Hiscock, P. D. 1988 Prehistoric Settlement Patterns and Artefact Manufacture at Lawn Hill, Northwest Queensland. Unpublished PhD thesis, University of Queensland, Brisbane.

Hope, G. and Golson, J. 1995 Late Quaternary change in the mountains of New Guinea *Antiquity* 69:818-830.

Kershaw, A. P. 1995 Environmental change in Greater Australia. *Antiquity* 69:656-676.

McCarthy, L. and Head, L. 2001 Holocene variability in semi-arid vegetation: New evidence from *Leporillus* middens from the Flinders Ranges, South Australia. *The Holocene* 11:681-689.

Schulmeister, J. and Lees, B. 1992 Morphology and chronostratigraphy of a coastal dunefield; Groote Eylandt, northern Australia. *Geomorphology* 5:521-534.

Slack, M. J. 2002 Aboriginal Responses to European contact in northwestern Queensland. Unpublished MA thesis, Australian National University, Canberra.

Walsh, G. L. 1985 The Archaeological Significance of Lawn Hill Gorge. Unpublished Report for Queensland Parks and Wildlife Service, Brisbane.

A NOTE ON RADIOCARBON DATES FROM THE PARABURDOO, MOUNT BROCKMAN AND YANDICOOGINA AREAS OF THE HAMERSLEY PLATEAU, PILBARA, WESTERN AUSTRALIA

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Introduction

Excavations have been carried out at a number of rock-shelters in the Pilbara region of Western Australia as part of mitigative salvage work and research supported by Hamersley Iron Pty Ltd (Fig. 1). The excavations commenced in 1998 and are ongoing. At all times, the work was conducted with participation of and supervision from the relevant Aboriginal people. These people are the Innawonga in the Paraburdoo area, the Gurama in the Mount Brockman area and the Bandjima and Niabarli in the Yandicoogina area. Their contributions to the research are gratefully acknowledged.

Thus far, 24 radiocarbon dates have been obtained from 10 rock-shelters (Table 1) in the iron rich gorges and gullies of the Hamersley Plateau. The dates obtained range from the Pleistocene through to the late Holocene. Most dates, however, are confined to the last 2000 years. Although some of the work is ongoing, this short report has been prepared to provide access to the radiocarbon dates and a brief description of each site beyond the grey literature of consulting reports. A more detailed article will be forthcoming.

Paraburdoo

CME-A-18

This site is a large rock-shelter near the top of the Channar Ranges. Large quantities of burnt timber, some of which has been straightened, one flaked stone artefact and one piece of modified spinifex resin were located on the rock-shelter floor.

Six thin timber pieces appear to have been heat straightened and are partially burnt; four of the six have pointed ends. The spinifex resin has four elongate linear marks on its surface similar to finger marks. The pointed timber pieces, modified spinifex resin and the stone artefact are consistent with ethnographic accounts describing spear manufacture and resultant debris (Hayden 1981:76, Plate 16). Furthermore the pointed timber pieces indicate that composite spears may have been made at this site (Bindon and Lofgren 1982:116-123; Davidson 1935).

A piece of straightened timber and a fragment of modified spinifex resin were submitted for radiometric analysis. The results suggest that this site was used from around 1000 BP to 350 BP (see Table 1). A number of items were salvaged from the site, conserved and mounted in a display case, which is to be returned to the relevant communities.

CME-A-30

This site is a large rock-shelter near the top of the Channar Ranges. A dead tree trunk (*Acacia* sp.), trimmed of peripheral branches was located in the shelter's rear. The trunk is adjacent to two rock-shelves/niches 1.5 m above the shelter floor and appears to have been deliberately positioned as a ladder. One wood sample from the tree trunk was submitted for radiometric analysis, which resulted in an age estimation of 440 ± 70 BP. (Table 1).

Yirra

CME-A-31

The site is a large rock-shelter in a low gully near a large riverbed in the Channar Ranges. A 1 m by 1 m test-pit was excavated at this site with bedrock encountered at 79 cm. Flaked stone artefacts, burnt plant remains and hearth features were noted throughout the deposit (Veitch et al. 2004) (Table 1).

