualitative and quantitative differences. A useful method for discovering patterns of differences and similarities is cluster analysis. This statistical method groups sites together based on how similar they are across multiple variables (cf. Read and Russell 1996).

The third step is to interpret the differences in reduction sequences in terms of human behaviour. An interpretive approach that has yet to be systematically pursued in the inland Pilbara is the organisation of mobility in response to seasonal, environmental and cultural variables (Chatters 1987; Kelly 1983; Kuhn 1995; Odell 2001: 62–64; Parry and Kelly 1987; Shott 1986; Veth 2000). Although this approach has often been fruitfully applied by American archaeologists, ethnoarchaeological studies by Gould *et al.* (1971) indicate that the curation-mobility relationship may be influenced by the social function of certain artefact types and the combination of curated and expedient technologies used by mobile groups of Aboriginal people in arid environments similar to those of the inland Pilbara. This tension

between the successful application of mobility studies in other parts of the world and the findings of Australian ethnoarchaeological research suggests that this approach could be fruitfully pursued in the inland Pilbara and potentially improve our understanding of hunter-gatherer mobility strategies and artefact technology. This type of analysis will provide detailed information on what people were doing with their stone resources and how environmental and cultural variables influenced site formation.

The second approach proposed here is a focus on the process of change in excavated assemblages. The creation of timelines based on the appearance of artefact types no longer makes substantial contributions to our understanding of how people lived in the past. We need to focus on understanding why people changed and how they changed. A focus on rockshelter excavations that are larger in volume and area will provide a larger sample of artefacts from rockshelters and increase the probability of detecting changes in the way the sites are used. It will also improve the reliability of analyses of change in the assemblages. Understanding of change over time can be improved through the analysis of sources other than the sparse cultural material, such as rockshelter sediments and pollen. Recent work (Marwick 2002) has identified patterns of technological, cultural and demographic changes in the inland Pilbara during the Holocene. Future excavations should aim to test and refine these patterns instead of testing models developed for other regions or continental scales. This will produce a more detailed and relevant picture of how people lived in the inland Pilbara.

Conclusion

In this paper I have examined the current criteria for evaluating the archaeological contribution of archaeological sites in the inland Pilbara. The current approaches no longer provide substantial contributions to the discipline and do not fully utilise the quality of data that is now being regularly collected from the inland Pilbara. Two new approaches are suggested as complements (rather than replacements) to the current approaches. The first approach is the analysis of reduction sequences and mobility organisation at surface artefact scatters. The second approach is a focus on the process of change in rockshelter assemblages.

Many archaeologists who work in the inland Pilbara might ask 'why is it important to update the research questions for the inland Pilbara?' There are two reasons why it is important to

review the way archaeological resources are scientifically assessed. Firstly, we have to produce accurate and detailed descriptions of how people lived in the past and better understand how they responded and adapted to change. Archaeologists have a professional obligation to tell stories about the past that reflect our best understanding of what happened. Secondly, we have to strive to improve the quality of cultural resource management in the inland Pilbara. New ways of describing and interpreting sites mean that there are new ways to evaluate their rarity, representativeness and research potential (Bowdler 1984), the three major aspects of archaeological significance. This does not mean that we have to agree with and slavishly adopt any new approaches to the evidence, only that we must engage with them to demonstrate our involvement in the discipline. The burden of the consultant archaeologist is to be familiar with the current state of archaeological research in order to make management recommendations that are sensitive to current scientific and social interests.

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References

- Andrefsky, W. 1998. *Lithics. Macroscopic Approaches to Analysis*. Cambridge, Cambridge University Press.
- Bowdler, S. 1984. Archaeological significance as a mutable quality. In *Site Surveys and Significance Assessment in Australian Archaeology*, S. Sullivan and S. Bowdler (eds). Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra, pp.1–9.
- Brown, S. 1987. *Toward a Prehistory of the Hamersley Plateau, Northwest Australia*. Occasional Papers in Prehistory 6, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra.
- Chatters, J. C. 1987. Hunter–gatherer adaptations and assemblage structure. *Journal of Anthropological Archaeology* 6: 336–375.
- Kee, S., Strawbridge, L. and Tonkinson, R. 1985. An investigation of the area proposed for development by Hamersley Iron Pty Ltd, Paraburdoo, Pilbara. Unpublished report for the Centre for Prehistory, University of Western Australia, February 1985.
- Hiscock, P. 1988. Prehistoric Settlement Patterns and Artefact Manufacture at Lawn Hill, north-west Queensland. Unpublished PhD Thesis, University of Queensland, St Lucia, Brisbane.
- Gould, R.A., Koster, D.A., and A.H. Sontz 1971. The lithic assemblage of the Western Desert Aborigines of Australia. *American Antiquity* 36:149-69.
- Hook, F. and Jackson, G. 2000. A report of an Aboriginal archaeological assessment of the proposed Tom Price Mine Extension Section 7 and associated haul road, Pilbara, Western Australia. Unpublished report for Hamersley Iron Pty Ltd.
- Hook, F. and Jackson, G. 1998. The report of an archaeological survey of the Brockman Mine Pit Extension Areas, Western Australia. Unpublished report for Hamersley Iron Pty Ltd.
- Hook, F., Jackson, G., Martin, C. and Veitch, B. 1998a. The report of an Aboriginal Archaeological Survey in the Eastern Ranges Project Area, Paraburdoo, Pilbara, Western Australia. Unpublished report for Hamersley Iron Pty Ltd.
- Hook, F., Jackson, G., Martin, C. and Veitch, B. 1998b. The report of the test excavation of 11 Aboriginal archaeological sites in the Eastern Ranges Project Area, Paraburdoo, Pilbara, Western Australia. Unpublished report for Hamersley Iron Pty Ltd.
- Hook, F., Veitch, B. and C. Martin 2000. A report of an Aboriginal archaeological salvage program of sites located on the HI Yandi railway route and mine area, Hamersley Plateau, Western Australia. 2 Vols. Unpublished Report held by Western Australian Department of Indigenous Affairs.
- Jackson, G. 2000. A report of an Aboriginal archaeological assessment of the Vivash East (E47/783) Drilling Program Area, Hamersley Range, W.A. Unpublished report for Hamersley Iron Pty Ltd.
- Jackson, G. 1999. A report of an Aboriginal archaeological survey of a fence-line on Rocklea Pastoral Station, Hamersley Plateau, Western Australia. Unpublished report for Hamersley Iron Pty Ltd.
- Jackson, G. 1994. Report of an Investigation of Archaeological Sites in the Yandi Mine Project Area, Pilbara W.A. Unpublished report, Department of Aboriginal Sites, Perth.
- Jackson, G. and Di Lello, A. 1999. A report of an assessment of 52 previously recorded Aboriginal archaeological sites in Hamersley Iron's Silvergrass and Homestead Project Area, near Brockman Detrital Mine, Pilbara, Western Australia. Unpublished report for Hamersley Iron Pty Ltd and Maliwatu Aboriginal Corporation.

