APPENDIX 5

EXCAVATED ROCKSHELTERS

This appendix presents summary descriptions of the 19 rockshelters excavated in the Christmas Creek area. All are located in the escarpment and foothills of the Chichester Range (see Chapter 5, Figure 5.1). They are discussed in relation to the drainage catchments within which they are situated, from east (Group 1) to west (Marandu Creek and other shelters). Excavation methods and recording of excavated cultural material are described in Appendix 1.

GROUP 1

The setting of Group 1 is described in detail in Chapter 6.

CB08-500 (DAA ID 26056)

CB08-500 is a large, west-facing rockshelter on the eastern slope of a shallow north–south oriented gully, with a small artefact scatter on a small terrace about 20 metres north of the shelter (Figure A5.1, A5.2). It is about three metres from the drainage line and there are several small rock holes situated immediately north of the site. The shelter itself is stable banded iron formation conglomerate. It is about 4 m high at the drip line and floor area within the drip line is 16 m deep by 7 m wide (about 53 m^2). The floor slopes towards the entrance, but the area close to the drip line is flat. There is a flat terrace (2 × 2 m) along the south wall 3–5 m in from the entrance.

The hill slope carries a relatively dense scrub of small *Acacia* and eucalypts with a moderately thick understorey of hummock grassland (*Triodia* sp.). Surface visibility is about 40–60%. There is no vegetation within the shelter.

Surface artefacts were recorded both within the shelter and on the small gravel terrace to the north (Figure A5.2). The artefacts recorded within the shelter include a muller and a manuport – both dolerite. One of the broken dolerite flakes showed evidence of retouch. Table A5.1 summarises the surface assemblage from each sample area.

Following six depth of deposit probes, two test pits were excavated at the front of the shelter. Square 1 (1 × 1 m) was placed on the flat area at the drip line and Square 2 (0.5 × 0.5 m) on the small raised terrace along the south wall (Figure A5.2).

CB08-500 was recorded and excavated in 2008. The excavation was described in Hook, Dias, and Rapley (2008, 30–49) and this discussion draws on the data presented more fully there.

Excavation results

Square 1 was excavated in nine excavation units (EU) (Figure A5.3). Two stratigraphic units (SU) and one feature were identified during excavation (Figure A5.4). The surface layer comprised compacted coarse banded iron formation gravel and degraded banded iron formation sediment with scattered macropod scats. SU1 comprised compacted fine gravel in a matrix of fine, dark brown degraded banded iron formation sediment, with plant remains and macropod scats. SU2 appeared in EU4 and 5 and continued to bedrock at 25 cm below the surface. This unit was brown/grey-brown degraded BIF, finer and looser than SU1 with less compacted gravel. Figure A5.5 shows the increasing proportion of fine-grained sediments with depth. The deposits were acidic throughout (pH 4.5–5).

Organic material was found throughout the deposits but was most common in EU1–4. It is considered unlikely that any of this material is cultural. Plant remains, including small broken sticks, leaf fragments and rootlets occurred mainly in EU1–4, but was rare in the lower levels. Macropod scats also occurred throughout but were particularly common in EU1, with minor peaks in EU3 and EU7. A small amount of highly fragmented bone from small mammals and lizards was also found. None of this was diagnostic

and none was burnt. Insect remains were found throughout but were most common in EU1.

A feature was noted in the south-west corner of the pit in EU6 and 7 (Figure A5.4, A5.6). This comprised loose dark brown sediment, rich in charcoal. Much of the charcoal was relatively large and a piece of burnt wood was found in situ at the base of EU7. This feature can be interpreted as a hearth. Three samples of charcoal from this feature were submitted to Waikato for radiocarbon determinations (Table 5.4). The results were not in stratigraphic order, but, since the determinations overlapped at one standard deviation, it seems likely that they are statistically the same age, within the last 500 years (Figure A5.7).

Square 2 was excavated in four units and reached bedrock at 19 cm below surface. There was a single stratigraphic unit of soft and loose deposit, comprising degraded macropod scats and fine gravel. Small amounts of scattered charcoal were found in EU1 and 3 and a single large piece of charred wood was found in situ at the base of the excavation. This was sent to Waikato for radiocarbon determination and returned a median date of 1452 cal BP (Table 5.4). However, it is doubtful whether this sample is cultural. Three artefacts were recovered from the 6 mm sieve fraction: a complete chert flake, a piece of chert debris and a broken mudstone flake, one from each excavation unit. The site records indicate that 11 artefacts were also recovered from the 3 mm sieve fraction. The results from such a small test pit (0.5 × 0.5 m) are difficult to evaluate. The resulting sample of artefacts is very small and the context of the single radiocarbon determination is ambiguous.

The distribution of cultural material with depth in Square 1 shows a marked peak in the discard of artefacts from the 3 mm sieve fraction, which coincides with the peak in charcoal corresponding to the hearth feature in EU6 and 7. There is also a marked peak in artefacts from the 6 mm sieve fraction, but this occurs in EU4 (Figure A5.8). This distribution, in association with the dating evidence, suggests that the evidence from Square 1 should be treated as a single analytical unit indicating an episode of occupation within the last 500 years. The sparse evidence from Square 2 may indicate at least one other episode of occupation in the late Holocene, but this cannot be confidently claimed.

Stone artefacts

A total of 341 stone artefacts was recovered from the excavation. One hundred and ninety-four artefacts were recovered from the 6 mm sieve fraction or in situ, while the remainder came from the 3 mm sieve sample.

Most artefacts are mudstone, BIF or chert. Other raw materials present in small quantities are basalt, chalcedony, dolerite, ironstone, quartz and silcrete (Table A5.2). The representation of different raw materials is similar for number, minimum number of flakes (MNF) and weight, although weight tends to increase the representation of BIF relative to mudstone.

The relative raw material proportions are different in the 3 mm and 6 mm assemblages and this is statistically significant in terms of number at the 5% level. Mudstone and chert both make up a slightly higher percentage of the 3 mm assemblage, while BIF decreases (Figure A5.9).

Most artefacts (65%) in the 6 mm sieve fraction are complete flakes (Table 5.3). The mudstone and BIF assemblages are broadly comparable with respect to the occurrence of major artefact classes. There are equal numbers of chert whole and broken flakes and a higher percentage of non-diagnostic chert debris. Other raw materials are more variable but only occur in small numbers. In the 3 mm sieve fraction, proportions of complete and broken flakes are roughly equal, with undiagnostic debris making up 23%.

Three artefacts show evidence of secondary retouch – one from EU1 and two from EU6. Two of these were adze slugs – a BIF tula and a chert burren adze from EU6. There is also one chert retouched flake from EU1. Only one core was recovered from the excavation, a BIF single platform core from EU4.

Most artefacts are non-cortical (88%), and cortex is only present on BIF (11), mudstone (seven), chert (two) and chalcedony (two) artefacts. The relatively high proportion of chalcedony artefacts with cortex is due to sample size. All cortex is terrestrial with the exception of one piece of riverine cortex on a complete chert flake from EU7. Cortical platforms mainly occur on BIF (31%) and mudstone (38%) flakes, although the only basalt platform is also cortical (Table A5.4).

Only BIF and mudstone flakes occur in sufficient numbers for comparison. There are higher percentages of focal and cortical platforms in the

mudstone assemblage (Table A5.4), but the difference is not statistically significant (chi-square=4.1954, p=0.24112, df=3).

BIF complete flakes are larger on all measures than mudstone and chert flakes (Table A5.5). T-tests indicate that these differences are statistically significant with respect to BIF and mudstone. BIF flakes are also significantly wider and thicker than chert ones. There are no significant differences between mudstone and chert complete flakes.

Discussion

The radiocarbon determinations from Square 1 suggest that the use of CB08-500 dates primarily to the last 500 years and may even constitute a single episode. The presence of artefacts in the 3 mm fraction indicates that knapping activities carried out at the site included retouch and core preparation. Comparison of the 3 mm and 6 mm sieve fractions indicates that the representation of raw materials is significantly different. This disparity between sieve fractions can be interpreted as indicating a relatively short occupation span. Mudstone and chert were both more intensively worked at the shelter, while the BIF core was discarded. The discarded core was relatively small; it had a volume of 9750 mm^3, which is about 10% of the average estimated nodule volume for BIF cores in the Christmas Creek area (see Table 4.11). Two adze slugs were also discarded at the shelter. Therefore, it seems likely that woodworking tools were repaired, as well as spent cores discarded. The presence of grey chert flakes (four in the 3 mm fraction were recorded in EU5 and EU7, and two in the 6 mm fraction in EU9) may relate to the resharpening of the grey chert burren adze slug from EU6. Analysis of the colours recorded for many of the chert and mudstone flakes hints that several individual flaking episodes might be recognisable, if more detailed analysis of the lithic assemblage were made using a minimum analytical nodule approach. This evidence suggests that nearly all the small mudstone flakes and about a third of the 6 mm sieve fraction may relate to the flaking of a single piece of raw material. Similarly, the chert flakes from the 3 mm sieve fraction are uniform in colour, indicating that they too may pertain to a single flaking event. By contrast, the larger chert flakes are more diverse in colour.

FIGURE A5.1: CB08-500: general view.

	= Shelter wall		= Slope
	= Rock / Roof fall		
	= Exposed shelf		
	= Excavation square		
	= Bedrock		
	= Drip line		

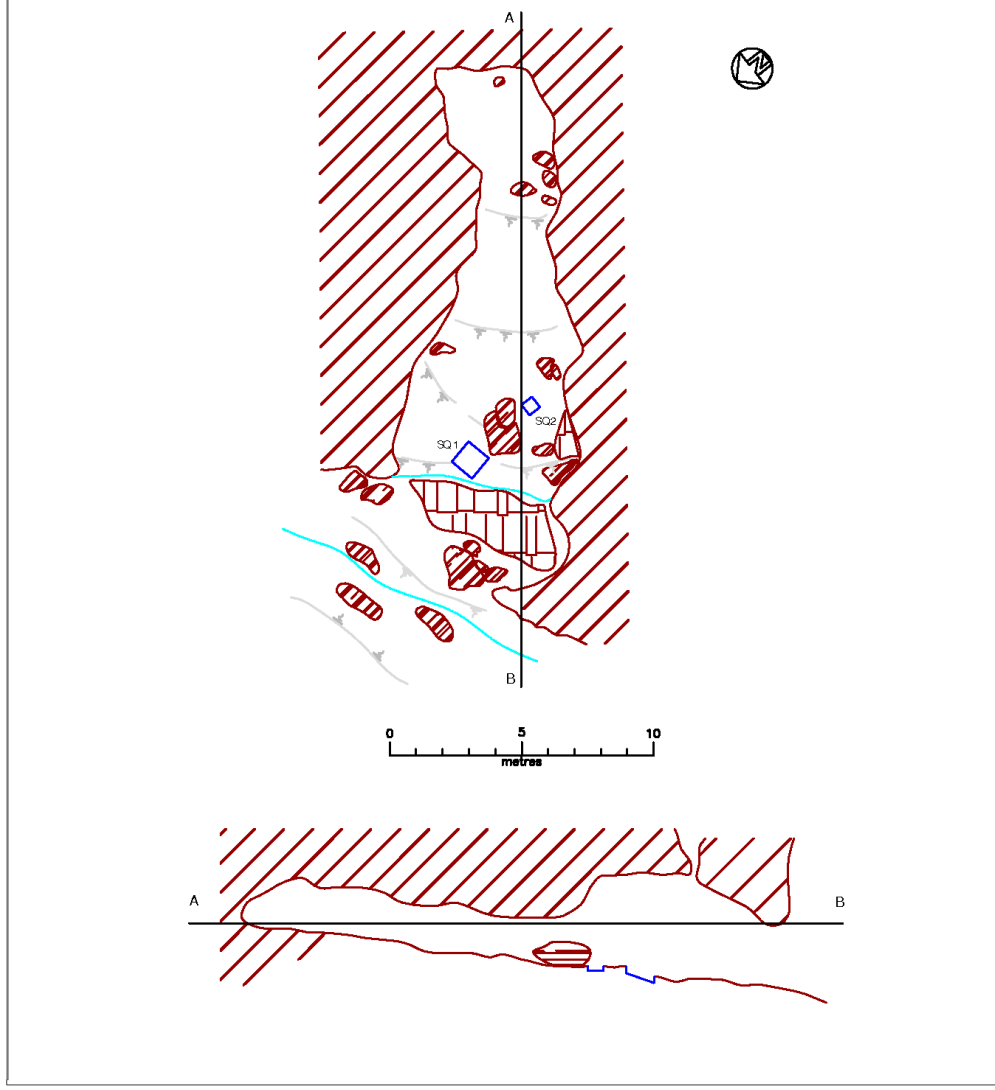

FIGURE A5.2: CB08-500: site plan and profile. (Drawn by M. Jimenez-Lozano).

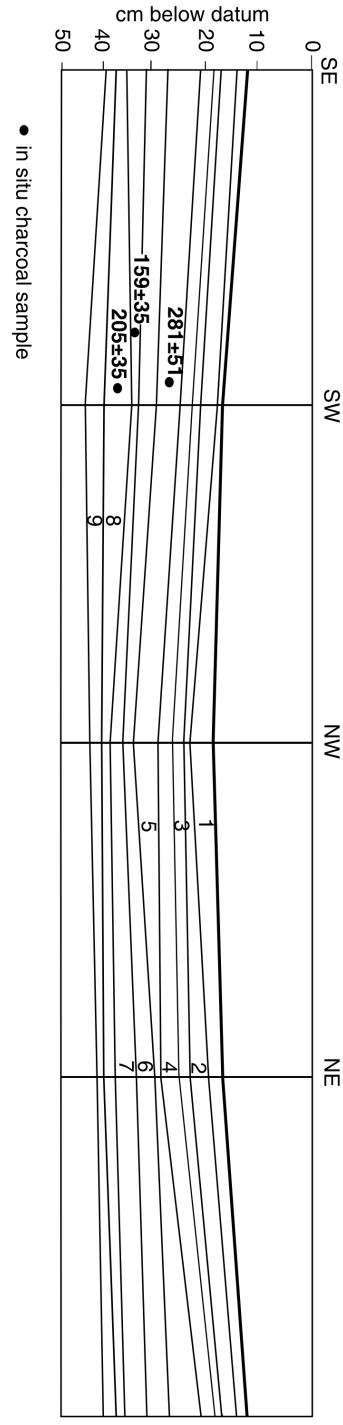

FIGURE A5.3: CB08-500: Square 1 excavation units, showing location of radiocarbon determinations.

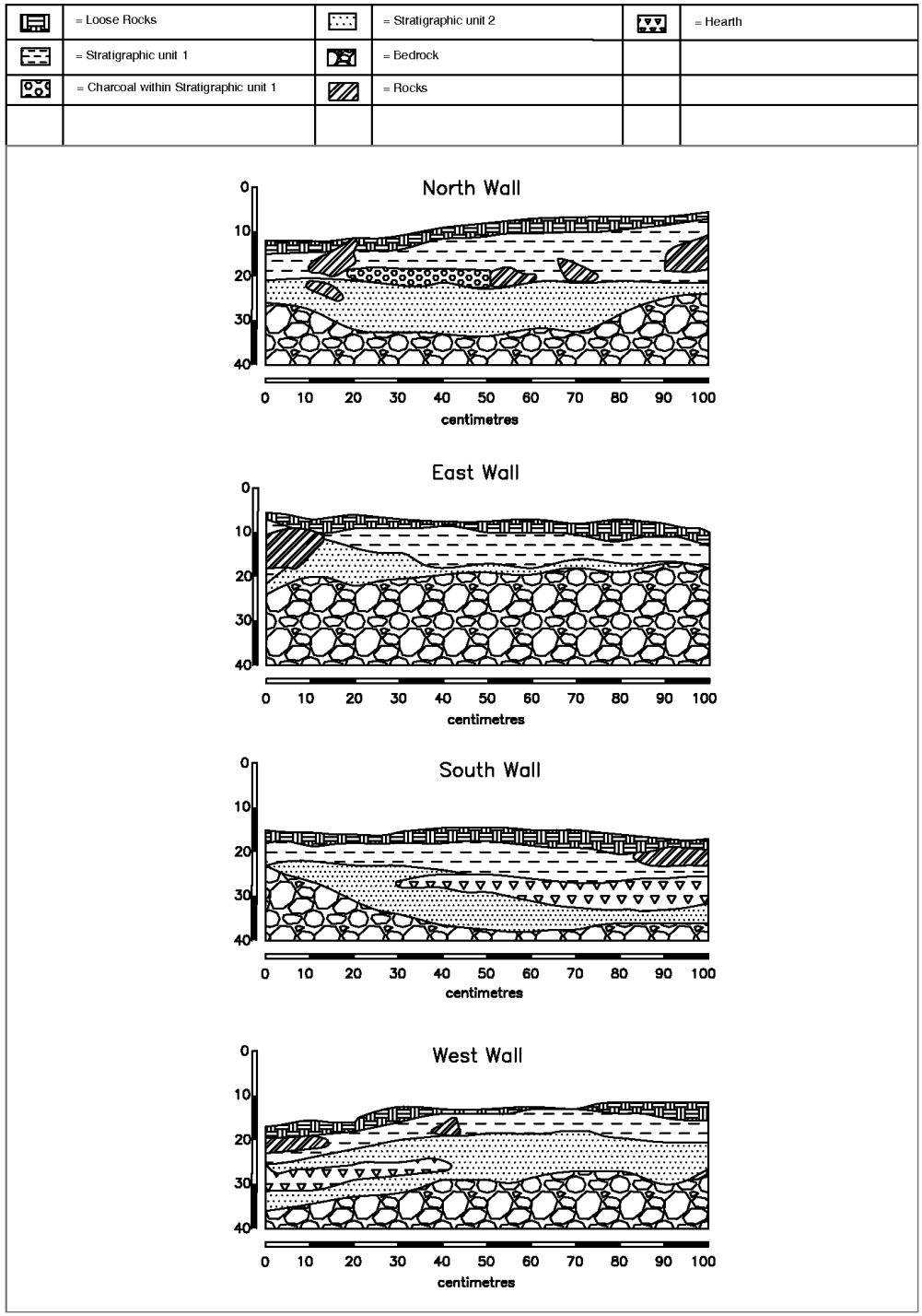

Figure A5.4: CB08-500: Square 1 section. (Drawn by M. Jimenez-Lozano).

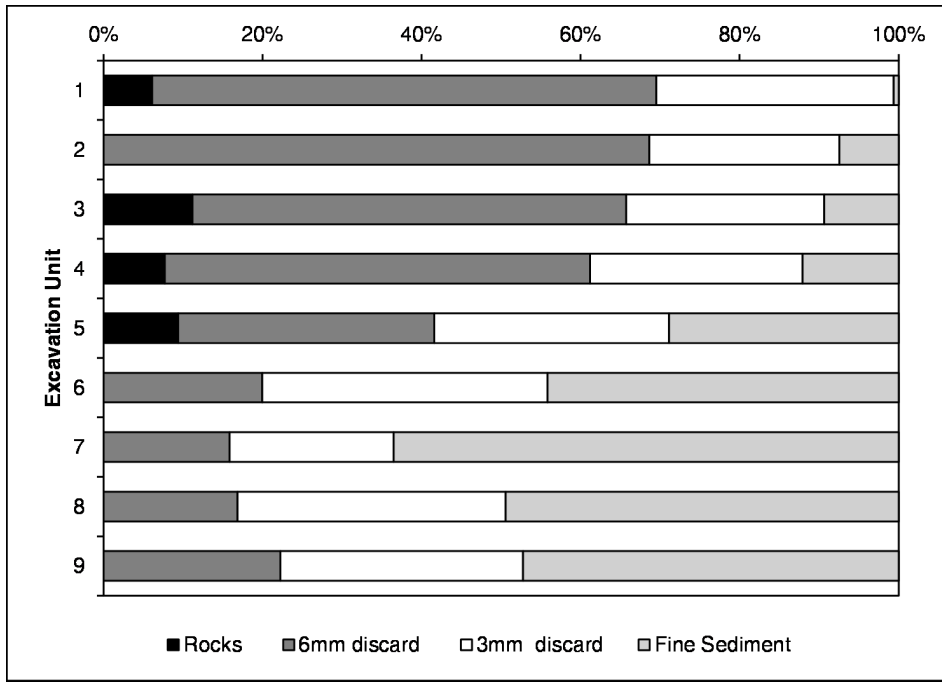

Figure A5.5: CB08-500: sediments.