Preliminary results obtained indicate several artefact and charcoal concentrations. Of significant interest is the lowest concentration in the depth range of 43.13 to 51.50 cm below the surface, which is bracketed by the dates of 16,950 ± 90 BP and 19,270 ± 140 BP (from depth range of 38.63 and 55.80 cm below surface respectively). This concentration is consistent with the use of the Hamersley Plateau as a refugium during the Last Glacial Maximum (LGM) (Hiscock 1988; Smith 1988; Thorley 1998; Veth 1989, 1993). Above this concentration, there are two others that may relate to post- glacial amelioration and later Holocene developments (e.g. Smith 1988; Veitch et al. 2003; Veth 1989, 1993). These alternatives will be more fully developed in a later publication.

There is an obvious problem with the anomalously young age returned for Wk-12536. This result is believed to be owing to limited bioturbation by ants (eg. Hussey 2002). This matter will be taken up in more detail in a future article dealing with aspects of bioturbation. Given that all other dates are in sequence, it is concluded that the level of bioturbation in this deposit has been minimal. Additionally, Hamersley Iron has undertaken to support further excavations at this site and to avoid it.

ERP-04

Site ERP-04 is a small rock-shelter located near the

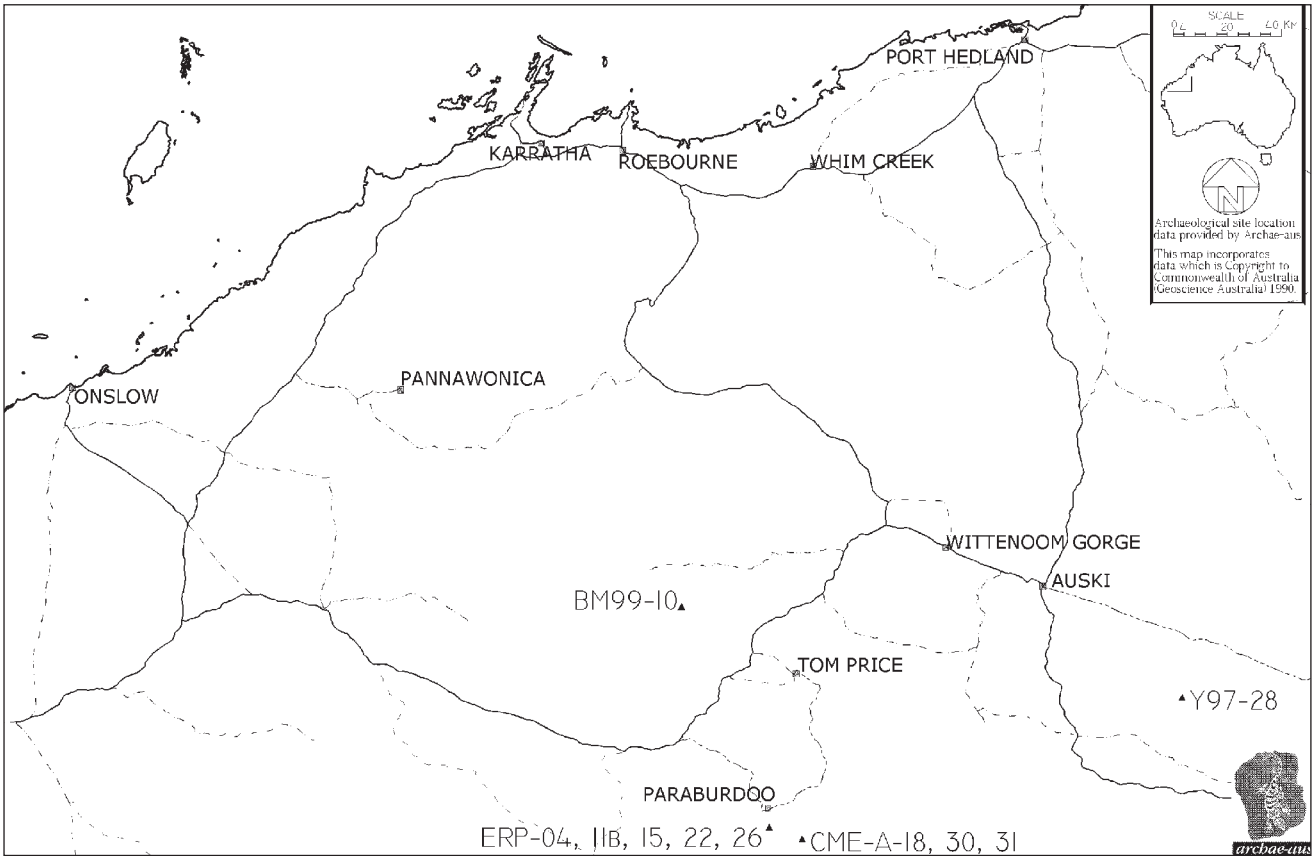

Figure 1 Map showing location of the Pilbara region of Western Australia, and sites mentioned in text.

summit of the Eastern Ranges. A total of nine flaked stone artefacts and one ironstone millstone are located on the shelter floor. A 50 cm x 50 cm test-pit was excavated to bedrock reaching a depth of 18.6 cm. The excavated deposit contained one hearth feature and four flaked stone artefacts. A charcoal sample from the hearth feature was submitted for radiometric analysis, which returned an estimation of 2000 ± 50 BP (Table 1).

ERP-11B(ii)

This site is a large rock-shelter within the Eastern Ranges. A scatter of 61 artefacts was located on the rock-shelter surface. A 1.0 m x 0.50 m test-pit was excavated to bedrock reaching a depth of 20.1 cm. A total of 100 flaked stone artefacts were recovered. Only scattered charcoal was present within the deposit. Two samples of charcoal were submitted for radiocarbon determinations, which suggest very recent use (i.e. from around 370 ± 50 BP and 350 ± 50 BP, Table 1). A further excavation measuring 2.5 m by 0.5 m was conducted in October 2002. The analysis of the more recently excavated material has yet to be completed.

