

Aboriginal people and post-glacial climatic change in the inland Pilbara

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In this presentation I discuss new archaeological research from the eastern Chichester Range in the inland Pilbara. This investigation identifies changing patterns of land use and site occupation in the area over the last ten thousand years.

I begin by outlining the background to our project.

I then describe some of the results in terms of changing Holocene patterns of land use and site occupation.

I go on to discuss the interaction between human use of the landscape and environmental change and place this in the context of our general understanding of the long term trajectory of Aboriginal occupation in the Pilbara and the broader arid zone.

The major thrust of archaeological investigation in the Pilbara over the last three decades has typically focussed on two main topics: antiquity – pushing back the age of occupation of the region – and the effect of the Last Glacial Maximum on human populations. The current view is of a rapid dispersal of small groups of hunter-gatherers with a generalised foraging adaptation throughout the whole continent before 40,000 years ago. It is now increasingly clear that this dispersal included parts of the arid zone perhaps taking advantage of greater surface water availability. There are now several sites with dates older than 40,000 which make it clear that the Pilbara was part of this early occupation. The deteriorating climate associated with the intensification of the Last Glacial cycle saw a contraction of territory and population and, in the arid zone, retreat into refuge areas through the rigours of the Last Glacial Maximum. It is likely that the Pilbara uplands played an important role as a refuge for people during the height of the Last Glacial Maximum with some sites showing evidence of continuing occupation through that period.

By contrast, little attention has been paid to the post-glacial period in the inland Pilbara. Most archaeological research on the last 10,000 years has been in coastal areas where the response to rising sea levels and the formation of islands has been a focus. For example, major projects are currently in progress on Barrow Island and on Murujuga – the Dampier Archipelago. [SEE SLIDE]



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The great driver for most archaeological work in the Pilbara region has been the mineral resource boom. However, the archaeological evidence is patchy and spread very thinly. It is relatively coarse grained for the arid Zone generally and for the Pilbara specifically.

The dated archaeological evidence for the inland Pilbara mainly comes from rock shelters – many of them in the Hamersley Ranges. This is very much in keeping with the focus on antiquity and building a regional chronological sequence. However, it is the major river systems of the Pilbara that are the cultural heart of the region for Aboriginal people. They must have been so for tens of thousands of years. We are lacking well dated archaeological information from the river systems and from areas like the Fortescue Marsh. These areas are likely to have been a key determinant of the capacity of human populations to adapt to changing environments. We are also short of fine-grained local information to fill out the details in the ‘big picture’ scenario.

Today I present some new evidence relating to human adaptation to the post-glacial environment in the inland Pilbara. The data comes from a project analysing archaeological sites recorded in the course of heritage compliance work in relation to the development of Fortescue Metals Group’s Christmas Creek and Cloudbreak mines [SEE SLIDE]. The archaeological recording and salvage work associated with this project was conducted by heritage consultancy Archae-aus for FMG. The project is in Nyiyaparli country and this additional research on the data collected has been supported by the Nyiyaparli people and with funding from Fortescue Metals Group.

I mention this because it is highly unusual for compliance data to be analysed in this way – normally the data are archived and maybe salvaged. Only archaeological sites thought to be particularly significant might be further investigated – perhaps because they are unusually rich in cultural material or because they have early dates.

The Cloudbreak-Christmas Creek project area is in the foothills of the eastern Chichester Range.