FIGURE A5.6: CB08-500: Square 1. Hearth feature in section (top) and in plan (bottom).

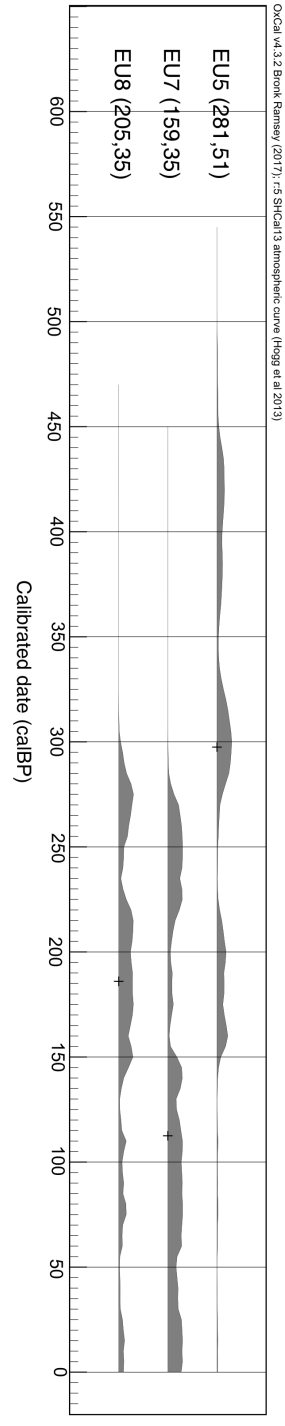

FIGURE A5.7: CB08-500: probability plot for calibrated radiocarbon determinations from Square 1.

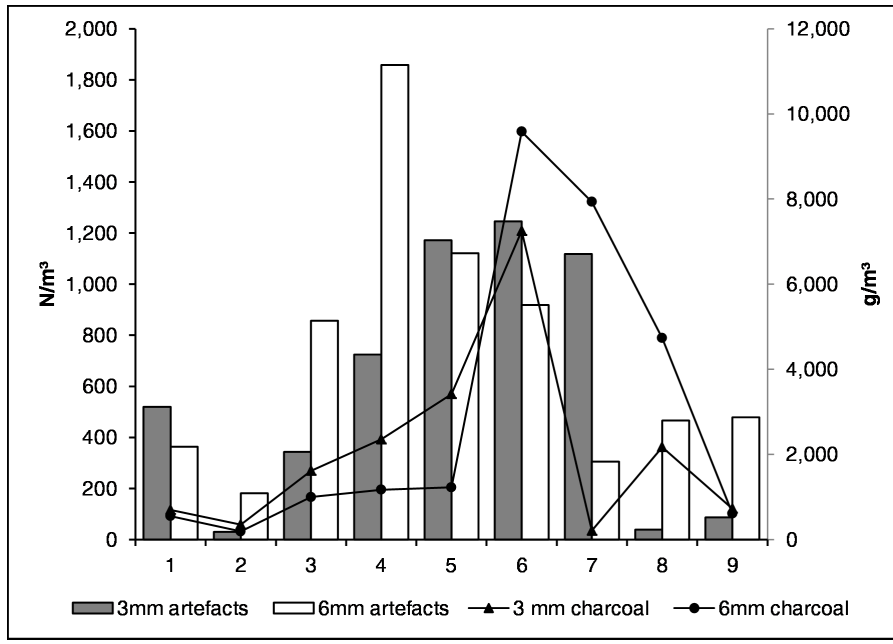

FIGURE A5.8: CB08-500: distributions of stone artefacts and charcoal by excavation unit.

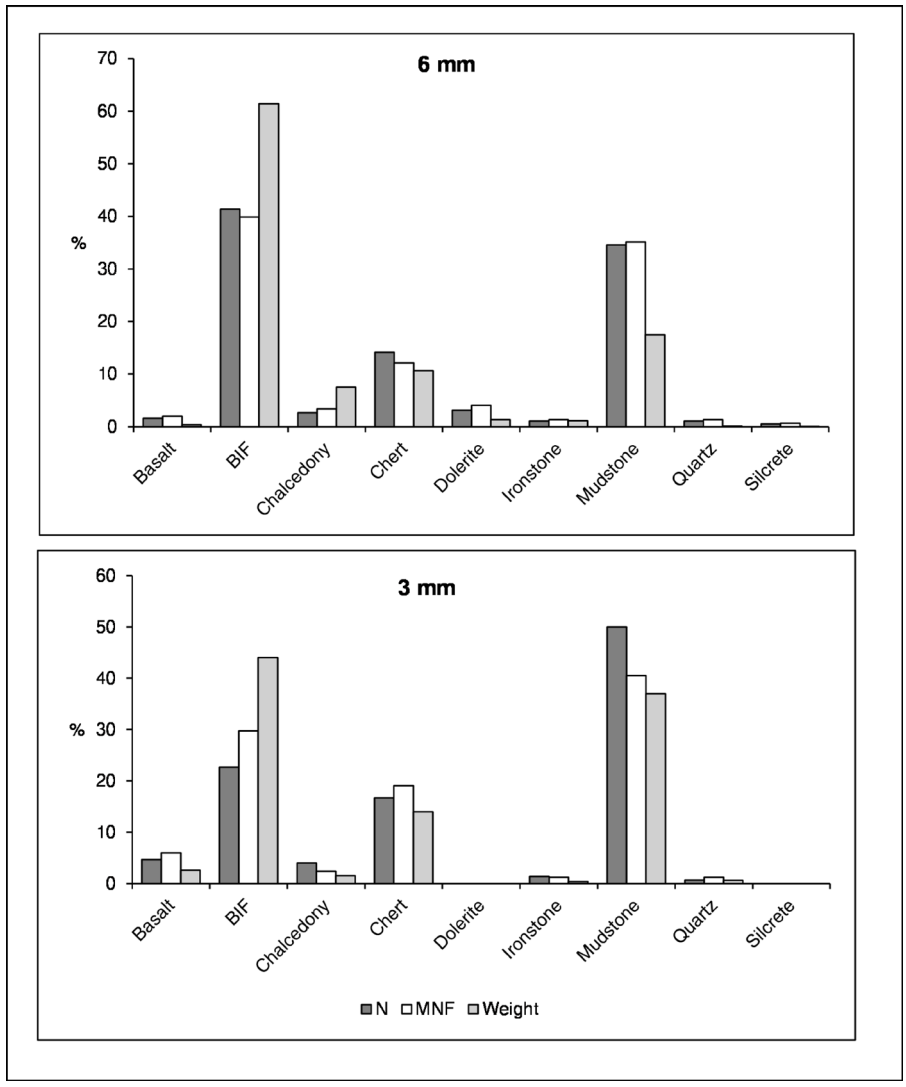

FIGURE A5.9: CB08-500: raw material composition for different sieve fractions.

Table A5.1: CB08-500: surface artefact assemblage.

	Basalt	*BIF*	*Chalcedony*	*Chert*	*Dolerite*	*Mudstone*	*Quartzite*	*Total*
Square 3								
Complete flake	1	3	1					5
Broken flake	1	1						2
Total square 3	2	4	1					7
Square 4								
Complete flake	1	4						5
Broken flake		1			2			3
Debris						1		1
Single platform core		1			1			2
Multi-platform core	1			1			1	3
Non-flaked					2			2
Total square 4	2	6		1	5	1	1	16
Total	4	10	1	1	5	1	1	23

Table A5.2: CB08-500: overall raw material composition (Chi-square for N=22.999, p<0.01, df=8).

	3 mm			6 mm		
	N	*MNF*	*Weight (g)*	*N*	*MNF*	*Weight (g)*
Basalt	7	5	0.29	3	3	1.89
BIF	34	25	4.94	79	59	314.14
Chalcedony	6	2	0.17	5	5	38.53
Chert	25	16	1.57	27	18	54.57
Dolerite	0	0	0	6	6	6.71
Ironstone	2	1	0.04	2	2	5.71
Mudstone	75	34	4.15	66	52	89.51
Quartz	1	1	0.07	2	2	0.44
Silcrete	0	0	0	1	1	0.31
Grand Total	150	84	11.23	191	148	511.81

Table A5.3: CB08-500: major artefact types by raw material and sieve fraction.

	3 mm			6 mm			
	Complete flake	*Flake fragment*	*Debris*	*Complete flake*	*Flake fragment*	*Debris*	*Core*
Basalt	3	4	0	1	2	0	0
BIF	19	15	0	54	12	12	1
Chalcedony	1	1	4	5	0	0	0
Chert	11	8	6	11	11	5	0
Dolerite	0	0	0	3	3	0	0
Ironstone	1	0	1	1	1	0	0
Mudstone	22	29	24	47	9	10	0
Quartz	1	0	0	2	0	0	0
Silcrete	0	0	0	1	0	0	0
Total	58	57	35	125	38	27	1

Table A5.4: CB08-500: platform types by raw material.

	Cortex	Crush	Flat	Focal	Total
Basalt	1	0	0	0	1
BIF	18	3	26	11	58
Chalcedony	0	0	5	0	5
Chert	0	1	9	3	13
Dolerite	0	0	5	1	6
Ironstone	0	0	2	0	2
Mudstone	20	1	16	16	53
Quartz	0	0	0	2	2
Silcrete	0	0	1	0	1
Total	39	5	64	33	141

Table A5.5: CB08-500: dimensions of complete flakes.

	BIF (N=54)		Mudstone (N=47)		Chert (N=11)	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Length (mm)	18.1	9.6	11.9	4.5	13.0	4.4
Width (mm)	19.4	10.6	12.8	4.9	12.5	3.5
Thickness (mm)	5.8	4.3	3.2	1.5	3.7	1.1
Mass (g)	4.7	11.0	1.4	3.7	0.8	0.5

GROUP 2

Group 2 is located in the next creek line to the west. Three shelters were excavated in this catchment. CB10-123 is the northernmost, while CB10-116 and CB10-117 are close together on opposite sides of a gulley just over 1 km south of CB10-123 (Figure A5.10). There are two more rockshelters in the same catchment north of CB10-123, with surface material only. One BIF flake and a BIF single platform core were recorded at CB10-125. CB10-127 is a small overhang; 12 BIF artefacts were recorded here, including a multiplatform core. A BIF quarry and associated artefact scatter, including knapping floors, is located within 100 metres (CB10-128). Otherwise, surface artefact scatters are sparse and mostly small, with a cluster of larger sites on either side of the main creek line within 500 metres south-east of CB10-116 and 117. Small artefact scatters and isolated artefacts occur on plateaus and knolls on either side of the creek line mainly to the east of CB10-116 and 117, and there is a cluster of isolated artefacts, which seems to be associated with CB10-123.

CB10-123 (DAA ID 30390)

CB10-123 is a north-facing shelter on the northern slope of a low hill (Figure A5.11). The site was first recorded in April 2010 and excavated in November 2011. The results of the excavation were described by Dias and Rapley (2013, 128–44) and this discussion draws on the data presented there.

The shelter is 5.5 m long and 6.9 m wide (floor area about 14.4 m^2) and is 2 m high at the drip line. A raised alcove at the rear of the shelter is 0.9 m long by 1.2 m wide and 0.4 m high (Figure A5.12). The talus slope is 30 m long, 15 m wide and slopes steeply down northward. At the base of the hill, 30 m to the north of the site, is a first order ephemeral creek. The shelter itself is largely free of vegetation, while the talus carries scattered eucalypts with an understorey of spinifex (*Triodia* spp.) and *Solanum* spp. Average ground visibility was estimated at 75%.

The surface assemblage comprised three BIF flaked stone artefacts (a complete flake and two flake fragments) close to the drip line and a large millstone fragment, also BIF, in the west of the shelter (Figure A5.13). Eleven depth probes indicated the deposit ranged from 4 to 30 cm deep.

A single 1 × 1 m test pit was placed on the west side of the shelter where the millstone fragment was found.

Excavation results

The test pit was excavated in five units and bedrock was exposed across the entire square at a depth of 23 cm (Figure A5.14, A5.15). EU1 comprised a dry, fine and loose reddish-brown soil interspersed with compact gravel and large rocks (SU1). In the eastern corner of EU2 a light brown soil appeared (SU2) while the southern corner contained loose, dry deposit with an area of grey specked soil, probably the result of degraded white roof fall. Large rocks were noted in the north of the square. Bedrock began to appear in the north-east corner at the base of EU3. Compact fine brown sediment with highly fragmented and degraded bedrock and increased moisture content appeared towards the base of EU4 (SU3). The deposits were acidic throughout (pH 4.5–5).

Charcoal was highly fragmented and no discrete hearths were identified. Charcoal occurred throughout the deposit, although most came from EU1–3. Two charcoal samples were submitted for radiocarbon dating, from EU2 and from EU4 (see Table 5.4, Figure A5.16). These determinations are in stratigraphic order.

The distribution of both artefacts and charcoal (Figure A5.17) shows a marked peak in distribution in EU1–3. Very small numbers of artefacts were recovered from EU4 and EU5. It is difficult to be certain how the radiocarbon determinations relate to the cultural material. However, it seems likely that this distribution indicates that most of the cultural material relates to a single episode of occupation in the late Holocene, with a possible earlier episode of occupation in the early Holocene.

Non-cultural organic material was recovered from all excavation units, comprising charcoal, insect remains, plant materials and macropod scats, although most came from EU1. No bone was recovered. Small quantities of insect remains and insect nests were identified from all excavation units (Dias and Rapley 2014, 131–32).

Stone artefacts

Fifty-seven artefacts were recovered from the excavation. Fifty-four came from the 3 mm sieve fraction, and most of these came from EU1–3. Only four BIF complete flakes were recovered from EU4 and 5 (Table A5.6). BIF comprised 41% of the 3 mm sieve fraction, with chert and mudstone each making up 22%. Chalcedony and basalt were the other raw materials present. The presence of artefacts in the 3 mm sieve fraction indicates that knapping was carried out on site. These artefacts probably indicate retouch or core preparation. Two mudstone artefacts came from EU1, a single platform core (in situ) and a complete flake from the 6 mm sieve fraction. The mudstone core had 40% terrestrial cortex, weighed 23.8 g and could have been left at the shelter for future use.

Discussion

CB10-123 has shallow deposits and sparse evidence of occupation. The widely separated radiocarbon dates suggest an initial occupation episode in the early Holocene, followed by re-use in the last thousand years. Alternatively, they could be interpreted as indicating extremely slow accumulation of sediments. In either case, the small quantity and limited size range of the artefacts suggest only brief visits, during which stone tools were likely manufactured or repaired. However, the presence of a millstone, and perhaps the mudstone core, suggests that the shelter was a place that was regularly visited, at least in the recent past.

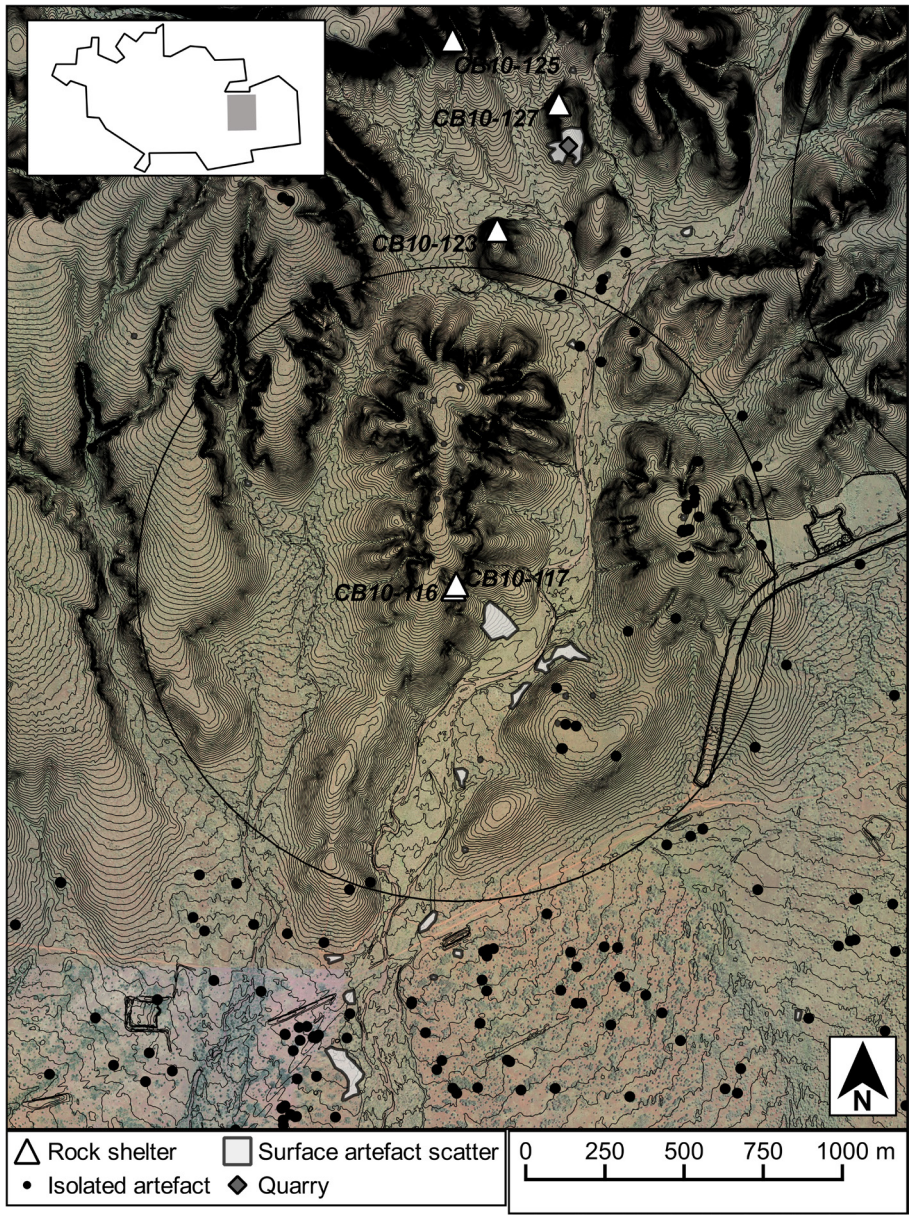

FIGURE A5.10: Group 2: the circle defines Group 2A.

Figure A5.11: CB10-123: general view.