- Jackson, G. and Fry, R. 2000a. A report of an Aboriginal archaeological assessment of proposed Tom Price Mine Extension Areas, Pilbara, Western Australia. Unpublished report for Hamersley Iron Pty Ltd.
- Jackson, G. and Martin, C. 1998. A report of an Aboriginal archaeological survey of drill holes and access tracks in Hamersley Iron's Silvergrass Peak Tenement. Unpublished report for Hamersley Iron Pty Ltd and *Yathalla* Aboriginal Corporation.
- Jackson, G., Hook, F. and Di Lello, A. 2000. The report of an Aboriginal archaeological survey of drilling program areas in Hamersley Iron's Silvergrass Leases, near Mount Brockman, Western Australia. Unpublished report for Hamersley Iron Pty Ltd.
- Kelly, R. L. 1983. Hunter-gatherer mobility strategies. *Journal of Anthropological Research* 39:277-306.
- Kuhn, S. L. 1995. *Mousterian Lithic Technology: An Ecological Perspective*, Princeton University Press, Princeton.
- McPherron, S. P., and Dibble, H. L. 1999. Stone tool analysis using digitized images: Examples from the Lower and Middle Paleolithic. *Lithic Technology* 24: 38-52.
- Marwick, B. 2002. Inland Pilbara Archaeology: A study of variation in Aboriginal occupation over time and space on the Hamersley Plateau, Western Australia. Unpublished MA thesis, Centre for Archaeology, University of Western Australia, Perth.
- Moore, M. W. 2000a. Technology of Hunter Valley microlith assemblages, New South Wales. *Australian Archaeology* 51:28-39.
- Moore, M. W. 2000b. Lithic technology in Tasmania. *Archaeology in Oceania* 57-73.
- Odell, G. H. 2001. Stone tool research at the end of the millennium: Classification, function, and behaviour. *Journal of Archaeological Research* 9(1):45-100.
- Odell, G. H. 2000. Stone tool research at the end of the millennium: Procurement and technology. *Journal of Archaeological Research* 8(4):269-331.
- Parry, W. J., and R. L. Kelly 1987. Expedient Core Technology and Sedentism. In *The Organization of Core Technology*, J. Johnson and C. Morrow (eds), pp. 285-304. Westview Press, Boulder, Colorado.
- Read, D. W., and Russell, G. 1996. A method for taxonomic typology construction and an example: Utilized flakes. *American Antiquity* 61: 663-684.
- Shott, M.J. 1994. Size and form in the analysis of flake debris: Review and recent approaches. *Journal of Archaeological Methods and Theory* 1:69-110.
- Shott M.J. 1986. Technological organization and settlement mobility, an ethnographic examination. *Journal of Anthropological Research* 42:15-51.
- Veth, P. M. 1993. *Islands in the interior: The dynamics of prehistoric adaptations within the arid zone of Australia*. Ann Arbor (MI): University of Michigan
- Veth, P. M. 2000. Cycles of aridity and human mobility: risk-minimization amongst late Pleistocene foragers of the Western Desert, Australia. Paper presented to the Society of American Archaeology, Philadelphia.
- Veth, P. M. 2003. Between the desert and the sea: A comparison of the archaeologies of the Western Desert and Pilbara regions, Western Australia. Paper presented to the Centre for Archaeological Research, ANU, July 25.

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The Yamatji/Pilbara Standard Heritage Agreement and its Implications for Consultant Archaeologists

by Nicholas Green¹

Introduction

This paper has been prepared in order to help explain the new Standard Heritage Agreement (SHA) that has been negotiated by the Yamatji Marlpa Barna Baba Maaja Aboriginal Corporation (YMBBMAC) Representative Body (under the *Native Title Act* 1993) with the Chamber of Minerals and Energy (CME) in Western Australia.

The SHA has been endorsed by the Western Australian Government and is being actively promoted with the mining industry by the Department of Industry and Resources (DoIR). A copy of the SHA is available on DoIR's web site.² It should be noted that other Representative Bodies in Western Australia have or are in the process of negotiating similar agreements with the CME.