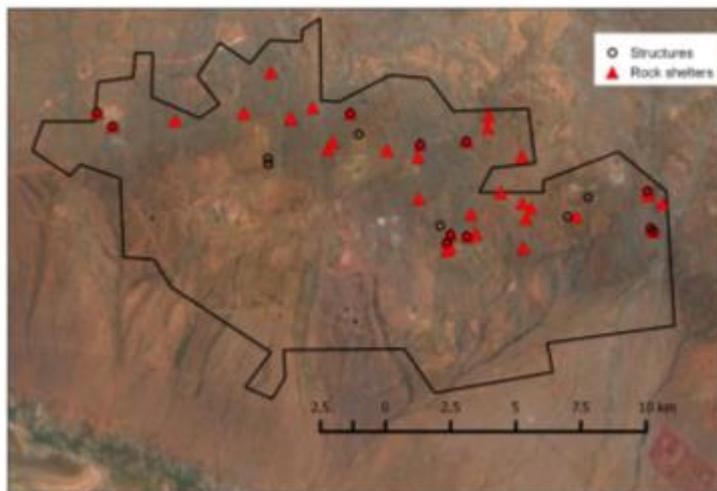


While the area is geologically similar to the Hamersley Range, the topography is not generally as rugged. It comprises plateaux and ridges with a series of drainage lines opening out into stony alluvial and colluvial plains.

[SLIDE 1 OF LANDSCAPES]

The Fortescue Marsh lies immediately to the south. [SLIDE 2 OF LANDSCAPES - BOTTOM]

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Within the area potentially affected by the mine and its associated infrastructure [SEE SLIDE for boundary], the escarpment, foot hills and surrounding alluvial plains were intensively investigated – an area of some 430 km². Nearly 2000 archaeological sites have been recorded in the area – mostly surface artefact scatters.

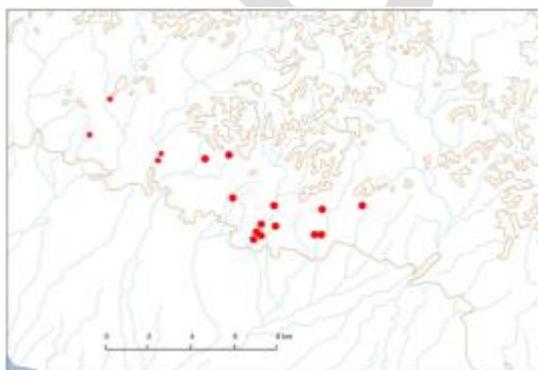
More than 40 rock shelters were identified and investigated. They all occur in outcrops of banded iron formation or conglomerate. They vary widely in form from large and spacious chambers to small cramped overhangs. Nearly all had cultural material associated with them. There were also shelters which were not usable as shelters but which nevertheless had evidence for use in the form of structures – most of these were alcoves or small chambers blocked off by stone walls.

[SLIDES x 2 OF SHELTERS] NOTE: structure on first slide

Around half also had excavation potential in the form of evidence for at least 10 cm of accumulated sediment.

[SLIDE – SHELTER DEPOSITS]

Shelter deposits in the area average about 30 cm deep – range is from 11 to 87 cm - and are generally derived from weathering of the banded iron formation. The deposits are normally acid and preservation of organic material is therefore usually poor.



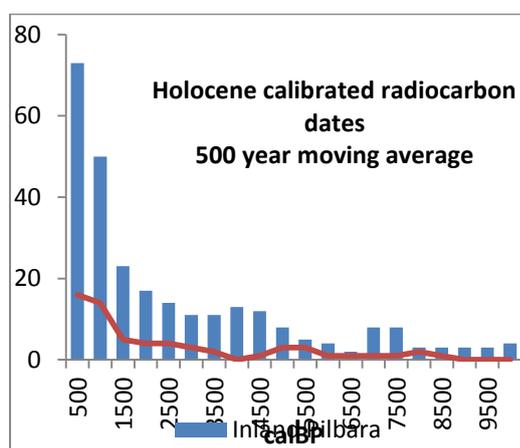
Nineteen shelters that were tested proved to have subsurface cultural material. As part of the assessment of their significance, more than fifty radiocarbon dates were obtained.