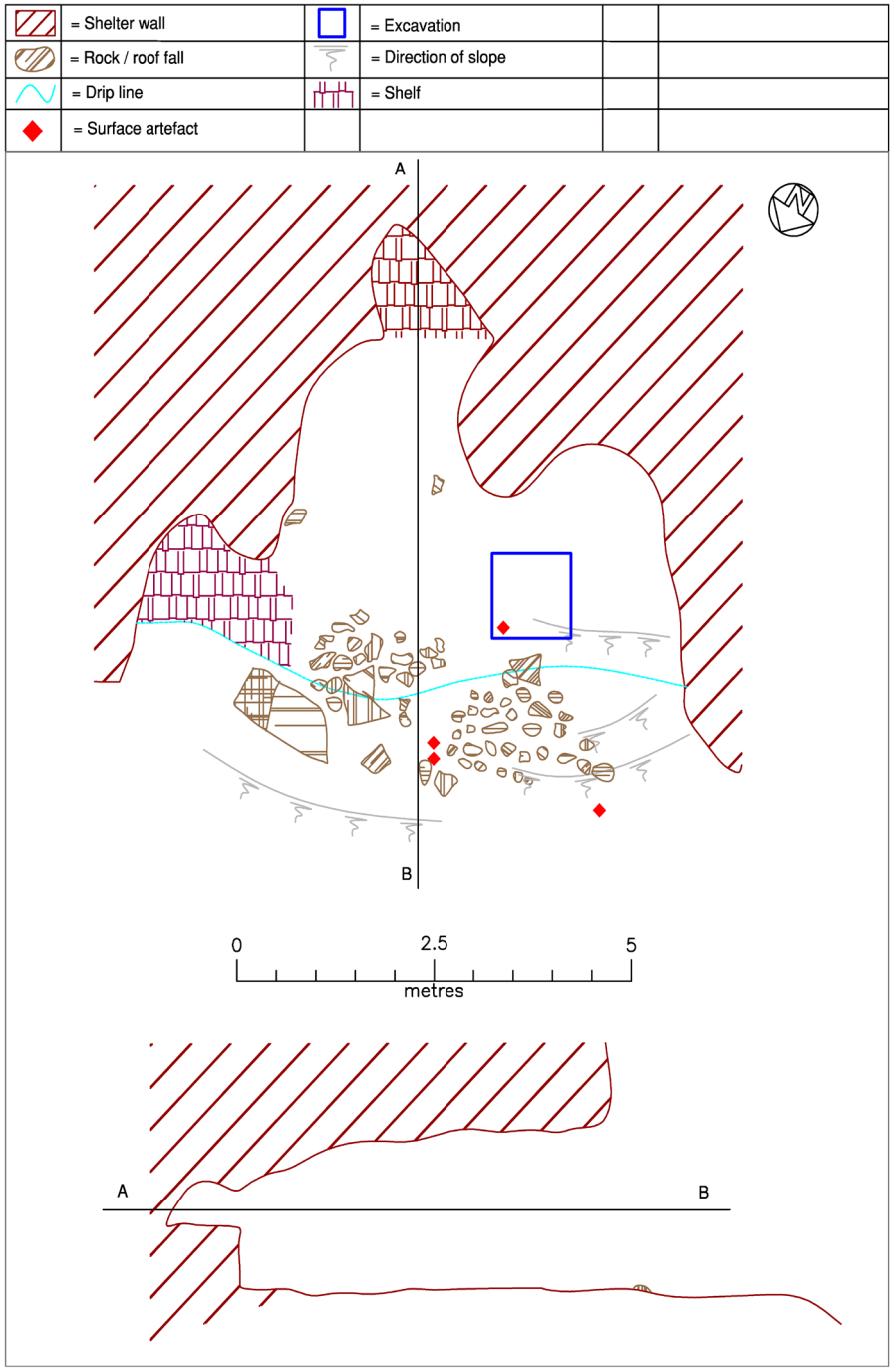

FIGURE A5.12: CB10-123: site plan and profile. (Drawn by M. Jimenez-Lozano).

FIGURE A5.13: CB10-123: banded iron formation millstone fragment on shelter floor.

FIGURE A5.14: CB10-123: excavation (a) and south section (b).

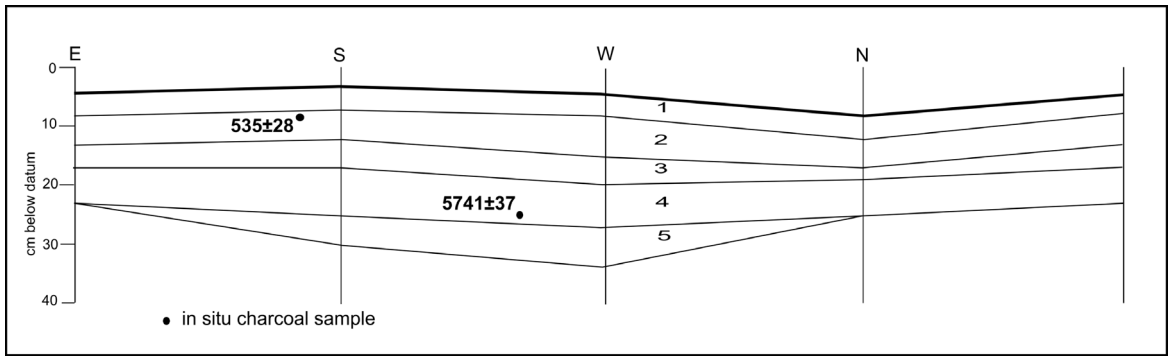

FIGURE A5.15: CB10-123: excavation units and location of in situ charcoal samples.

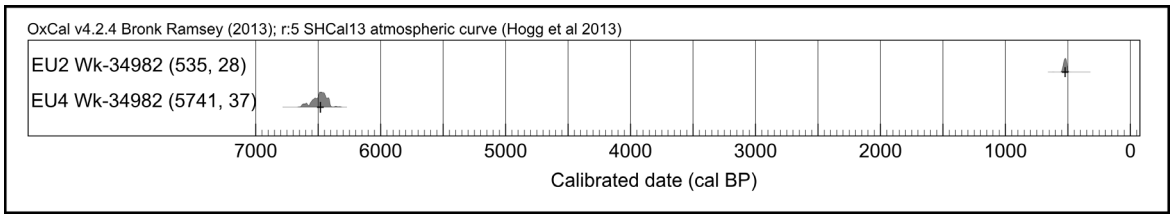

FIGURE A5.16: CB10-123: probability plot for calibrated radiocarbon dates.

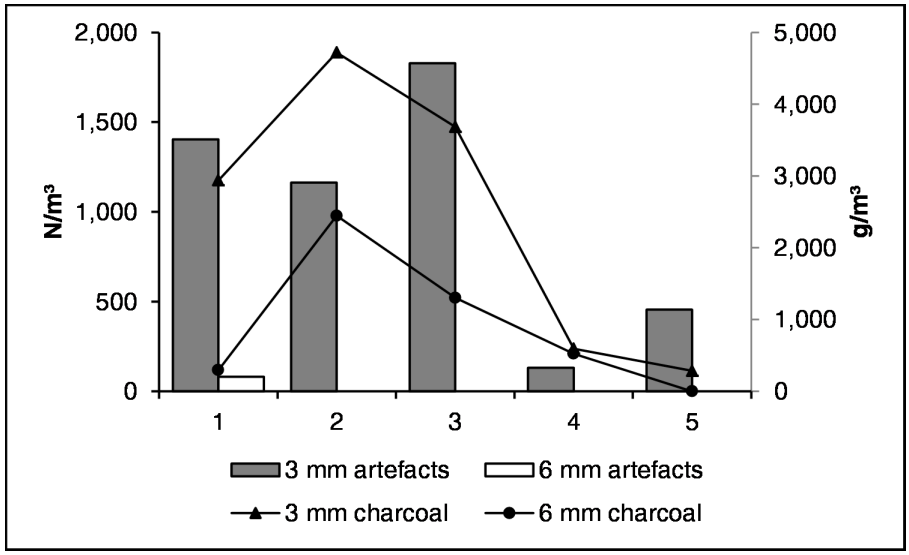

Figure A5.17: CB10-123: distribution of artefacts and charcoal.

Table A5.6: CB10-123: summary of artefacts from the 3 mm sieve fraction.

	Complete flake	*Broken flake*	*Debris*	*Total*
Basalt	1	0	0	1
BIF	19	3	0	22
Chalcedony	6	1	0	7
Chert	7	3	2	12
Mudstone	11	1	0	12
Total	44	8	2	54

CB10-116 (DAA ID 29120) AND CB10-117 (DAA ID 29121)

CB10-116 and CB10-117 were both first recorded in 2010 and excavated in 2011 (Edwards and Hook 2011, 50–84). This discussion draws on the data presented more fully there.

CB10-116 is a small rockshelter within a banded ironstone outcrop on an east-facing gully wall about 300 m west of a large third order ephemeral creek (Figure A5.18). CB10-117 is a small, south-facing rockshelter 10 m north-east of CB10-116 on the opposite slope (Figure A5.18). At the time of excavation, the area had been recently burnt. Remaining vegetation comprised scattered eucalypts and acacia.

CB10-116 is 1.9 m high at the drip line with a floor area of 13.6 m wide by 6.2 m deep (about 64 m^2). Only the front of the shelter is suitable for occupation as the roof drops to less than 1 metre in height about 3 m in from the drip line. The floor is level with fine sediment, gravel and roof fall (Figure A5.19). A surface sample of stone artefacts was recorded from a 1 × 1 m square in the centre of the shelter, comprising eight chert and chalcedony flakes and flake fragments.

CB10-117 is 2.4 m high at the drip line with a floor area of 6 m wide by 9.5 m deep (about 88 m^2). The shelter is quite spacious, but the floor is covered with large slabs of roof fall. There was little surface material. Two complete flakes and a single platform core, all chert, were recorded.

Probing showed that the deposit at each shelter ranged from 6 cm to 40 cm deep. An 1 × 1 m square test pit was excavated at CB10-116 at the point where the deposit was deepest. Two 0.5 × 1 m test pits were excavated at CB10-117. Pit A was placed near the west wall and Pit B in the centre of the shelter.

CB10-116 excavation results

CB10-116 was excavated in three excavation units. There were two stratigraphic units. SU1 (comprising all of EU1) was loose degraded banded iron gravel, small roof fall and assorted organic material. The start of SU2 at EU2 was defined by a change in deposit to small gravel (<1 cm) embedded within a darker matrix of fine sediment that became increasingly compact until bedrock was exposed across the entire base of the pit within EU3 at 11 cm below the surface (Figures A5.22, A5.23). Small amounts of organic material

occurred in EU1 (macropod scats, plant remains and insect remains) and to a lesser extent in EU2 (macropod scats and plant remains only). A single undiagnostic bone fragment was found in EU1. The sediments were weakly acidic (pH=6) throughout.

Fine charcoal occurred throughout the deposit. Most was recovered from the 3 mm sieve fraction. Two samples from the 6 mm fraction, one from EU1 and one from EU3, were sent to the Waikato Laboratory for radiometric dating (see Table 5.4, Figure A5.24). The two dates are stratigraphically inverted. However, the radiocarbon determinations overlap at one standard deviation and, given that the charcoal sample came from the 6 mm sieve fraction, it seems likely that these dates are the same. The shelter was thus probably used within the last 400 years.

The distribution of both artefacts and charcoal from the 3 mm and 6 mm sieve fractions shows some variation. Artefacts from the 3 mm fraction peak in EU1 while those from the 6 mm fraction peak in EU3. Charcoal is sparse in the 6 mm fraction and peaks in EU2 in the 3 mm fraction. This may indicate some size sorting, but the deposit is so shallow (about 10 cm) that it seems likely that the excavated material represents a single episode of use and should be analysed as a single unit.

Stone artefacts

A total of 46 artefacts was recovered from the excavation. Twenty were from the 6 mm sieve fraction and 26 from the sampled 3 mm sieve fraction. The majority of artefacts from the 3 mm sieve fraction came from EU1 and 2 (25). By contrast more than half (11) of the artefacts from the 6 mm sieve fraction came from EU3.

Most artefacts from the 6 mm sieve fraction were chert flakes and flake fragments (17) (Table A5.7, Figure 5.26). One chert flake from EU3 had secondary retouch on two margins. Two BIF flakes and one basalt flake fragment were also found. In the 3 mm sieve fraction the picture is somewhat different. Eighteen artefacts were BIF, with four each of chert and basalt. All were flakes or flake fragments.

Thirty-five per cent of flakes in the 6 mm fraction were cortical (Table A5.8) and about 35% of platforms were also cortical (Table A5.9).

Discussion

The sample size is clearly very small. However, BIF's dominance in the 3 mm fraction suggests that retouch and/or core preparation of this material occurred on site. By contrast, the chert assemblage suggests either early stage reduction of at least one chert core or the introduction of larger flakes to the site. This raises the intriguing possibility that, in the recent past, the shelter perhaps provided a space for replacing and repairing equipment, involving the replacement of chert tools with BIF.

CB10-117 excavation results

The two test pits at this site produced somewhat different results and will therefore be discussed separately.

Square A. Square A was excavated in nine excavation units (Figure A5.27a). The deposits were generally uniform throughout and characterised by fine, loose, dusty sediment intermixed with gravel (Figure A5.28). Exfoliating bedrock began to appear within EU5 and constituted the southern half of the pit by EU7. Bedrock was finally reached at the base of EU9, 41 cm below surface.

Plant material occurred throughout, with macropod scats in EU1 to 5 and EU7 and insect remains in EU1 to 7. Most organic remains, however, occurred in EU1 and 2. Bone also occurred in EU1 and 2, and included vertebrae and jawbones of reptiles, such as snake and lizard, and fragments of mammalian long bone and macropod teeth. There was no unequivocal evidence of human modification, although some of the bone was charred. The deposits were acidic throughout (pH 5–6.5) (Edwards and Hook 2011, 66).

Most of the charcoal was recovered from the 3 mm sieve fraction and was therefore fine. There is a marked peak in the distribution of charcoal in EU2, and it is very sparse in EU4 and below (Figure A5.29). A sample of in situ charcoal from EU2 (8 cm below surface) was sent to Waikato Laboratory for radiometric dating (see Table 5.4).

The distribution of stone artefacts is largely opposite to the distribution of charcoal (Figure A5.29). Only five artefacts were recovered from the 6 mm sieve fraction or in situ and all were found in the upper units (EU1, 2 and 4). These include a chert multiplatform core on the surface, three chert

flakes or flake fragments and a BIF flake. The chert core weighs 196 g and is nearly twice the estimated nodule volume of chert cores in the Christmas Creek area (see Table 4.11, Chapter 4). Fifty-eight artefacts were recovered from the 3 mm sieve fraction and these show a peak in EU5–7. All were flakes or flake fragments with the exception of five pieces of debris: three BIF and one each of chert and quartzite. Two chert flakes were found in EU1 and 2, and one mudstone flake in EU5. All the rest of the artefacts were BIF.

Square B. Square B was excavated in four units (Figure A5.27). EU1 was a loose sandy deposit with some more compacted material in the centre. Below this the deposit was darker and more compacted. Bedrock began to appear at the base of EU3 and was completely exposed at the base of EU4, at a depth of 17 cm below surface.

Macropod scats, plant material and insect remains occurred throughout the deposits. Macropod scats decreased with depth and a small number of small mammal scats occurred in EU2 and 3. Bone occurred throughout the deposit with a total of 206 pieces, mostly small and highly fragmented. They included frog, lizard, snake, unidentified reptile, and macropod teeth and long bone fragments. Bat or bird long bone fragments were also noted. Some bone in EU3 and 4 showed signs of charring. A small amount of red macropod fur was found in EU4; this is unlikely to be cultural.

Charcoal occurred throughout the deposits but there was a marked peak in EU3 and 4 (Figure A5.30). One piece of in situ charcoal from EU4 (depth 17 cm) was sent to Waikato Laboratory for radiometric dating (Table 5.4). It returned a result in the early Holocene (8255 cal BP).

Only 15 stone artefacts were recovered and all came from the 3 mm sieve fraction. A single complete chert flake was found in EU1. Two chert flakes were found in both EU2 and 3. The remainder were mostly BIF complete flakes with one BIF piece of debris in each of EU2–4.

Discussion

The results from CB10-117 are difficult to interpret given the wide discrepancy between the radiocarbon determinations in the two test pits and the sparseness of the assemblage. It seems likely that history of deposition in the shelter is complex and the centre and interior of the shelter may preserve

older deposits than the periphery. Thus, the two test pits provide samples of different episodes of occupation: an early Holocene occupation from Square B and a more recent occupation, within the last 1000 years.

The stone artefact assemblage from Square B is particularly sparse. It indicates that flaking occurred in the shelter and mostly likely represents an episode of retouch or core preparation. The assemblage from Square A is slightly larger but still dominated by the 3 mm fraction. Artefacts recovered from the 6 mm sieve fraction or found in situ occur only on the surface or in the upper excavation units. Given the configuration of the bedrock and the small area excavated in EU6 and below, it is possible that the material recovered from the lower units has moved down the profile or collected in a hollow in the floor of the shelter. The artefact material from Square A is best considered as a single time-averaged episode of use with an estimated age of about 600 years. The marked disparity in assemblage composition in the 3 mm and 6 mm assemblages suggests that the assemblage results from brief occupation. The presence of two chert cores on the surface indicates provisioning of the shelter with raw material. Both cores are large, with volumes well above the estimated nodule volume for the Christmas Creek study area (see Table 4.11, Chapter 4).

FIGURE A5.18: General views of CB10-116 (top) and CB10-117 (bottom).

Figure A5.19: CB10-116.

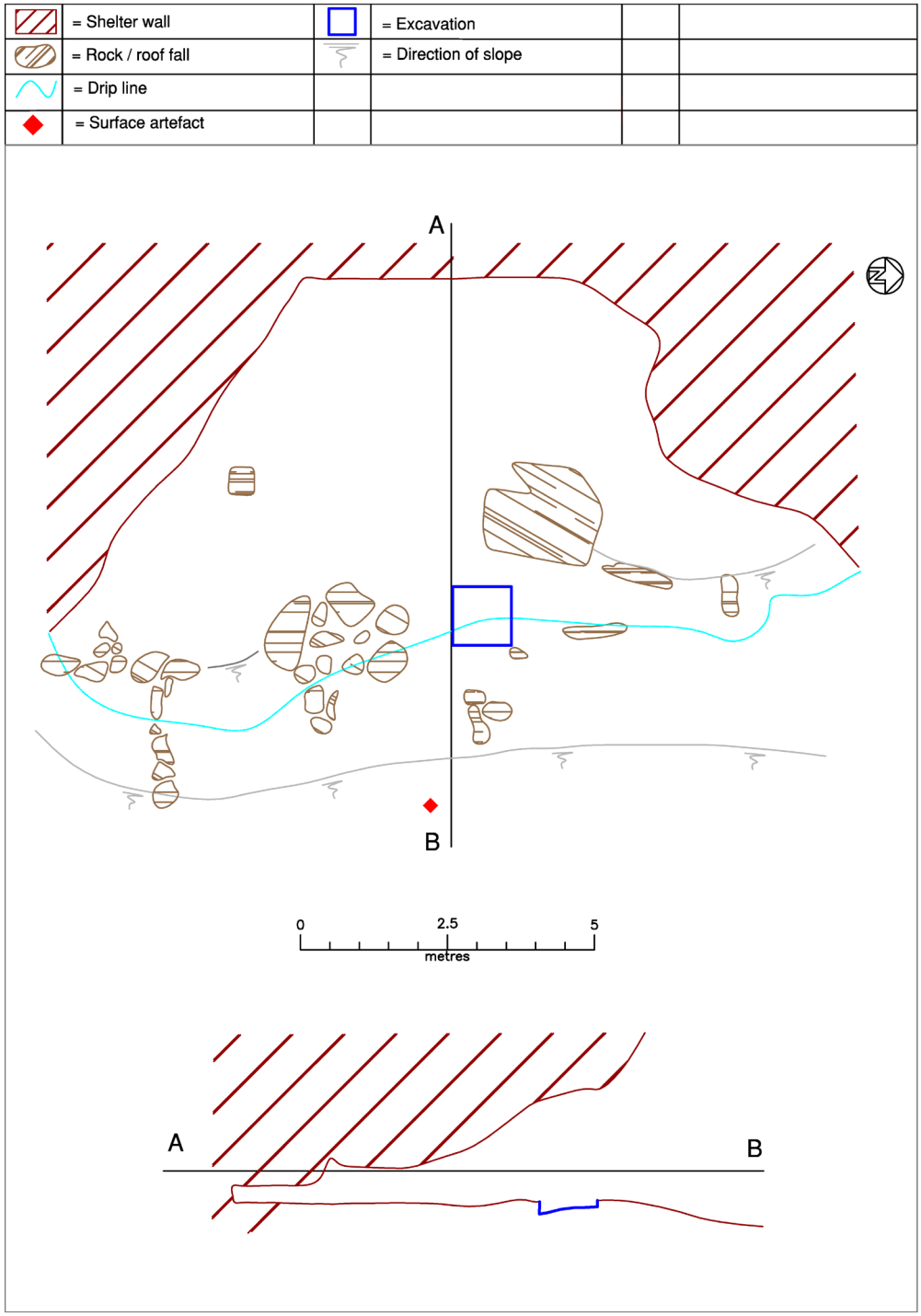

FIGURE A5.20: CB10-116: plan and profile. (Drawn by M. Jimenez-Lozano).