ERP-15

This site is a medium sized rock-shelter among a series of steep gullies in the Eastern Ranges. The shelter contains a small surface assemblage of flaked stone artefacts and manuports. Two 50 cm x 50 cm test-pits were excavated to bedrock reaching a depth of 15.8 cm and 19.3 cm respectively. No flaked stone artefacts were recovered from either test-pit but one charcoal concentration, interpreted as a hearth, was encountered in test-pit 1 at a depth of 3.0 cm. A charcoal sample from this hearth returned an age estimation of 950 ± 50 BP (Table 1).

ERP-22

ERP-22 is a small rock-shelter containing a hearth on the surface of the shelter floor. No artefacts of any kind were noted on the surface of the deposit. The site was excavated to determine if it constituted a site as defined under the WA *Aboriginal Heritage Act 1972*. Three 50 cm x 50 cm test-pits were excavated in the rock-shelter. With the exception of the hearth, no cultural features or artefacts were encountered. Charcoal was recovered from the upper layers of test-pit 1, where the hearth feature was located. One sample of charcoal from test-pit 1 was submitted for radiometric analysis and returned an age estimation of 560 ± 50 BP. (Table 1).

ERP-26

This site is a medium sized rock-shelter near the base of a shallow north/south oriented gully. A single quartzite muller was recorded within the shelter, on a rock shelf at the rear centre of the shelter. In addition two manuports, both large flat ironstone slabs interpreted as anvils, were recorded on the shelter floor.

Initially, a single 50 cm x 50 cm test-pit was excavated to a depth of 24 cm. This test-pit was not excavated to bedrock because a relatively large number of flaked stone artefacts and a hearth feature were encountered. These were considered sufficient to evaluate the archaeological potential of the site, as specified by the Excavation Permit. A total of 28 flaked stone artefacts were recovered. A distinct hearth feature was also encountered. A charcoal sample from this feature was submitted for radiometric analysis and resulted in an age estimation of 1840 ± 50 BP (Table 1).