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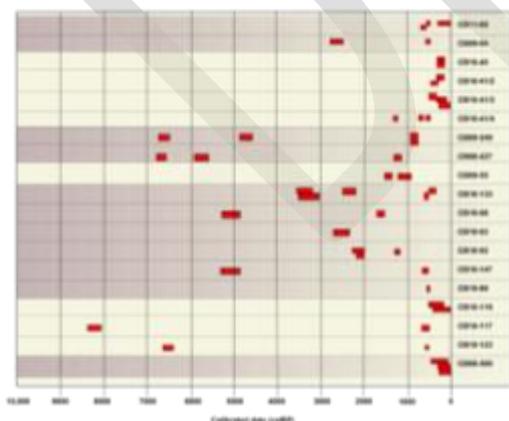
The distribution of these dates shows marked patterning in space and time.

There is one date of 41,000 – all the rest are Holocene. This 41,000 date is the first Pleistocene date to be obtained from the Chichester Range and confirms early occupation in the area.

The remainder of the dates are younger than 10,000 years ago. They generally follow the pattern for the Pilbara as a whole and indeed much of the arid zone – namely a gradual general increase through time with a proliferation of dates from about 1500 years ago.



Archaeologists have analysed regional suites of radiocarbon dates since the late 1980s to examine changing patterns of land use (e.g. ref). More recently large regional datasets of radiocarbon dates from archaeological sites have been increasingly been analysed using probability distributions and used as a proxy for ancient populations and demographic change at a regional or continental scale. This dataset is small and local by comparison. The analysis I discuss here focusses on the context of the determinations in terms of the broader interpretation of the sites from which they come and their associated cultural material, rather than a statistical analysis, for which key assumptions cannot be met. The strength of this dataset lies in the fact that it is a comprehensive sample from a small area, rather than a very large regional sample.



Looking at the individual dates in conjunction with the stratigraphic sequences from particular sites the shelters seem to broadly fall into two groups. First, there are shelters with quite substantial numbers of artefacts where occupation can be interpreted as relatively intense over some continuous period. These shelters were regularly and repeatedly visited over several hundred or in

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some cases thousands of years. Second, at the other extreme are shelters where occupation seems to be brief and episodic.

In particular, there are several sites where the dates are widely separated in time [SEE SLIDE] ~~CB09-249, CB08-427, CB10-117, CB10-147, CB10-123 and perhaps CB10-98~~. In all these sites, deposits are quite shallow, artefact numbers are low. The question here is whether these dates are samples from a long continuous sequence of low level occupation or do they indicate discontinuous and intermittent occupation. There are good grounds to think that occupation in these sites is indeed discontinuous and intermittent.

The figure arranges sites geographically from west to east and groups them according to the drainage system in which they occur [SEE SLIDE]. This shows that before about 4000 years ago, use of the study area seems to be widespread. From about 4000 years it contracts noticeably to a single drainage system and – except for a fleeting episode of occupation in the west of the study area – remains so until about 1500 years ago.

From about 1500 years ago new sites are used [SEE SLIDE] and some previously used sites are used again. This pattern of reoccupation and use of new shelters continues into the last thousand years with widespread occupation throughout the range.

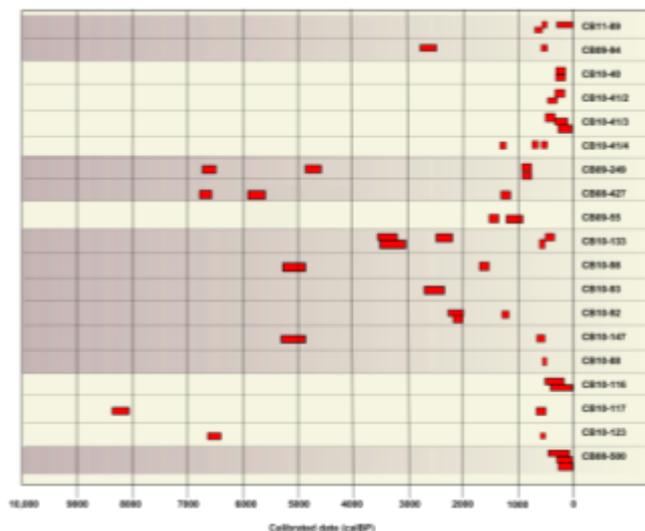
[SLIDE – DISTRIBUTION OF SITES]

This slide shows similar information mapped spatially. Sites with early occupation are quite widespread. Between 4000 and 2000 years ago occupation use is almost entirely restricted to a single drainage line. In the next thousand years, usage expands once again and in the last 1000 years usage is spread through the whole area.