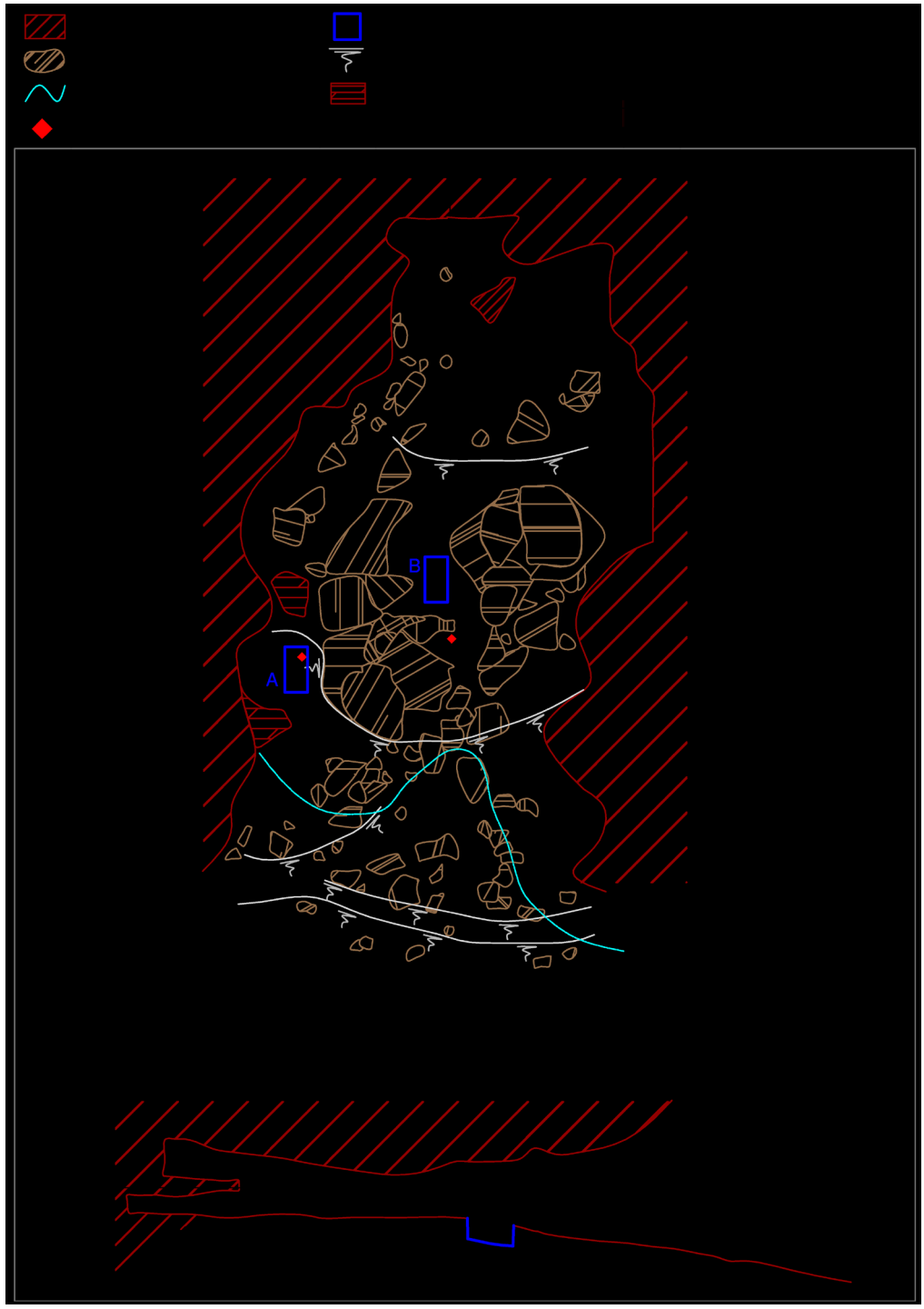

FIGURE A5.21: CB10-117: plan and profile. (Drawn by M. Jimenez-Lozano).

FIGURE A5.22: CB10-116: base of excavation (top) and west section (bottom).

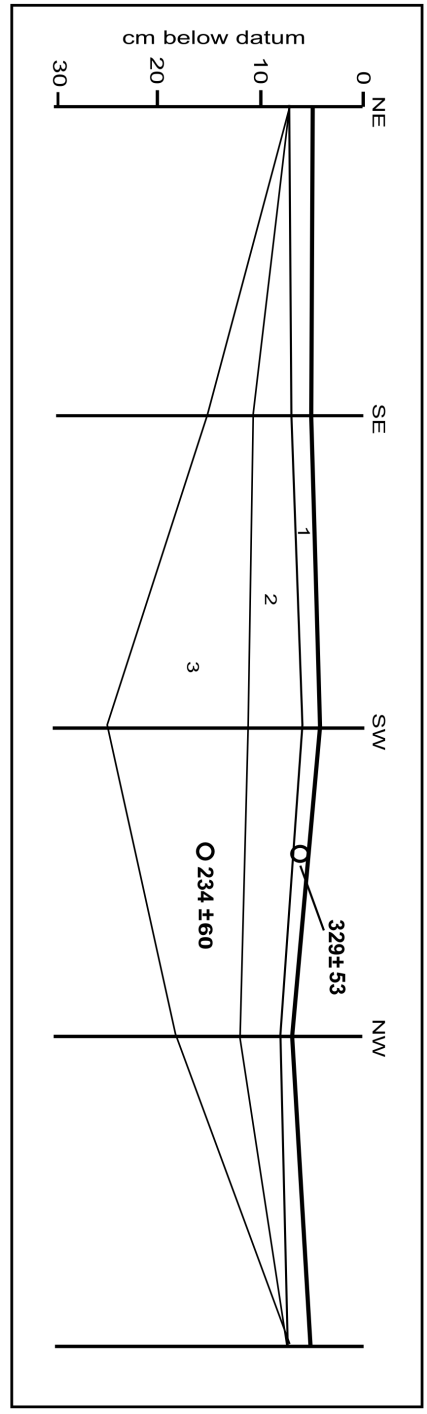

FIGURE A5.23: CB10-116: excavation units showing approximate level of radiocarbon samples.

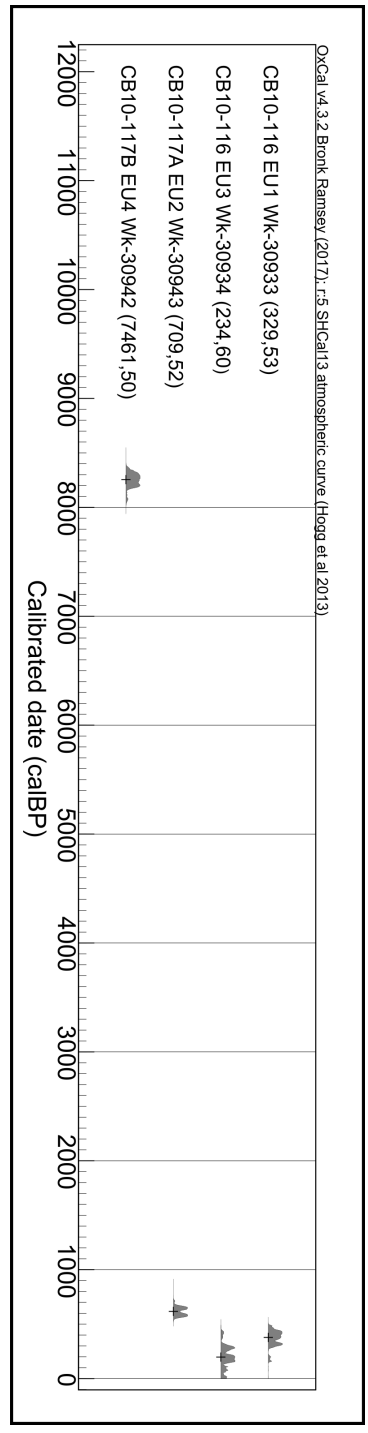

FIGURE A5.24: Probability plot for calibrated radiocarbon dates from CB10-116 and CB10-117.

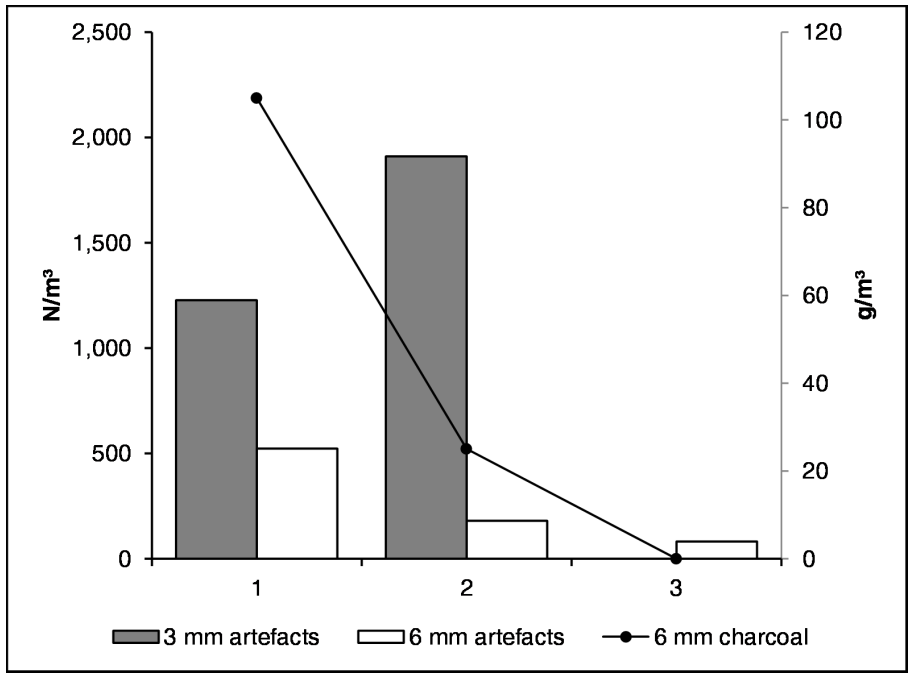

FIGURE A5.25: CB10-116: distribution of stone artefacts and charcoal.

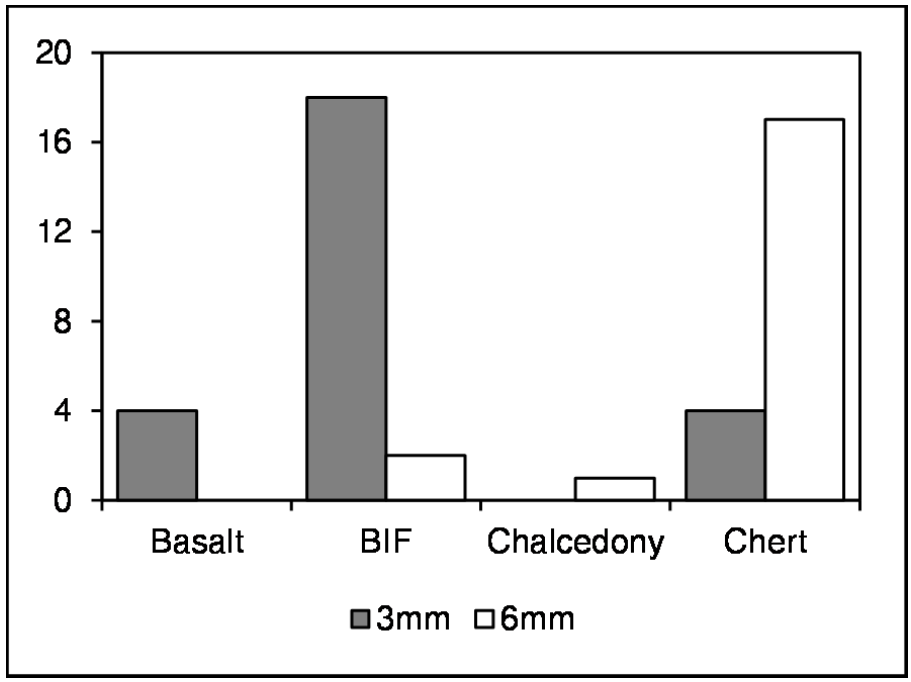

FIGURE A5.26: CB10-116: assemblage composition by sieve fraction.

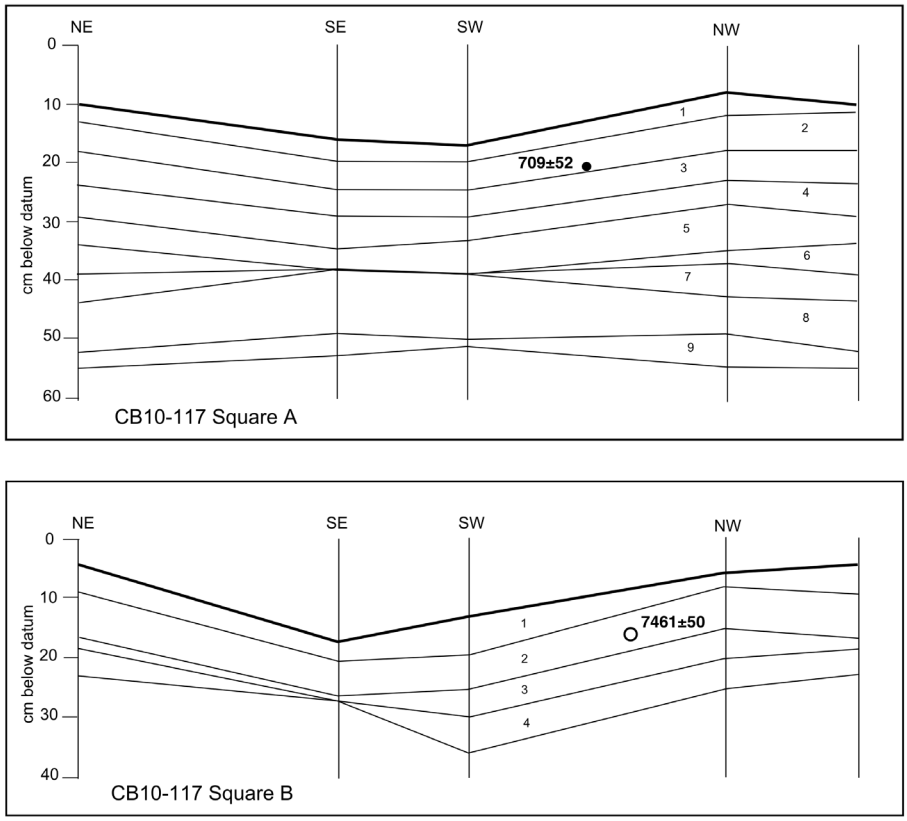

FIGURE A5.27: CB10-117: excavation units showing approximate level of in situ (filled circle) and sieve (open circle) radiocarbon samples.

Figure A5.28: CB10-117: excavation of Square A, east section.

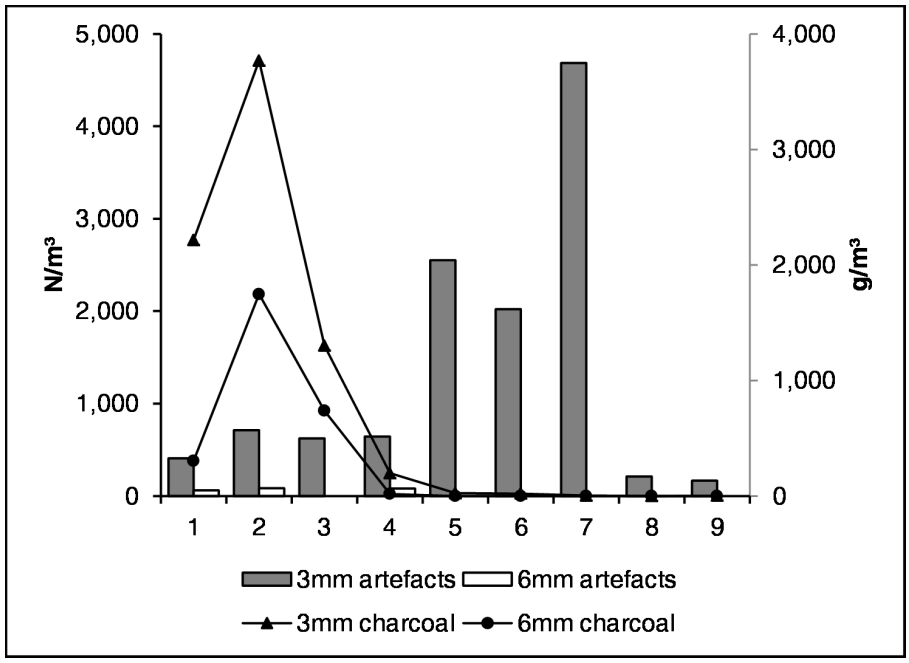

Figure A5.29: CB10-117, Square A: distribution of artefacts and charcoal.

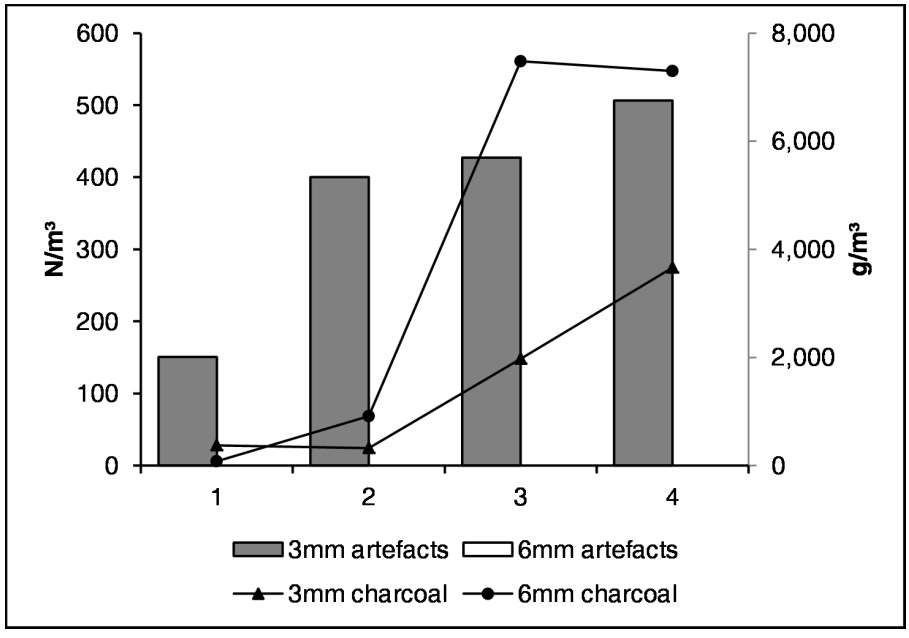

Figure A5.30: CB10-117, Square B: distribution of artefacts and charcoal.