Hamersley Iron has undertaken to avoid this site. At the

Site Field Code	Depth Below Surface (cm)	Conventional Age (BP)	Lab Number	Material Dated	Feature Report	Unpublished	Area
CME-A-18	Surface	390 ± 50	Wk-8002	Wood	Spear Point	(Veitch et al. 2001)	P
CME-A-18	Surface	1000 ± 60	Wk-8001	Spinifex Resin	Spinifex ball	(Veitch et al. 2001)	P
CME-A-30	Surface	440 ± 70	Wk-8955	Wood	Tree ladder	(Veitch et al. in prep)	P
CME-A-31	4.5	1307 ± 40	Wk12534	Charcoal, *in situ*	no feature	(Veitch et al. in prep)	P
CME-A-31	10.7	1610 ± 50	Wk-9147	Charcoal, *in situ*	Hearth	(Veitch et al. in prep)	P
CME-A-31	22.1	3230 ± 50	Wk-8953	Charcoal, *in situ*	Hearth	(Veitch et al. in prep)	P
CME-A-31	24.00-29.00	3702 ± 56	Wk-12535	Charcoal, *in situ*	No feature	(Veitch et al. in prep)	P
CME-A-31	29.00-34.00	1057 ± 45	Wk-12536	(*Corymbia* sp) 3 mm sieve	No feature	(Veitch et al. in prep)	P
CME-A-31	29.00-34.00	10,628 ± 74	Wk-13779	Charcoal, *in situ*	No feature	(Veitch et al. in prep)	P
CME-A-31	34.50-36.00	13,375 ± 94	Wk-12537	Charcoal, *in situ*	Hearth	(Veitch et al. in prep)	P
CME-A-31	43.1	16,950 ± 90	Wk-9148	Charcoal, *in situ*	Hearth	(Veitch et al. in prep)	P
CME-A-31	55.1	19,270 ± 140	Wk-8954	Charcoal, *in situ*	Hearth	(Veitch et al. in prep)	P
ERP-04	3.9-7.5	2000 ± 50	Wk-6325	Charcoal, *in situ*	Hearth	(Hook et al. 1998)	P
ERP-11b(ii)	4.0	350 ± 50	Wk-6322	Charcoal, *in situ*	Hearth	(Veitch et al. 2001)	P
ERP-11b(ii)	6.	370 ± 50	Wk-6326	Charcoal, *in situ*	Scattered Charcoal	(Hook et al. 1998)	P
ERP-15	3.1	950 ± 50	Wk-6323	Charcoal, *in situ*	Hearth	(Veitch et al. 2001)	P
ERP-22	7.5	560 ± 50	Wk-6324	Charcoal, *in situ*	Hearth	(Veitch et al. 2001)	P
ERP-26	10.0	1840 ± 50	Wk-6327	Charcoal	Hearth	(Hook et al. 1998)	P
BM99-10	Surface	540 ± 50	Wk-7099	Spinifex Resin	Spinifex ball	(Veitch and Di Lello 2000)	B
BM99-10	3.0	470 ± 50	Wk-8000	Charcoal, *in situ*	Hearth	(Veitch and Di Lello 2000)	B
Y97-28	Surface	810 ± 80	Wk-5605	Shell (Melo sp.)	Water carrier fragment	(Hook et al. 2000)	Y
Y97-28	14.7	modern	Wk-5603	Charcoal, *in situ*	Scattered charcoal	(Hook et al. 2000)	Y
Y97-28	21.5	modern	Wk-5604	Charcoal, *in situ*	Scattered charcoal	(Hook et al. 2000)	Y
Y97-28	14.3	380 ± 80	Wk-5627	Charcoal, *in situ*	Scattered charcoal	(Hook et al. 2000)	Y

P = Paraburdoo; B = Mt Brockman; Y = Yandicoogina

Table 1 Radiocarbon dates from sites in Paraburdoo, Mt Brockman and Yandicoogina, Western Australia.

request of the Aboriginal community the excavation was expanded and continued to bedrock in October 2002. The deposit reached a depth of 65 cm and was found to contain one hearth and flaked stone artefacts. The analysis of the more recently excavated material has yet to be completed. Little charcoal was preserved beneath the hearth and consequently no further radiometric determinations have been obtained.