Interpretations of the broader arid zone by Smith, Williams and others have linked changes in intensity of occupation of sites, demography and technological change to the Holocene establishment and variation of the El Nino Southern Oscillation (ENSO). These researchers identify an increase in arid zone populations 5000-3000 years ago in the early part of the ENSO cycle (Smith et al. 2008) followed by a sharp contraction of population at about 3000 as climate becomes drier and more variable climate. Population then expanded markedly again from about 1.5ka throughout the arid zone.

Unfortunately fine grained palaeoenvironmental records are lacking for the inland Pilbara over the time span of human occupation. Nor is it clear how strong the influence of ENSO would be in the northwest, although the general picture of an early Holocene wetter period and a mid- Holocene drier period does seem likely to hold true. The evidence from the Cloudbreak and Christmas Creek area seems to be broadly consistent with this general interpretation.

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Prior to about 4000 years ago [SEE SLIDE] a relatively small population with a broad based wide ranging foraging pattern was able to exploit the wetter and more stable conditions that prevailed in the early Holocene, peaking about 8000-6000. The fact that human populations become archaeologically visible at this time in the Chichester Range perhaps indicates an expanding population and one spreading out of glacial refuges in the Hamersley to take advantage of the greater availability of water in the landscape.

About 4000 years ago there is a marked change in land use patterns and archaeologically visible occupation contracts to a few shelters in a single creek system. These shelters are also much more intensively occupied. This contraction of occupation seems to coincide with the onset of drier conditions. [SEE SLIDE]

More widespread use of the landscape begins from about 1500 years ago. At this point there is some local hydroclimatic data available from the Fortescue Marsh and Alex Rouillard's results from 14 Mile Pool. The 14 Mile Pool record is estimated to cover the last 2000 years. It indicates hyper arid conditions some 2000 years ago and a local shift to wetter conditions about 1200 years ago [SEE SLIDE].

The last 1000 years sees widespread usage of this part of the ranges once more. The exponential proliferation of dates is similar to results from the broader arid zone. But this must be viewed with some caution as it could be a result of better preservation and recovery of the most recent part of the record. Nevertheless this period apparently does see use of new sites that apparently were not used at previous times [SEE SLIDE]. Some of these sites have much denser and richer accumulations of cultural material than previously seen in the area.

[SLIDE –SUMMARY MAPS]

To summarise, Aboriginal responses to changing environments in this area during the post-Glacial period seem to have involved a reorganisation of land use, and particularly a contraction to one particular creek line. It is worth noting that this creek is also the location of Kakutungutanta – the site which has evidence of occupation more than 40000. The shelter takes its name from the Niyaparli name for the creek which is documented as culturally significant to Niyaparli people

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today. Like other creeks which flow into the Fortescue March it is a key part of the hydrological system that gives life to the region. This in turn is critical to Nyiyaparli culture and their responsibilities towards communities downstream.

Clearly this particular locality has been used for a very long time. This long continuity of usage is attested to by a number of sites which have not themselves been continuously used.

‘Big picture’ views of Pilbara archaeology tend to focus on individual sites. The search for sites, the choice of sites for detailed archaeological investigation usually prioritises large sites with deep old deposits and good preservation – all rare in the Pilbara. The evaluation of sites for heritage management purposes commonly echoes these priorities. This research, by contrast, has investigated a diverse suite of smaller sites at a local scale. By examining them in terms of their context within the landscape in time and space and in terms of the relationships between them, we have been able to provide a rare glimpse of how general models of human occupation and the interactions between humans and environment play out at the local scale.

Acknowledgements

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