Table A5.7: CB10-116: assemblage composition.

	3 mm			6 mm			
	Complete flake	*Broken flake*	*Total*	*Complete flake*	*Broken flake*	*Debris*	*Total*
Basalt	2	2	4	0	0	0	0
BIF	9	9	18	1	1	0	2
Chalcedony	0	0	0	0	1	0	1
Chert	2	2	4	10	6	1	17
Total	13	13	26	11	8	1	20

Table A5.8: CB10-116: distribution of cortex by raw material (6 mm).

	BIF	Chalcedony	Chert	Total
Cortical	1	0	6	7
Non-cortical	1	1	11	13
Total	2	1	17	20

Table A5.9: CB10-116: platform type by raw material (6 mm).

	BIF	Chert	Total
Cortical	0	5	5
Crush	0	1	1
Flat	2	5	7
Focal	0	1	1
Total	2	12	14

GROUP 3

Group 3 comprises the Kakutungutanta Creek system (see Figure 6.7) and is discussed in detail in Chapter 6. There is a high density of archaeological features within this catchment, including six excavated rockshelters. There are also a number of stone features associated with rockshelters. Surface artefacts are sparse and tend to occur at the southern end of the creek line, with several surface artefact scatters within 500 metres of CB10-92 and CB10-98, where the creek enters the alluvial plains.

CB10-133 (DAA ID 29122)

CB10-133 is a large, east-facing, multiple-chambered rockshelter situated in a banded iron formation rock face that forms part of a gully system. Sparse mulga and other acacia shrubs line the mouth of the shelter along with scattered fig trees. The ground surface consists of outcrops and exfoliating slabs of BIF with estimated visibility of 70%. The shelter itself is largely devoid of vegetation, except for seasonal grasses. The site was originally recorded and excavated in 2010. The excavation was described by Edwards and Hook (2011, 85–119). This discussion draws on data presented there.

The two chambers located at the front of the shelter are divided by a large central pillar at the entrance (Figure A5.31, A5.32). Chamber 1, the southernmost, is 3.3 m high at the drip line and 7 m wide by 13.2 m deep. Chamber 2 has a similar height and is 7 m wide by 10 m deep. These two chambers join behind the pillar, where the roof height drops and the shelter narrows before opening out into a third chamber. Chamber 3 is 1.6 m high at the entrance and 7.4 m wide by 21 m deep. The floor slopes steeply towards the entrance (Figure A5.32). There is a short talus slope descending to a third order creek about 5 m away.

During the original field recording, 36 flaked stone artefacts were recorded on the surface in Chamber 1 from two 2 × 2 m sample squares. Most were BIF (25), with the rest being chert (8) or chalcedony (3). A chert geometric microlith was also found. As well as flakes and flake fragments, nine cores were recorded. These included five BIF cores (one single platform and four multiplatform), two chert single platform cores and two chalcedony cores (one single and one multiplatform), as well as a dolerite

millstone that had also been flaked. Subsequent detailed surface recording showed that three millstones, a muller and a hammer stone were present at the front of chambers 1 and 2 (Figures A5.32, A5.33). A fragment of baler shell was also recorded (Figure A5.33).

Table A5.10 summarises the surface flaked stone artefact assemblage recorded at the time of excavation. Most artefacts were found in Square A and more than half were mudstone. Three retouched pieces were recorded, all from the area of Square A. Two of these were geometric microliths, one of chalcedony, the other chert. The third was a mudstone flake with macroscopic edge damage due to use.

Several pieces of wood were found in Chamber 3 (Figure A5.34). Some lay on the surface toward the centre, while others were lodged behind roof fall at the rear of the shelter or on a ledge on the rear wall. The size of these fragments and their out-of-the-way location suggest they were deliberately cached. Two had cut marks and one was charred and may have been used as a torch or firestick. Four samples were taken for radiocarbon dating and yielded results ranging from 486 to 932 cal BP (see Table 5.4).

Only Chamber 1 was considered suitable for excavation. This is because it has sufficient roof height and space to move around and the ground surface was a dry loose sedimentary matrix largely free of roof fall. While Chamber 2 is also large enough for occupation the floor area was covered in roof fall and bedrock. Chamber 3 is fairly confined with a narrow entrance and limited light. Eight depth probes in areas free of roof fall in Chamber 1 indicated that the deposit ranged from 4 cm to 17 cm. Three 1 × 1 m test pits (Squares A, B and C) were excavated in areas with the deepest deposit in Chamber 1. Squares A and B were placed close to the drip line, while Square C was located in the interior of the shelter (Figure A5.32).

Excavation results

The deposits in Square A comprised a single stratigraphic unit excavated in five excavation units (Figure A5.35). The deposits were unconsolidated and mixed with gravel. Bedrock and large immovable roof fall began appearing at the base of EU2 in the eastern part of the test pit and, in EU4 and 5, the area excavated was restricted (Figure A5.36). The test pit was terminated at

about 20 cm below the surface. No features were observed during excavation. The deposits were consistently acidic throughout (pH 5–6.5).

Fine charcoal was found throughout, but large pieces only occurred in EU1 and 2 and there was little charcoal in the lower excavation units. Most of the 132 artefacts recovered were also found in EU1 and 2. Two flakes from the 6 mm sieve fraction were recovered from EU3 and 4 and a total of 11 artefacts from the 3 mm sieve fraction sample were recovered from EU4 and 5. When corrected for excavated volume, this sparse assemblage forms a marked secondary peak in the distribution of cultural material. However, this material is most probably derived from downward movement of artefacts from EU1 and 2, given the small area excavated and the large number of immovable rocks (Figure A5.37). Organic remains were present throughout and included macropod scats (EU1 and 2 only), plant remains (mostly in EU4) and insect remains (EU1, 2, 4 and 5, increasing towards the base). Seven small, undiagnostic bone fragments occurred in EU1 and 2. All these remains are assumed to be non-cultural.

Small fragments of red, yellow, white and grey ochre were also found in EU1–4, with red ochre the most common. However, ochre occurs naturally within the banded iron formation and is unlikely to be cultural.

Square B was similar to Square A in that it comprised a single stratigraphic unit of unconsolidated sediment mixed with gravel. This was removed in three excavation units (Figure A5.35). Bedrock began to appear in EU2 and was completely exposed at the base of EU3, 16 cm below surface.

Charcoal occurred only in EU1 and 2 and was restricted to the 6 mm sieve fraction. Most artefacts were recovered from EU1 and 2. Only four artefacts occurred in EU3, all found in the 6 mm sieve fraction (Figure A5.38). Organic remains occurred in EU1 and 2 and included macropod scats, insects and plant material. Eleven very small, undiagnostic bone fragments were recovered from these units and a macropod tooth fragment was found in EU1. Small fragments of ochre were recovered from EU1 and 2. As in Square A, these remains are assumed to be non-cultural.

The deposit in Square C was different from the others. There were two stratigraphic units. These were removed in eight excavation units (Figure

5.35). SU1 comprised mainly uncompacted deposits of sediment and gravel. Within EU4, the transition to SU2 was marked by a compact layer of orange material, probably decomposed roof fall (Figure A5.39). SU2 comprised a fine pinkish-red deposit with small gravel. Bedrock was reached 35 cm below surface. The deposits were acidic throughout (pH 5–6).

Charcoal occurred throughout the deposit, but was more abundant in EU1–5, rising to a marked peak at the interface between SU1 and 2. There was very little charcoal in EU5–8 and the only charcoal in EU6–8 came from the 3 mm sieve fraction. There are two peaks in the distribution of flaked stone artefacts. Most stone artefact material, particularly in EU7 and 8, came from the 3 mm sieve fraction (Figure A5.40). Organic remains, including plant material, insect remains and macropod scats, occurred throughout the deposits, but were more common in EU1–4. Two hundred and ninety-four fragments of bone were identified in EU1–7. These were mostly small mammal or reptile bones. A few macropod teeth were also noted. The only evidence of modification was a charred undiagnostic fragment in EU3. Small fragments of ochre were recovered from EU1 and 2, but this material is probably not cultural.

Dating

Table 5.4 (Chapter 5) lists the radiocarbon determinations from CB10-133 and Figure A5.41 presents the probability plot of calibrated dates. The dating evidence from this site seems confusing and indicates a complex history of occupation over some 5000 years. The irregular nature of the bedrock produced an accumulation of sediment in some areas and possible 'lateral stratigraphy' with evidence of activity preserved in different parts of the shelter at different times.

Square C provides the oldest evidence for use of the site, with a concentration of activity about 2500–3000 years ago. Figure A5.40 shows a peak of both artefacts and charcoal in EU1–5, with a secondary peak of artefacts in EU7 and 8. The radiocarbon determinations from EU4 and 5 overlap (see Figure A5.41). It seems likely that the upper peak represents an episode of occupation about 2500 to 3500 years ago. The slightly younger determination from EU1 may result from mixing of charcoal from the surface

and the older deposit, or may provide a *terminus post quem* for this early episode of occupation. The marked lower peak of artefact deposition may represent an earlier episode of occupation, perhaps in the mid-Holocene about 5000 years ago.

The deposits in Square A and B at the front of the shelter are not as deep as those in Square C. Square A has evidence for use of the shelter within the last 1000 years. As in Square C, there are two distinct peaks of artefact deposition and a peak of charcoal corresponding to the upper artefact peak in EU1 and 2 (Figure A5.37). Two radiocarbon determinations from EU2 and 3 indicate that this occupation was about 500–600 years old. There is no charcoal associated with the earlier artefact peak, which is therefore undated. However, as already noted, the uneven bedrock and large roof fall indicates that this material probably results from downward movement of artefacts from the sediments above. The deposits from Square B are similar, but there is only a single peak in deposition of cultural material (Figure A5.38). No dates were obtained from Square B, but it seems likely that the material recovered is comparable in date to Square A. The dates from the cached wood also support use of the shelter during the last 1000 years.

Thus, the depositional history of the site indicates that the cultural material from Squares A and B at the front of the shelter, and Square C in the interior, result from different periods of use, with older deposits preserved in Square C. The excavated assemblages from each square will therefore be discussed separately.

Stone artefacts

Square A. A total of 132 flaked stone artefacts was recovered from Square A, 64 from the 6 mm sieve fraction and 68 from the 3 mm sieve fraction. When 3 mm sampling is taken into account, the estimated total number of artefacts in the 3 mm fraction rises to 263.

Table A5.11 summarises assemblage composition by raw material for Square A. Comparing MNF for the different sieve fractions shows that the proportions of BIF and basalt are similar (Figure A5.42). Conversely, chalcedony and dolerite are more common in the 3 mm fraction and chert and mudstone make up a higher proportion of the 6 mm fraction.

This difference in assemblage composition is statistically significant (chi-square=14.175, df=4, p=0.007).

Most artefacts in Square A are non-cortical (66%), with the highest proportion of cortical flakes in the BIF component of the assemblage. Chi-square, however, suggests that there is no difference between the primary raw materials with respect to presence or absence of cortex. All cortex is terrestrial except for two BIF complete flakes with riverine cortex (Table A5.12). Platforms are mostly plain (82%), with cortical platforms only occurring on BIF or mudstone flakes (Table A5.13).

Table A5.14 summarises length measurements of complete flakes for each raw material. The relatively small mean length of chalcedony flakes is probably attributable to small sample size. ANOVA indicates that there is no significant difference between raw materials with respect to mean length.

Three artefacts excavated in Square A had secondary retouch or use wear. A chert tula adze was recovered from EU2. Two undiagnostic retouched BIF flakes were found, one each in EU1 and 3. No cores were recovered from the excavated deposits.

Square B. A total of 76 artefacts was recovered from Square B, 29 from the 6 mm sieve fraction and 47 from the analysed sample of the 3 mm sieve fraction. When 3 mm sampling is taken into account, the estimated total number of artefacts in the 3 mm fraction rises to 188.

Table A5.15 summarises assemblage composition by raw material for Square B. Comparing MNF for the different sieve fractions shows that proportions of BIF and chalcedony are broadly similar, while chert and mudstone differ (Figure A5.43). However, these differences are not statistically significant (chi-square=6.0329, df=6, p=0.420).

In contrast to Square A, most flaked stone in Square B (59%) carries some cortex (Table A5.16). Like Square A, the BIF assemblage has the highest proportion of cortical flakes, but it should be noted that sample size is small. Chi-square suggests that the difference between raw materials is not significant (chi-square=4.182, df=3, p=0.24217, omitting basalt and quartz). All cortex is terrestrial except for one BIF single platform core with cortex of uncertain origin. Most platforms (82%) are plain (Table A5.17).

Table A5.18 summarises the length of complete flakes from Square B, where sample size was greater than 1. BIF flakes seem to be larger than those of chalcedony or mudstone. This would be consistent with the higher proportion of cortical flakes. However, ANOVA indicates that the difference is not statistically significant. Two chert flakes with undiagnostic retouch or use wear were found in Square B, EU1.

Four single platform cores (one basalt and three BIF) were excavated from Square B. The basalt core was small (28.6 g, with volume 31,185 mm^3) and retained only 25% cortex. There were no basalt flakes in the 6 mm sieve fraction and only one in the 3 mm fraction. The BIF cores were 14.2 g (10,560 mm^3), 46.0 g (42,640 mm^3) and 135.0 g (93,436 mm^3), and the two larger ones retained more than 50% cortex. BIF MNF for the 6 mm sieve fraction is still only six, although the amount of debitage in the 3 mm sieve fraction is higher. This suggests that the basalt core was discarded at the site but not worked there, while the BIF cores were all flaked on site. The largest of the BIF cores was certainly left at the site while it still retained some utility, and perhaps the other BIF cores also.

Square C. A total of 173 flaked stone artefacts was analysed in Square C, 40 from the 6 mm sieve fraction and 133 from the analysed sample of the 3 mm fraction.

Table A5.19 summarises assemblage composition by raw material for Square C. Comparing MNF for the different sieve fractions shows that the proportions of BIF and dolerite are similar. Chert and mudstone are more common in the 6 mm fraction while chalcedony is more common in the 3 mm fraction (Figure A5.44). Chi-square indicates that these differences are statistically significant (chi-square=26.364, df=7, p=<0.001). More raw materials are also represented in the 3 mm sieve fraction.

The proportions of debris, complete and broken flakes are similar for each lithology in the 3 mm sieve fraction (chi-square=9.9812, df=14, p=0.764). The 6 mm sieve fraction does differ significantly in the proportions of debris, complete and broken flakes (chi-square=20.515, df=10, p=0.025) but this is probably due to the low number of chert complete flakes (Table A5.19).

Square C is similar to Square B in that 58% of flaked stone has some cortex (Table A5.20). Like Squares A and B, the highest proportion of

cortical artefacts occurs in the BIF assemblage. However, chi-square suggests that the difference between raw materials is not significant. Like the other squares, most platforms (68%) are plain (Table A5.21). Three artefacts from Square C had undiagnostic retouch or use wear, one each in EU1, EU2 and EU7. Like Square B, BIF complete flakes were larger than chert or mudstone. However, ANOVA suggests that the differences are not statistically significant (Table A5.22).

Ten cores were recovered from the excavation of Square C (Table A5.23). Seven were BIF (four single platform and three multiplatform) and one was a mudstone single platform core. The other two were ironstone (one single platform and one multiplatform). This raw material was not otherwise found at the site, except for two flakes in the 3 mm sieve fraction from Square C. All cores but one retained at least some cortex, and seven had at least 50% cortex. They are quite variable in size. Four BIF cores and both ironstone cores weigh more than 100 g and the mudstone core weighs 97 g, suggesting that many of the cores were probably left at the shelter for future use.

Discussion

CB10-133 amply illustrates the difficulty of interpreting rockshelters in the Pilbara region. The stratigraphic and dating evidence suggests a relatively complex history of use for the shelter, starting in the mid-Holocene. It seems likely that the shelter was used repeatedly with the focus of activity occurring in different parts of the shelter and at different times. The configuration of the floor area means that accumulation of sediments was unlikely to be uniform, while the varying depths of sediment suggest uneven bedrock. Thus, particular parts of the shelter may have been available at different time periods. Erosion may also be a factor. The relatively deep deposit in Square C, with its older radiocarbon determinations, suggests that older deposits may have been preserved in a hollow in a more protected part of the shelter.

Square C provides evidence of at least one episode of use about 3000–3500 years ago, with the focus of activity located in the centre of Chamber 1. The assemblage from that square can be considered as a single time-averaged occupation. The assemblage from Square A represents a more recent time-averaged occupation within the last 1000 years, with the focus

of activity at the front of the shelter just within the dripline. In both Square A and Square C there is a second, sparser peak of stone artefact material, below the main occupation pulse, lacking organic material and charcoal. It is not clear whether this represents an earlier (and undated) episode of occupation or indicates downward movement of small artefacts. Square B is undated and only has a single peak of cultural material. Like Square A, it is close to the front of the shelter and probably relates to the same time-averaged occupation.

Assemblage comparison shows there is little difference between the squares that could be interpreted as change through time. No diagnostic artefacts were recovered from any of the squares. Raw material composition is also generally similar throughout the site. There is no significant difference in the 6 mm sieve fraction between squares with respect to raw material composition (chi-square=22.918, df=14, p=0.061). Raw material composition does differ between squares in the 3 mm sieve fraction (chi-square=64.603, df=18, p<0.001). However, square by square comparison suggests that the Squares A and B are similar and it is Square C that is different. Percentage of artefacts with cortex is also not significantly different between squares (chi-square=5.666, df=2, p=0.059), although square by square comparison results in a significant difference between Squares A and C (chi-square=5.3626, df=2, p=0.0205). This is consistent across all the main raw materials. There is no evidence for size variation between squares or raw materials for complete flakes. Only BIF, chert and mudstone complete flakes occur in all three squares. ANOVA indicates no significant differences in length of complete flakes between squares (F=1.3, p=0.284, df=2) or between raw materials (F=2.619, p=0.083, df=2).

Intra-site comparisons are difficult. This is because sample size is generally small and this is particularly exacerbated by raw material diversity. It is likely that the unsystematic variation between squares results from sampling factors as well as possible spatial and temporal variation in activity within the shelter. This variation, together with the disparity between sieve fractions in raw material composition for Squares A and C, seems to indicate that people used CB10-133 briefly and intermittently over a relatively long period, perhaps beginning some 4000 years ago. Activities at the shelter

included tool manufacture and maintenance, as well as core preparation. The unusually high number of cores recovered from the excavation, especially in Square C, indicates that cores were brought to the shelter and left for future use. The caching of wood and the presence of grinding material, including a large millstone on the surface, also suggests planned long-term re-use of the locality. The absence of surface artefact scatters within a radius of 1 km of CB10-133 seems to be a consequence of rough terrain and suggests that the shelter provided a key focal point for past human activity in this part of the study area.

FIGURE A5.31: CB10-133: general view of shelter (a) and interior (b).