Mount Brockman

BM99-10

This site is a small rock-shelter, the surface of which contained a considerable number of flaked stone artefacts and two balls of modified spinifex resin. A 1.0 m x 0.50 m area was excavated to bedrock to a depth of 8 cm. Relatively large amounts of charcoal were recovered; one sample from a hearth feature was submitted for radiometric analysis which resulted in an age estimation of 470 ± 50 BP (Table 1). A total of 138 flaked stone artefacts were identified. A radiometric date of 540 ± 50 BP was also obtained from one of the spinifex resin balls (Table 1).

Yandicoogina

Y97-28

This site is a medium sized rock-shelter which had a large surface scatter of flaked stone artefacts, a high proportion of grinding material and a fragment of baler shell (*Melo* sp.). The presence of a large amount of grinding material in this rock-shelter indicated its use for either the storing of grindstones or for intensive seed grinding.

Two test-pits, measuring 1 m x 1 m and 0.5 m x 0.5 m respectively, were excavated to bedrock reaching depths of 45 cm and 17 cm. Both squares contained abundant flaked stone artefacts and scattered charcoal but no hearth features. Test-pit 1 contained 272 flaked stone artefacts and test pit 2 contained 73 artefacts. Four samples of charcoal and shell were submitted for radiometric analysis. The two dates on charcoal from test-pit 1 returned modern estimations. The charcoal sample from test-pit 2 resulted in an age estimation of 380 ± 80 BP and the surface baler shell sample an estimation of 810 ± 80 BP. When compared to the dates from test-pit 2 and the surface, the estimations from test-pit 1 appear anomalous. Notwithstanding this problem

with test-pit 1, the dates from test-pit 2 and the surface suggests relatively recent use of the shelter (Table 1).

Discussion

The age estimations from *Yirra* (CME-A-31) suggest relatively intense occupation over the LGM, and during subsequent periods. It is not clear at present whether the data from this site demonstrate relatively continuous use from the end of the LGM to the later Holocene, or reflect sample size phenomena (cf. Jerardino and Yates 1997; Lyman 1987; O'Neil 1993). It is hoped that further excavation, dating and analysis at this site will clarify these matters.

In addition there is an abundance of material from other sites covering the period from approximately 2000 BP to the last few hundred years. Further detail and analysis on these excavations will be provided in a more comprehensive article to follow.

References

Bindon, P. and Lofgren, M. 1982 Walled rock shelters and a cached spear in the Pilbara region, Western Australia. *Records of the Western Australian Museum* 10:111-126.

Davidson, D. S. 1935 Australian spear-traits and their derivations. *Journal of the Polynesian Society* 34:41-72, 143-162.

Hayden, B. 1981 *Palaeolithic Reflections. Lithic Technology and Ethnographic Excavations among Australian Aborigines*. Canberra: Australian Institute of Aboriginal Studies. *AIAS New Series* 5.

Hiscock, P. 1988 Prehistoric Settlement and Artefact Manufacture at Lawn Hill, North-east Queensland. Unpublished PhD Thesis, University of Queensland, Brisbane.

Hook, F., Jackson, G., Martin, C. and Veitch, B. 1998 The report of the test excavation of 11 Aboriginal archaeological sites, in the Eastern Ranges project area, Paraburdoo, Pilbara, Western Australia. Hamersley Iron Pty Ltd and Archae-Aus.

Hook, F., Veitch, B. and Martin, C. 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. Volume One. Hamersley Iron Pty Ltd and Archae-Aus.

Hussey, B. M. J. 2002 Wattle I plant for wildlife. *Conservation Science W. Aust* 4:62-71.

Jerardino, A. and Yates, R. 1997 Excavations at Mike Taylor's midden: A summary report and implications for a re-characterisation of megamiddens. *South African Archaeological Bulletin* 52:43-51.

Lyman, R. L. 1987 On the analysis of vertebrate mortality profiles: Sample size, mortality type, and hunting pressure. *American Antiquity* 52:125-142.

O'Neil, D. H. 1993 Excavation sample size: A cautionary tale. *American Antiquity* 58: 523-529.