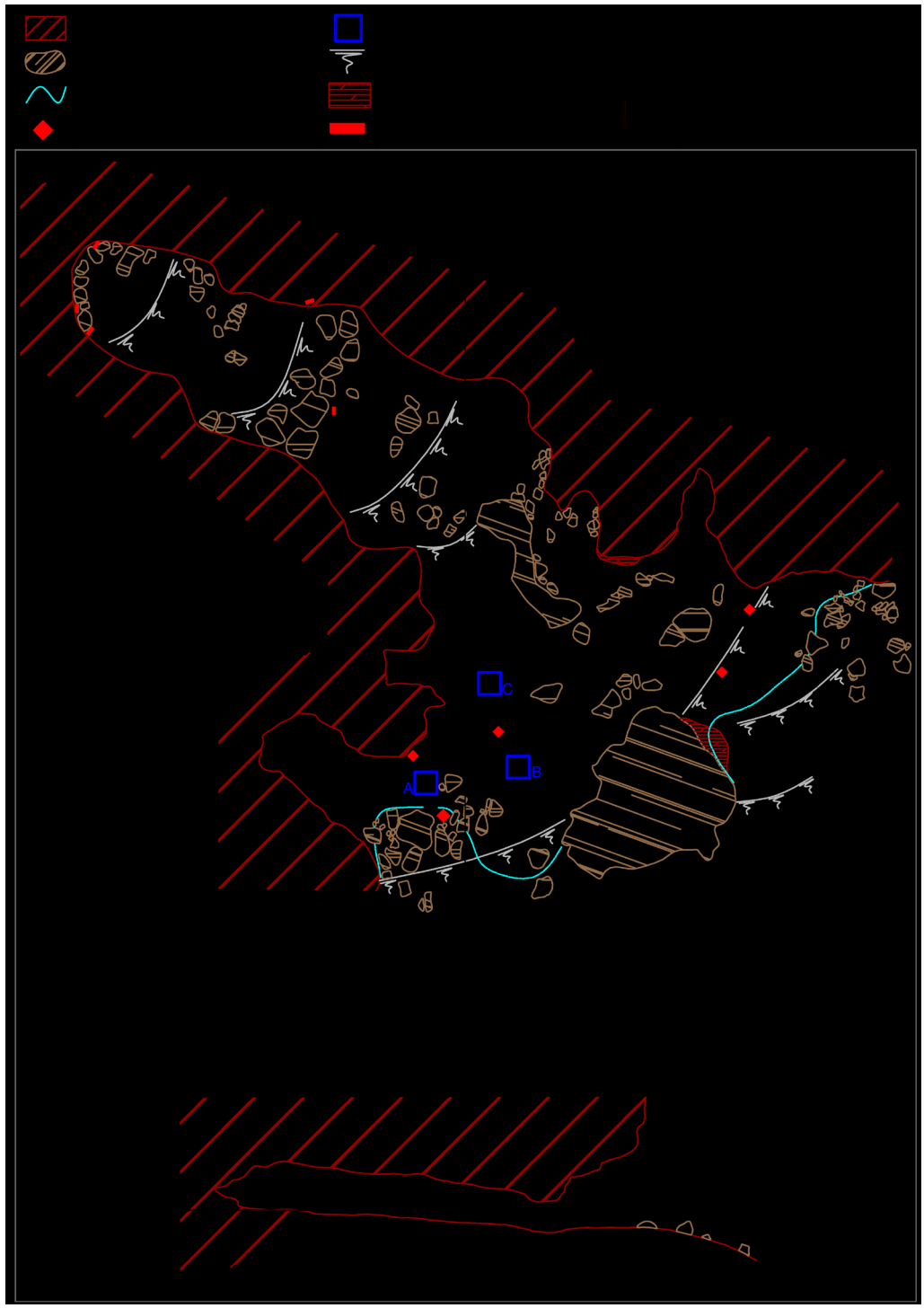

FIGURE A5.32: CB10-133: site plan and profile. (Drawn by M. Jimenez-Lozano).

FIGURE A5.33: CB10-133 surface assemblage: millstone (top) and baler shell fragment (bottom).

Figure A5.34a: CB10-133, surface assemblage: cached wood.

FIGURE A5.34B: CB10-133, surface assemblage: cached wood showing charred end (top) and cut marks (bottom).

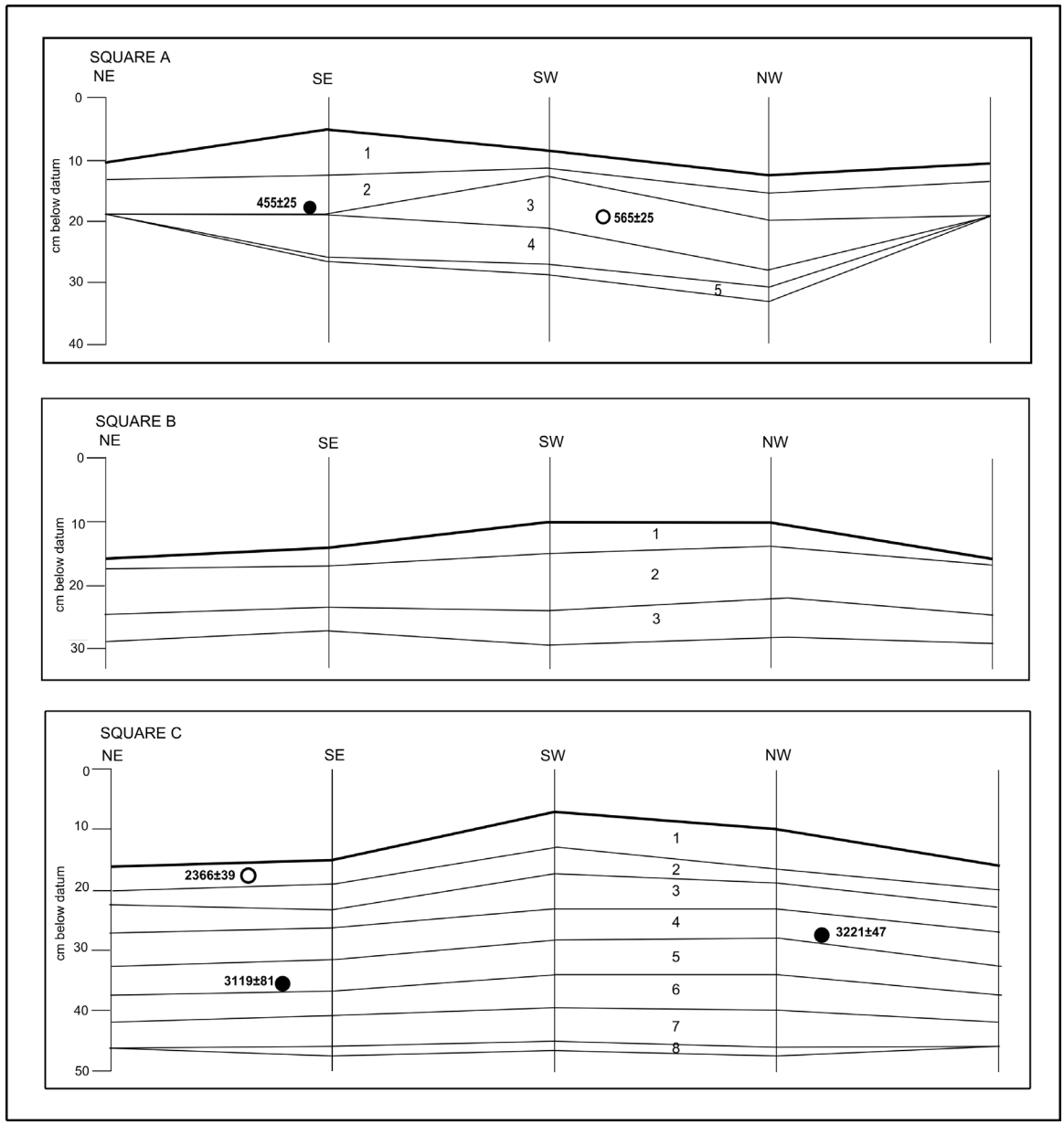

FIGURE A5.35: CB10-133: excavation units and location of radiocarbon samples for all squares. Closed circles: in situ samples, open circles: 6 mm sieve.

FIGURE A5.36: CB10-133, base of Square A excavation showing roof fall and uneven bedrock.

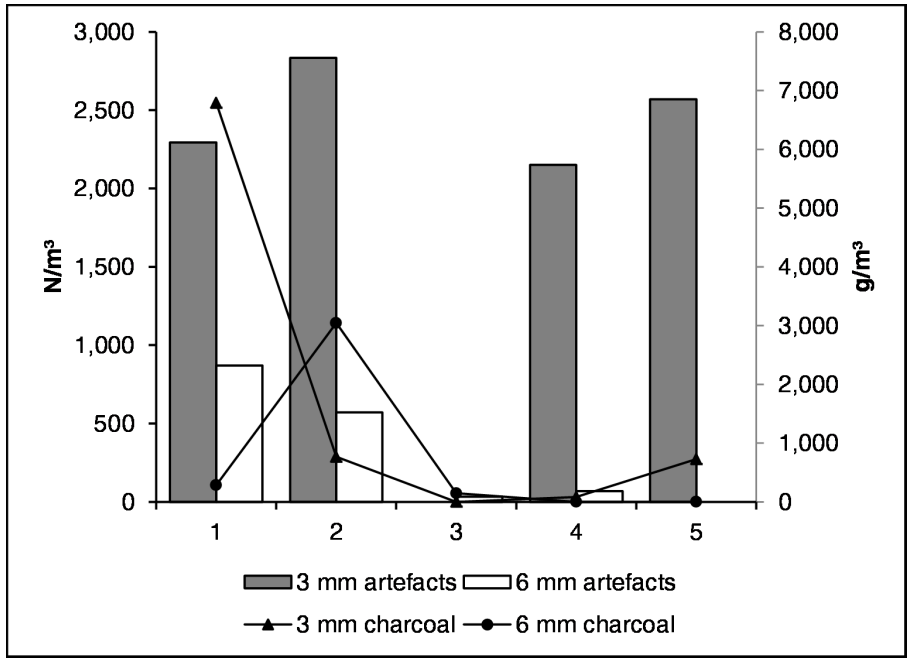

Figure A5.37: CB10-133, Square A: distribution of artefacts and charcoal.

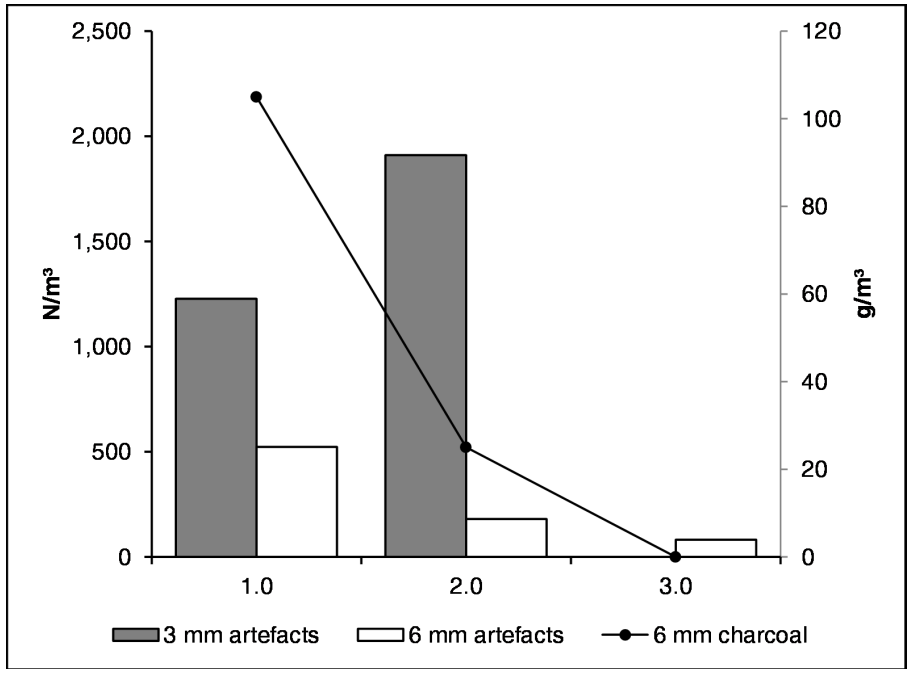

Figure A5.38: CB10-133, Square B: distribution of artefacts and charcoal.

FIGURE A5.39: CB10-133, Square C: east wall.

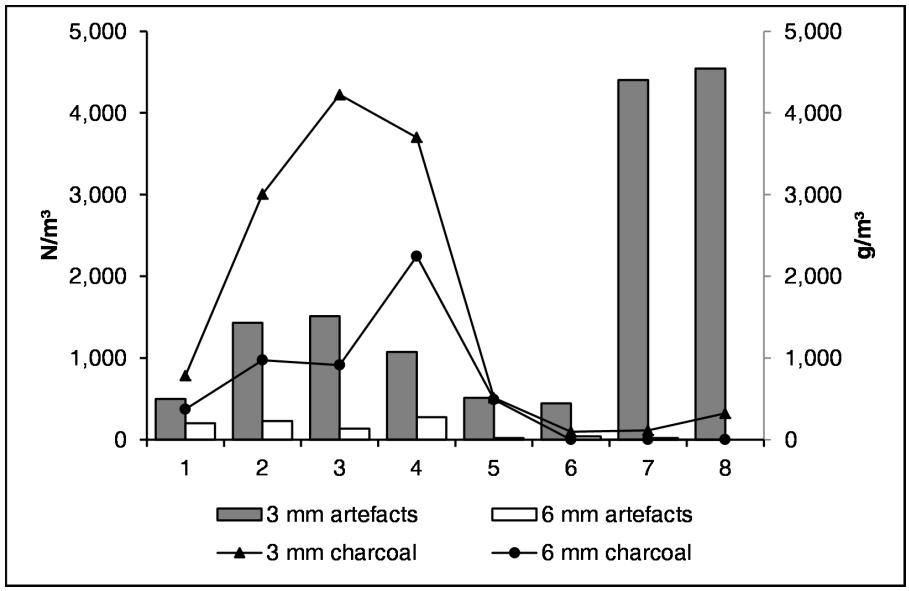

FIGURE A5.40: CB10-133, Square C: distribution of artefacts and charcoal.

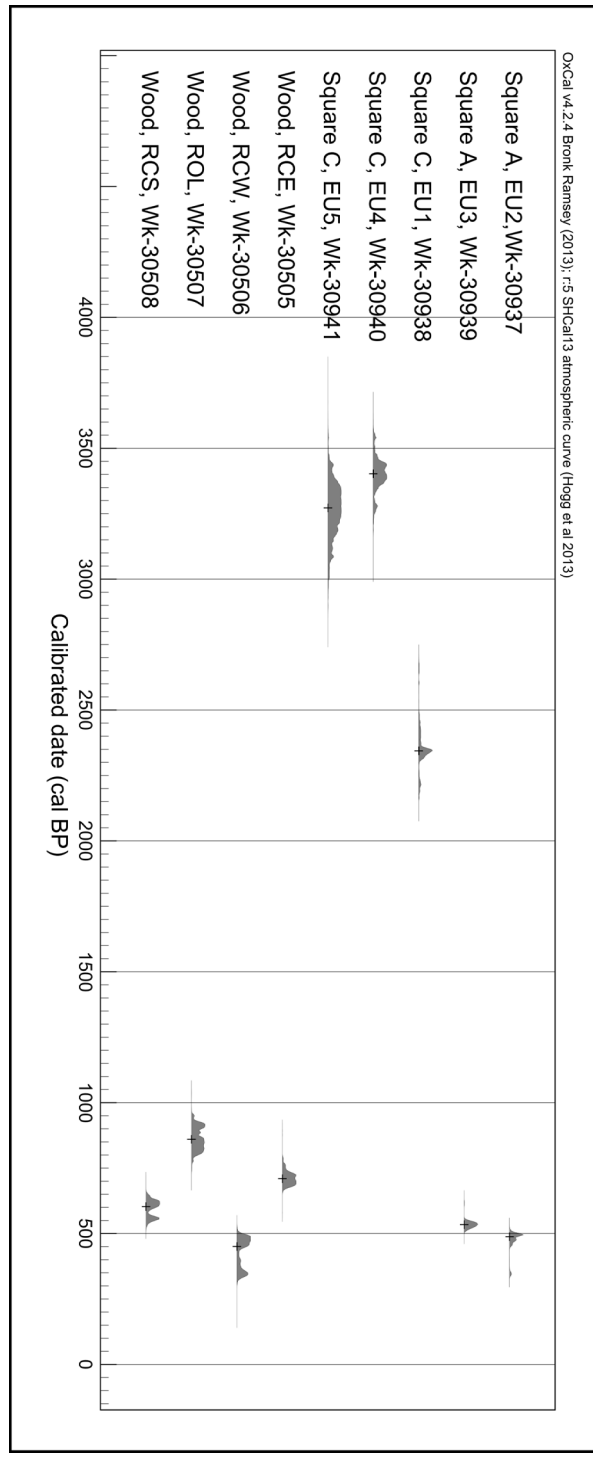

Figure A5.41: CB10-133: probability plot of radiocarbon determinations.

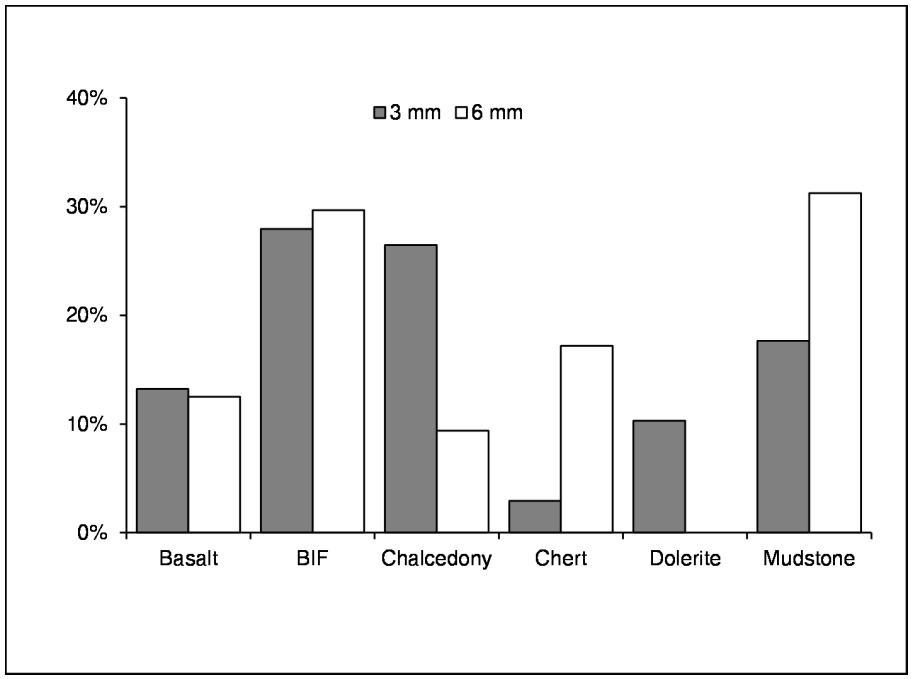

FIGURE A5.42: CB10-133, Square A: comparison of raw material by sieve fraction.

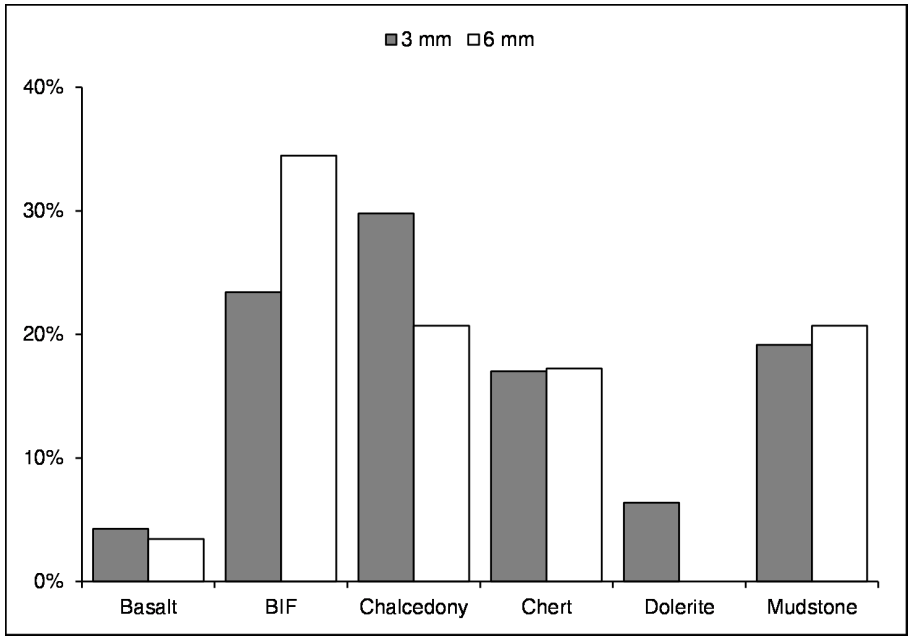

FIGURE A5.43: CB10-133, Square B: comparison of raw material by sieve fraction.

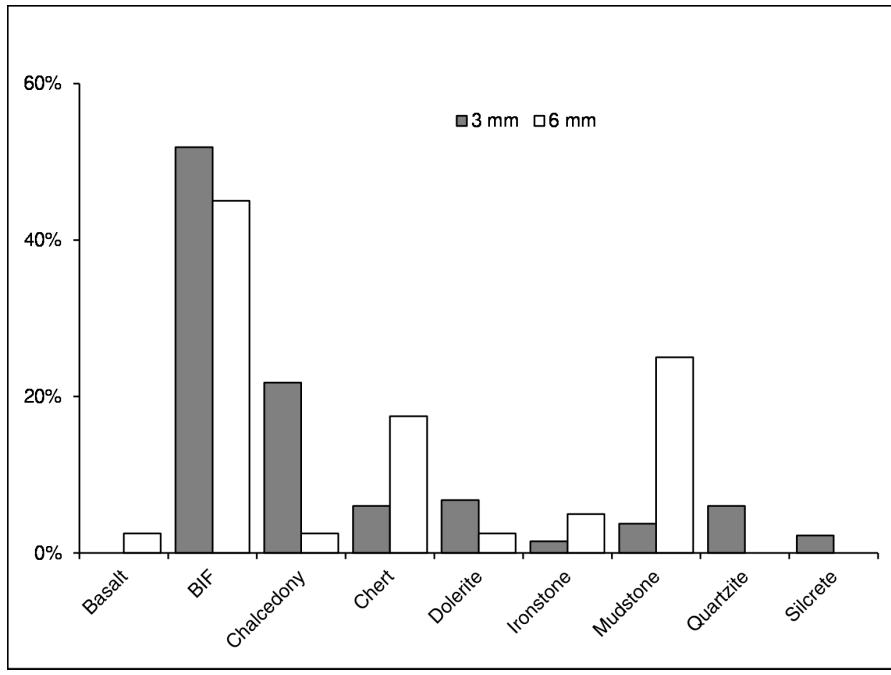

FIGURE A5.44: CB10-133, Square C: comparison of raw material by sieve fraction.

Table A5.10: CB10-133: surface flaked stone artefacts.

	Complete flake	Flake fragment	Core	Total
Square A				
BIF	1	0	0	1
Chalcedony	2	2	0	4
Chert	2	2	2	6
Dolerite	1	0	0	1
Mudstone	15	2	3	20
Total	21	6	5	32
Square B				
BIF	2	0	0	2
Chalcedony	1	0	2	3
Mudstone	1	0	0	1
Total	4	0	2	6
Square C				
BIF	1	0	0	1
Chert	0	1	0	1
Total	1	1	0	2
Grand Total	26	7	7	40

Table A5.11: CB10-133, Square A: summary assemblage composition.

	3 mm			6 mm		
	Complete flake	*Flake fragment*	*Debris*	*Complete flake*	*Flake fragment*	*Debris*
Basalt	8	1	0	5	3	0
BIF	17	2	0	9	6	4
Chalcedony	12	2	4	3	2	1
Chert	2	0	0	8	3	0
Dolerite	6	1	0	0	0	0
Mudstone	10	2	0	12	4	4
Quartz	0	0	1	0	0	0
Total	55	8	5	37	18	9

Table A5.12: CB10-133, Square A: presence or absence of cortex for main raw materials (chi-square=3.0892, df=4, p=0.54302).

	Cortical	Non-cortical
Basalt	3	5
BIF	9	10
Chalcedony	1	5
Chert	4	7
Mudstone	5	15

Table A5.13: CB10-133, Square A: platform type.

	Cortical	Plain	Crushed	Focal	Total
Basalt	0	5	0	1	6
BIF	2	8	0	1	11
Chalcedony	0	2	0	1	3
Chert	0	10	1	0	11
Mudstone	2	11	0	0	13
Total	4	36	1	3	44

Table A5.14: CB10-133, Square A: length (mm) of complete flakes for each raw material (F=1.756; p=0.1603; df=36).

	N	Mean	SD	Min	Max
Basalt	5	27.8	11.7	10	40
BIF	9	24.6	11.6	12	45
Chalcedony	3	11.7	0.6	11	12
Chert	8	21.6	9.8	15	45
Mudstone	12	19.3	7.2	10	34

Table A5.15: CB10-133, Square B: summary assemblage composition.

	3 mm			6 mm		
	Complete flake	*Flake fragment*	*Core*	*Complete flake*	*Flake fragment*	*Debris*
Basalt	1	1	1	0	0	0
BIF	10	1	3	6	0	1
Chalcedony	14	0	0	3	2	1
Chert	8	0	0	1	2	2
Dolerite	3	0	0	0	0	0
Mudstone	9	0	0	5	1	0
Quartz	0	0	0	1	0	0
Total	45	2	4	16	5	4

Table A5.16: CB10-133, Square B: presence or absence of cortex (chi-square=5.7763, df=5, p=0.3286).

	Cortical	Non-cortical
Basalt	1	0
BIF	8	2
Chalcedony	2	4
Chert	2	3
Mudstone	3	3
Quartz	1	0
Total	17	12

Table A5.17: CB10-133, Square B: platform type.

	Cortical	Facet	Plain	Focal	Total
BIF	0	0	5	1	6
Chalcedony	0	1	2	0	3
Chert	0	0	2	0	2
Mudstone	0	0	5	0	5
Quartz	1	0	0	0	1
Total	1	1	14	1	17

Table A5.18: CB10-133, Square B: length (mm) of complete flakes for raw materials where sample size >1 (F=2.879; df=14; p=0.100).

	N	Mean	SD	Min	Max
BIF	6	31.5	12.5	15	46
Chalcedony	4	16.0	4.2	12	22
Mudstone	5	21.2	11.0	11	34

Table A5.19: CB10-133, Square C: summary assemblage composition.

	3 mm			6 mm			
	Complete flake	*Flake fragment*	*Debris*	*Core*	*Complete flake*	*Flake fragment*	*Debris*
Basalt	0	0	0	0	0	0	1
BIF	60	7	2	7	10	1	0
Chalcedony	21	5	3	0	0	1	0
Chert	7	1	0	0	2	3	2
Dolerite	8	1	0	0	1	0	0
Ironstone	2	0	0	2	0	0	0
Mudstone	3	1	1	1	7	0	2
Quartzite	7	1	0	0	0	0	0
Silcrete	2	1	0	0	0	0	0
Total	110	17	6	10	20	5	5

Table A5.20: CB10-133, Square C: presence or absence of cortex (chi-square=6.3866, df=6, p= 0.381).

	Cortical	Non-cortical
Basalt	0	1
BIF	12	6
Chalcedony	0	1
Chert	3	4
Dolerite	1	0
Ironstone	2	0
Mudstone	5	5
Total	23	17

Table A5.21: CB10-133, Square C: platform types.

	Cortical	Crush	Plain	Focal	Total
BIF	2	0	9	0	11
Chalcedony	0	0	1	0	1
Chert	0	0	2	0	2
Dolerite	1	0	0	0	1
Mudstone	0	1	3	3	7
Total	3	1	15	3	22

Table A5.22: CB10-133, Square C: length (mm) of complete flakes for raw materials where sample size >1 (F=0.9369; df=18; p=0.412).

	N	Mean	SD	Min	Max
BIF	10	23.6	15.5	4	50
Chert	2	13.0	1.4	12	14
Mudstone	7	17.3	5.8	10	25

Table A5.23: CB10-133, Square C: distribution and attributes of cores recovered from the excavation.

EU	*Core type*	*Raw material*	*Length (mm)*	*Width (mm)*	*Thickness (mm)*	*Volume (mm^3)*	*Weight (gm)*	*% Cortex*
1	Multiplatform	BIF	30	47	32	45120	39.1	0
1	Single platform	Mudstone	50	45	26	58500	97.2	20
2	Single platform	BIF	28	42	30	35280	54.37	50
2	Multiplatform	Ironstone	78	52	64	259584	434.54	30
2	Single platform	Ironstone	28	51	51	72828	104.92	60
3	Multiplatform	BIF	40	47	61	114680	183.87	70
3	Single platform	BIF	43	67	55	158455	353.78	90
3	Single platform	BIF	32	84	49	131712	167.82	70
4	Multiplatform	BIF	36	43	22	34056	55.64	55
6	Single platform	BIF	35	31	50	54250	112.98	90

KAKUTUNGUTANTA/CB10-93 (DAA ID 29119)

Kakutungutanta (CB10-93) was originally recorded in April 2010 as a rockshelter with deposit and associated open scatter (Dias and Rapley 2013; Sinclair and Wright 2012, 111). The shelter is on a gully slope and is easily accessible. It faces south-east towards an ephemeral, third order creek. The talus slopes down 45° for 20 m (Figure A5.45, Figure A5.46). The talus and base of the gully carry Low Woodland of scattered acacia trees with an under storey of scattered shrubs (*Acacia* and *Cassia* spp.), seasonal grass (*Eragrostis* spp.) and moderately dense spinifex (*Triodia* spp.) tussocks. Estimated ground surface visibility was 50% at the base of the gully and 30% on the talus slope. There is no vegetation in the shelter and visibility is 100%. The shelter itself is 5 m deep by 6 m wide (floor area approximately 16 m^2) and 3 m high at the drip line. The interior is sheltered, and large enough for an adult to stand comfortably (Figure A5.47). Four depth probes indicated the presence of subsurface material and the potential for excavation. In November 2011, a single 1 × 1 m test pit was placed in the centre of the shelter immediately inside the drip line to sample the deepest area of deposit. The results of the excavation were described by Dias and Rapley (2013, 87–108) and this discussion draws on data presented there.

The surface artefact scatter is about 10 m south of the shelter and measures 21 m by 16 m (about 263 m^2) (Figure A5.46). Artefacts are concentrated within the central southern portion of the site, with lower densities towards the southern, eastern and western boundaries. Overall average density was estimated at 0.52/m^2. A sample of 13 artefacts was recorded in detail (Table A5.24). The only cultural material recorded within the shelter was five manuports, all pebbles, a complete flake and a flake fragment. All were BIF (Sinclair and Wright 2012).

Immediately west of the shelter is CB12-180, a small rockshelter with a stone structure to the right of the entrance (Figure A5.48). This appears to be a partially demolished wall consisting of about 25 rocks. There was no other cultural material associated with the structure or within the chamber.

Excavation results

The test pit was excavated to bedrock at 87 cm in 15 excavation units averaging 5.8 cm deep (Figure A5.49). The surface of the test pit was dry and loose, consisting of fine sediment, degraded macropod scats and fragments of dry grass, which probably blew into the shelter. Immediately (<1 cm) below the surface the deposits were dry, fairly loose, dark reddish brown with small rocks (SU1). Insect burrows were uncovered in the south-east area of the pit. At the start of EU3 the deposits became brown (SU2) and at the base of EU3 a layer of fine, red sediment interspersed with fine gravel appeared in the northern half of the square (SU3). By the base of EU9 this red layer completely covered the square and continued to bedrock at the base of EU15. These colour changes appear to reflect degradation of rocks rather than discrete depositional events. An increasing number of large rocks were encountered as excavation proceeded, reducing the area of the test pit. Apart from the colour changes there was little variation in the overall composition of the deposit with depth (Figure A5.50). The sediments were acidic throughout (pH 4.5–6) (Dias and Rapley 2013, 90).

Charcoal was recovered in small amounts from all excavation units. No discrete hearths or charcoal concentrations were noted in excavation. In situ samples were only collected from EU1 and 2. There was a marked peak in distribution in EU2. No charcoal was recovered in situ or in the 6 mm sieve fraction below EU5 (Figure A5.51). The distribution of cultural material with depth shows a marked peak in EU2, which also corresponds to the peak in charcoal (Figure A5.51). Most of the artefacts (65%) come from EU1–3 (i.e. within the top 14 cm). Below EU7 (39 cm below surface) only three artefacts were found, all from the 3 mm sieve fraction. Only one of these occurs below 52 cm.

Samples of charcoal from the 6 mm sieve fraction of EU2 and EU5 were sent to Waikato Laboratory for AMS dating. The results (Figure A5.52) were surprising as the sample from EU5 was dated to 40,647 cal BP. This is the oldest determination obtained to date from the Chichester Range (Dias and Rapley 2014). Such an age is not unexpected, since there are now several sites from the inland Pilbara region with dates older than about 40,000 (see Chapter 2 for discussion). However, the context of the date means that

it is difficult to interpret. It occurs at a relatively shallow depth and only a few centimetres below a late Holocene date. This pattern of radiocarbon determinations widely separated in time, but not by depth, seems to be characteristic of a number of sites in the study area (see discussion in Chapter 5), although this is the only example where the older date is Pleistocene.

Organic material, other than charcoal, including insect remains, macropod scats and plant remains (leaves, seeds, twigs and roots) was found in small quantities throughout the excavation (Dias and Rapley 2013, 91–92). Macropod scats were concentrated in EU1 with small quantities in EU2 and EU8. Insect remains were mostly found in EU2 and EU3 with small amounts also in EU6 and EU9. Small amounts of insect nests were found throughout EU3 to EU12 and in EU14. Plant remains were found in all units.

Most cultural material comes from EU1–3 and this can be attributed to a late Holocene use of the shelter, about 2500 years ago. The earlier date hints at a much older use of the site. However, its position within the stratigraphic sequence suggests that it should be treated with some caution. Moreover, the sparse cultural assemblage found in association is difficult to interpret. Additional excavation is clearly needed to recover more datable material or attempt to date the sediments by alternative means. Unfortunately, it has not been possible to renew excavations at this site.

Sixty stone artefacts were recovered from the excavation (Table A5.25). Most are complete flakes (63%) or flake fragments (25%) with the remainder undiagnostic debris. Two artefacts show evidence of use: a complete BIF flake from EU4 and a basalt flake fragment from EU7. Both were undiagnostic retouched pieces. Twenty-six artefacts were found in the 6 mm sieve fraction. Thirty-four came from the 3 mm sample; once sampling was taken into account, the estimated total number of artefacts from this fraction was 135 (Dias and Rapley 2013, 88–89).

The assemblage was mainly basalt, BIF and chert with small quantities of chalcedony and quartz in the lower excavation units. The 3 mm and 6 mm samples were not significantly different overall with respect to raw material (chi-square=2.554; df=4; p=0.635). Figure A5.53 compares the late Holocene assemblage from EU1–3 with the older material from EU4–14. In terms of raw material composition, the two samples are broadly similar with respect

to raw materials (chi-square=6.1923; df=4; p=0.18524). There is a slightly higher proportion of basalt and chert in the upper assemblage, but a greater diversity of materials in the lower assemblage. Most of the assemblage was non-cortical. Only 38% of BIF artefacts retained some terrestrial cortex. Most platforms were plain (Table A5.26). Only BIF flakes had cortical platforms.

Table A5.27 summarises the dimensions for complete flakes from EU1–3 (6 mm fraction) and for BIF complete flakes from EU4–14. The differences between raw materials and between BIF flakes in the upper and lower samples are not statistically significant.

Discussion

Kakutungutanta (CB10-93) is the oldest site so far identified in the Chichester Range and seems to have been first occupied before 40,000 years ago. Unfortunately, the small size of the artefact sample and the limited dating evidence means that the site is difficult to interpret. There is a marked peak in both artefacts and charcoal associated with a date of about 2500 years ago. Cultural material is very sparse in the lower levels of the site with only small numbers of artefacts recovered from the 3 mm sieve fraction below EU7. While the assemblage is small, there appears to be no difference throughout the sequence in raw material or artefact size. The relatively high proportion of small artefacts from the 3 mm sieve fraction in all excavation units indicates that tool manufacture and maintenance was among the activities conducted at the site. The presence of several manuports in the shelter on the surface suggests provisioning of place and therefore regular use of the shelter.

Kakutungutanta (CB10-93) forms part of a cluster of rockshelters on the west side of Kakutungutanta Creek (Figure A5.54). As well as CB12-180, these include CB10-94, a small shelter 50 metres to the north of CB10-93, which had a BIF manuport in its surface assemblage. There is also another pair of rockshelters, one excavated and one with a stone feature (CB10-88 and CB10-89, discussed below), about 250 m downstream. While the evidence from Kakutungutanta (CB10-93) itself is sparse, the dating evidence attests to the ancient use of this creek system, with its unusually high density of archaeological features.

FIGURE A5.45: Kakutungutanta (CB10-93): general views of setting (top) and shelter (bottom).

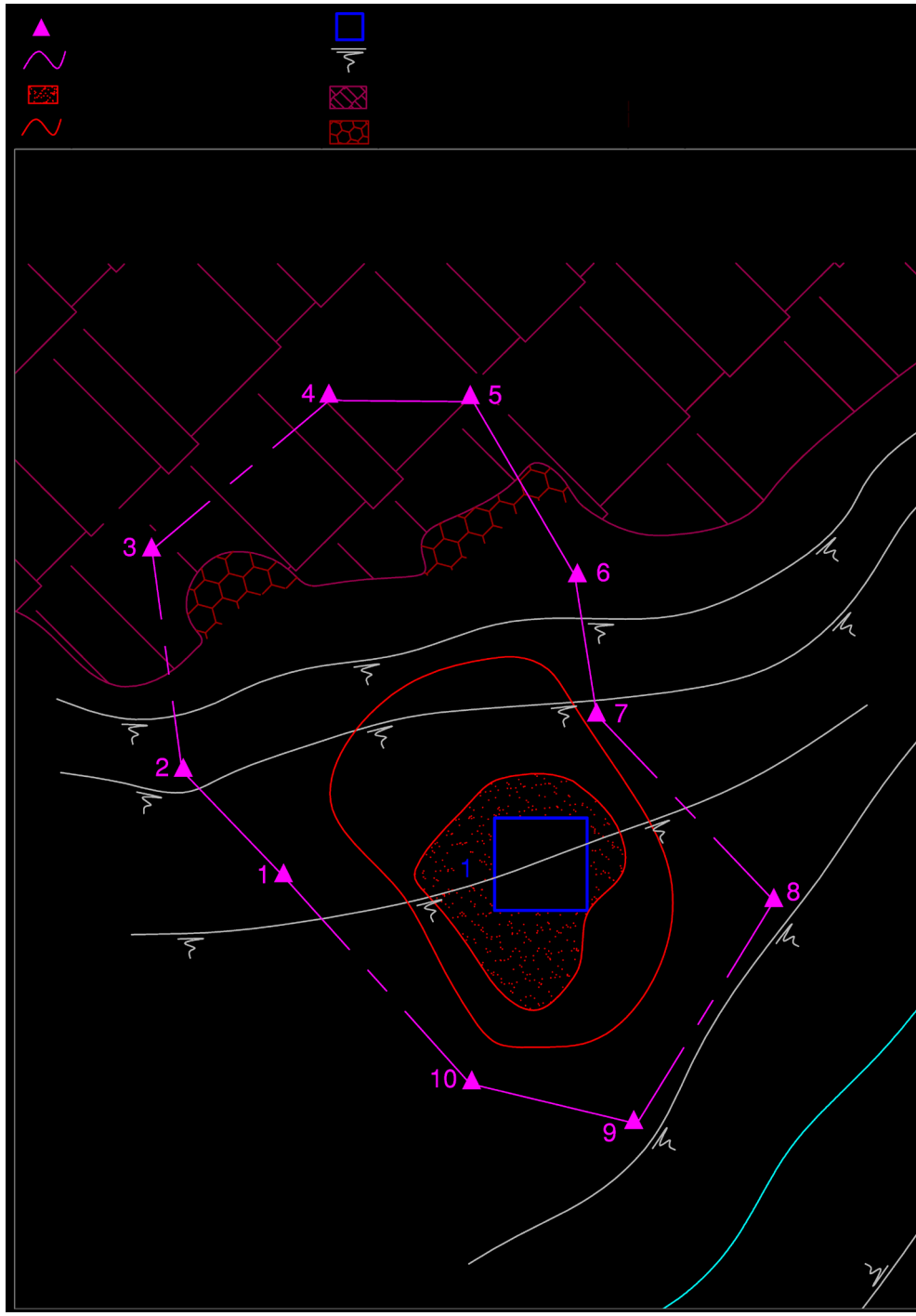

FIGURE A5.46: Kakutungutanta (CB10-93): overall site plan. (Drawn by M. Jimenez-Lozano).