Smith, M. A. 1988 The Pattern and Timing of Prehistoric Settlement in Central Australia. Unpublished PhD thesis, University of New England, Armidale.

Thorley, P. B. 1998 Pleistocene settlement in the Australian arid zone: Occupation of an inland riverine landscape in the central Australian ranges. *Antiquity* 72:34-45.

Veitch, B. and Di Lello, A. 2000 The report of the test excavation of five Aboriginal archaeological sites in the proposed pit 4 and 6 extension areas situated within the Brockman Mine, Pilbara, Western Australia. Hamersley Iron Pty Ltd and Archae-Aus.

Veitch, B., Hook, F. and Fry, R. 2001 A second addendum report to: Hook, F. and Veitch, B. 1999. The report of an Aboriginal Heritage Assessment of the proposed Channar Mine Extension Areas, near Paraburdoo, Western Australia - Salvage Program. Hamersley Iron Pty Ltd and Archae-Aus.

Veitch, B., Hook, F. and Martin, C. 2004. A third Addendum to Hook, F. and Veitch, B. 1999. The report of an Aboriginal Heritage Assessment of the Proposed Channar Mine Extension Areas, near Paraburdoo, Western Australia - November 2000 Salvage Excavations. Archae-Aus.

Veitch, B., Hook, F. and Martin, C. in prep A fourth Addendum to Hook, F. and Veitch, B. 1999. The report of an Aboriginal Heritage Assessment of the Proposed Channar Mine Extension Areas, near Paraburdoo, Western Australia – November 2000 Salvage Excavations. Archae-Aus.

Veitch, B., Hook, F. Warren, L. and Spooner, N. 2003 Relocation and Preliminary Optical Dating of the Gurdadguji Stone Arrangements in the Pilbara region of Western Australia. Paper presented to the Fifth World Archaeological Congress, Washington D.C.

Veth, P. M. 1989 The Prehistory of the Sandy Deserts: Spatial and Temporal Variation in Settlement and Subsistence Behaviour within the Arid Zone of Australia. Unpublished PhD thesis, University of Western Australia, Perth.

Veth, P. M. 1993 *Islands in the Interior: The Dynamics of Prehistoric Adaptations within the Arid Zone of Australia*. Ann Arbor: University of Michigan. *International Monographs in Prehistory, Archaeological Series* 3.

INDIGENOUS ARCHAEOLOGICAL SITES AND THE BLACK SWAMP FOSSIL BED: ROCKY RIVER PRECINCT, FLINDERS CHASE NATIONAL PARK, KANGAROO ISLAND, SOUTH AUSTRALIA

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Introduction

Fossil evidence for extinct megafauna at Black Swamp, Rocky River in the Flinders Chase National Park, Kangaroo Island was first noted in 1908 by C.J. May, then caretaker of the Rocky River Reserve (Tindale et al. 1935). Formal palaeontological investigation of the fossil area was initiated during a visit to the former Flinders Chase Flora and Fauna Reserve by Norman Tindale in late 1934 (Tindale et al. 1935; Tindale 1937a, 1937b). Further interest was not rekindled until the late 1970's (Hope et al. 1977). Since 1995 however, palaeontological investigations have been intensely focused on the Black Swamp fossil site (Wells et al.1997; Thammakhantry 1998; Dalgairns 1999).

Archaeological evidence from Kangaroo Island, South Australia generally suggests occupation by Indigenous people between about 16,000 and 4000 years ago (Lampert 1981, 1983). Archaeological sites and objects have been recorded at Black Swamp, Rocky River and the intriguing question of coalescence between megafuana and Indigenous people was initially posited by Tindale in the 1930's (Tindale 1937a, 1937b). This same question has 'shadowed' later palaeontological investigations at Black Swamp, Rocky River but irrefutable physical evidence remains as elusive here as it does for the vast majority of megafaunal sites on the mainland.

Archaeological finds on Kangaroo Island have been reported since 1903 (Howchin 1903) but investigations were concentrated principally on the eastern part of the island. It was not until the 1980's that archaeological investigations were undertaken, albeit brief in time at Black