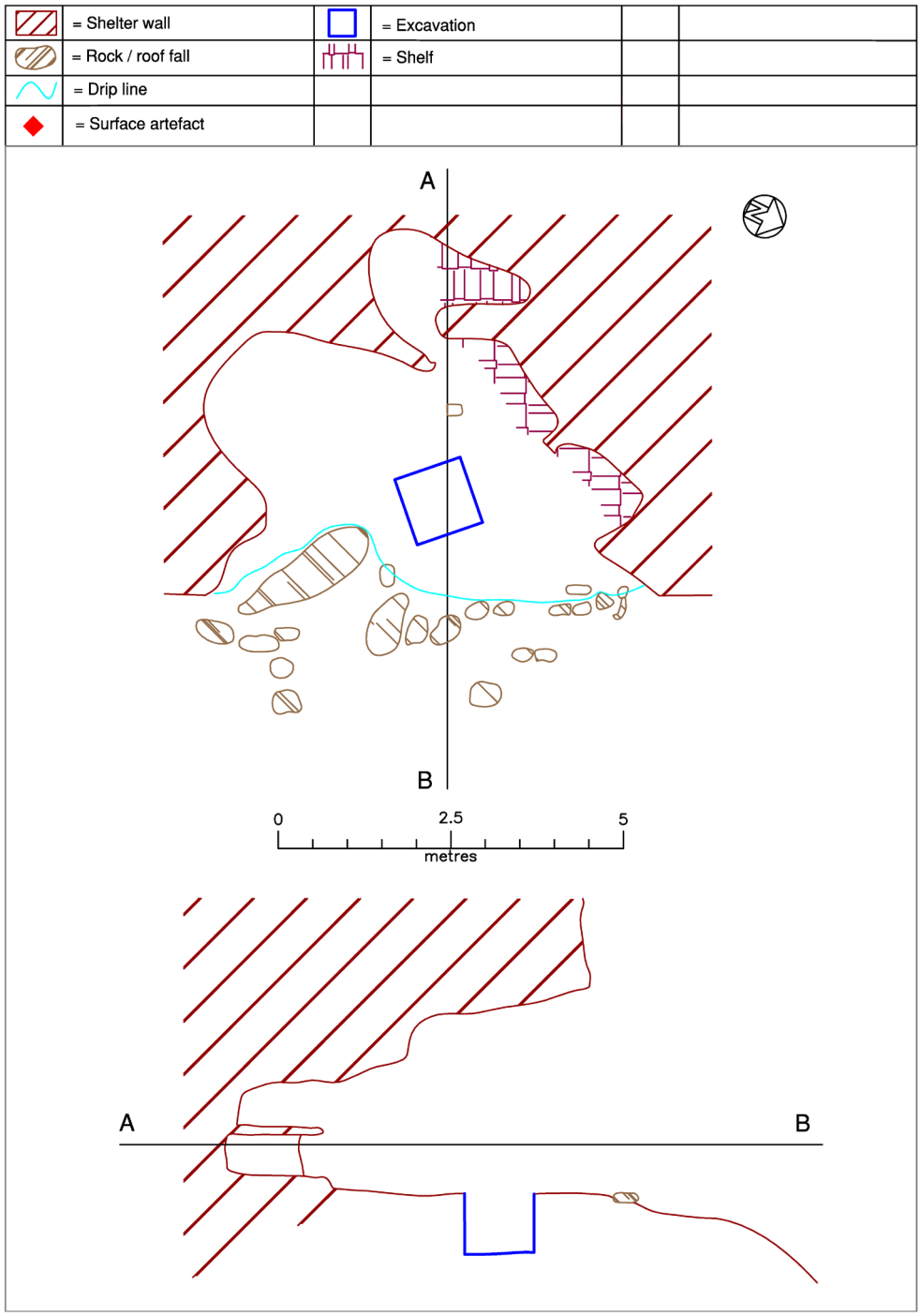

FIGURE A5.47: Kakutungutanta (CB10-93): shelter plan and profile (Drawn by M. Jimenez-Lozano).

FIGURE A5.48: CB12-180: stone structure.

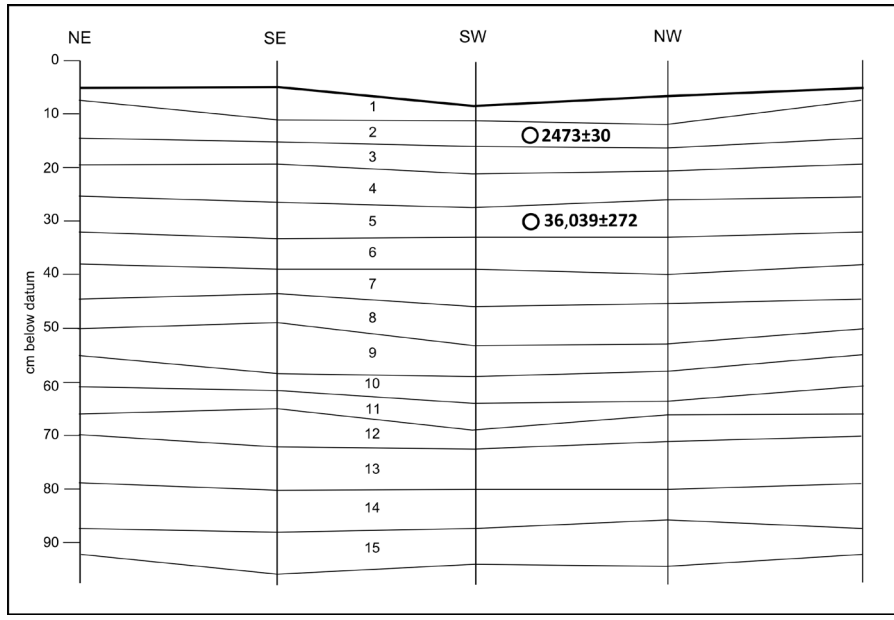

FIGURE A5.49: Kakutungutanta (CB10-93): excavation units and approximate position of radiocarbon samples.

FIGURE A5.50: Kakutungutanta (CB10-93) during excavation (top) and base of EU15 .

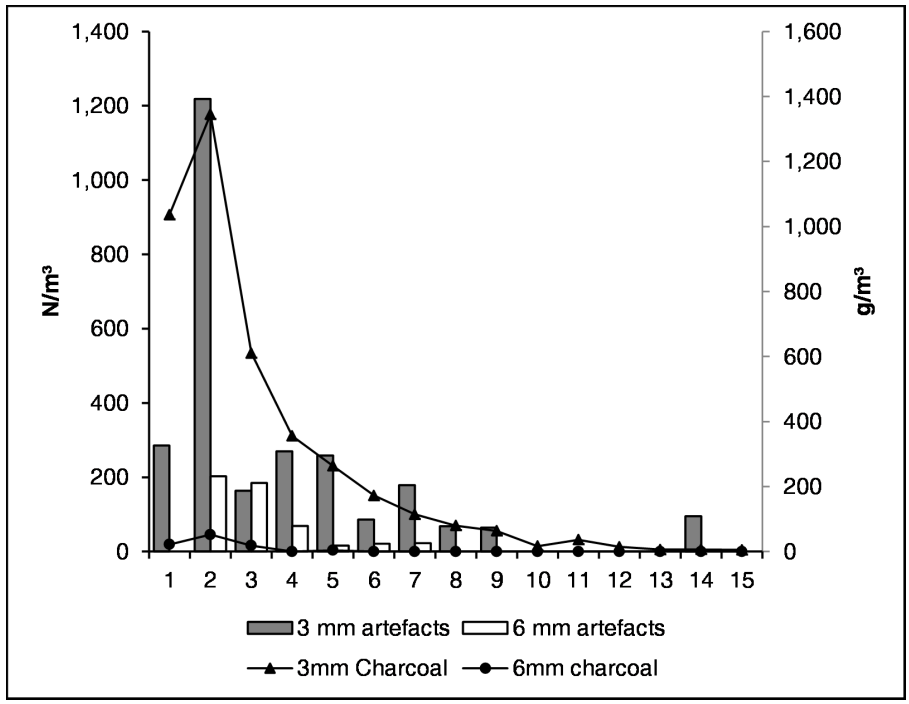

FIGURE A5.51: Kakutungutanta (CB10-93): distribution of stone artefacts and charcoal.

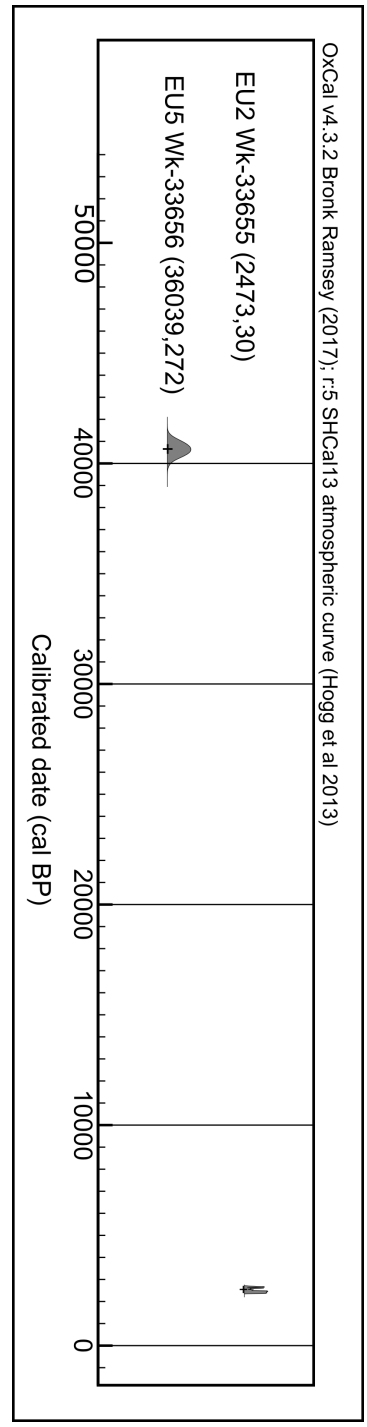

FIGURE A5.52: Kakutungutanta (CB10-93): probability plot for calibrated radiocarbon dates.

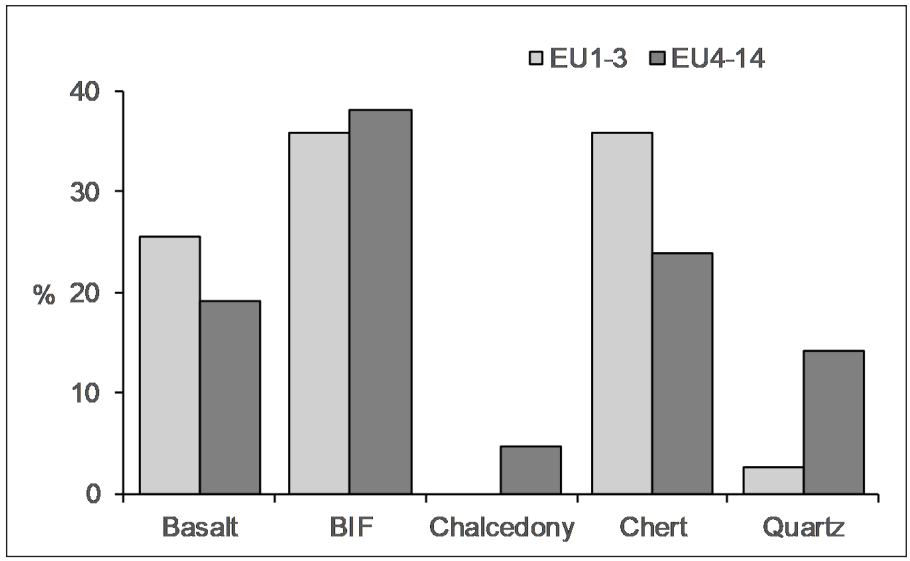

FIGURE A5.53: Kakutungutanta (CB10-93): comparison between upper and lower units in terms of overall raw material composition.

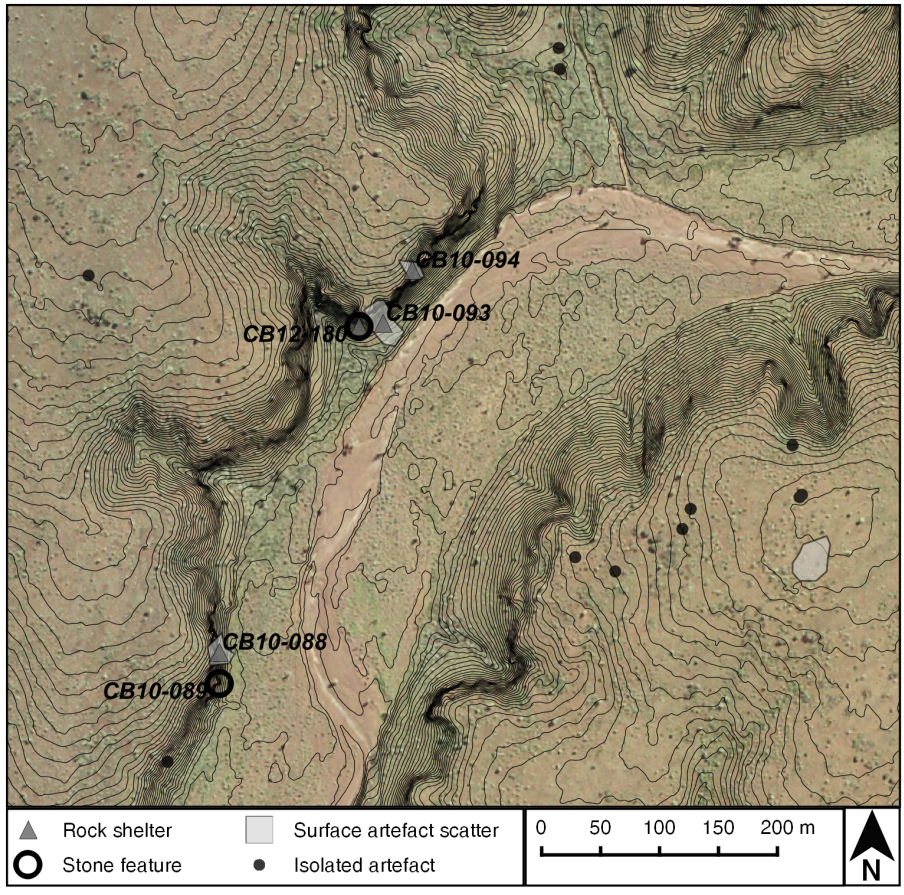

FIGURE A5.54: Kakutungutanta (CB10-93) and associated sites.

Table A5.24: Kakutungutanta (CB10-93): summary of surface assemblage.

	Complete flake	*Flake fragment*	*Manuport*	*Total*
Basalt	2	1	0	3
BIF	7	4	5	16
Chert	1	0	0	1
Total	10	5	5	20

Table A5.25: Kakutungutanta (CB10-93): summary of assemblage composition.

	3 mm				6 mm				Total
	Debris	*Complete flake*	*Flake fragment*	*3 mm total*	*Debris*	*Complete flake*	*Flake fragment*	*6 mm total*	
EU1–3									
Basalt	3	4	0	7	0	3	0	3	10
BIF	0	4	2	6	0	7	1	8	14
Chert	2	1	3	6	0	6	2	8	14
Quartz	0	1	0	1	0	0	0	0	1
Total	5	10	5	20	0	16	3	19	39
EU4–14									
Basalt	0	2	1	3	0	0	1	1	4
BIF	0	3	0	3	1	3	1	5	8
Chalcedony	0	1	0	1	0	0	0	0	1
Chert	0	2	3	5	0	0	0	0	5
Quartz	1	0	1	2	0	1	0	1	3
Total	1	8	5	14	1	4	2	7	21

Table A5.26: Kakutungutanta (CB10-93): platform type.

	Cortex	Plain	Focal	Total
Basalt	0	2	1	3
BIF	2	10	0	12
Chert	0	4	2	6
Quartz	0	1	0	1
Total	2	17	3	22

Table A5.27: CB10-93: dimensions for complete flakes from the 6 mm sieve fraction.

	EU1–3			EU4–14
	Basalt	BIF	Chert	BIF
N	3	7	3	3
Length (mm)				
Mean	20.3	15.1	15.8	24.3
SD	4.6	8.8	9.3	8.0
Range	15–23	9–34	7–33	16–32
Width (mm)				
Mean	13.0	15.1	12.8	19.3
SD	6.2	11.2	3.0	6.1
Range	6–18	8–40	9–18	14–26
Thickness (mm)				
Mean	3.3	2.7	3.5	4.0
SD	1.2	1.5	1.6	0.0
Range	2–4	2–6	2–6	4–4

CB10-88 (DAA ID 29117)

CB10-88 is an east-facing banded iron formation rockshelter on the western slope of a small gully in the foothills of the Chichester Range (Figure A5.55). About 80 m to the east is a third order ephemeral creek. The shelter has two chambers divided by a large area of roof fall and boulders. Overall the shelter is 3.5 m long and 26.5 m wide with an estimated floor area of about 42.5 m² and a height of 3.1 m at the drip line. The talus is 10 m long by 25 m wide and slopes steeply to the base of the gully at a gradient of 30˚. The talus slope and the gully carry a moderately dense understorey of seasonal grasses (*Eragrostis* spp.), spinifex (*Trioidia* sp.) hummocks with scattered acacia trees and shrubs. Ground visibility averaged about 50%. The shelter itself is largely devoid of vegetation with several small acacia shrubs along the dripline.

Chamber 1 is 3.7 m long, 9.5 m wide (about 23.7 m²) and is 2.3 m high at the drip line. Chamber 2, to the north of Chamber 1, is larger (3.5 m long, 17.5 m wide and 3 m high at the drip line), but a series of large boulders along the drip line forms a natural wall and reduces the usable floor area to about 18.4 m² (Figure A5.56).

Immediately south of CB10-88 is a stone structure (CB10-89/DAA 30391) (Sinclair and Wright 2012, 92–8). CB10-89 is a small single chamber with two adjacent entrances (Figure A5.57). The chamber is about 1.5 m above the ground in a vertical banded iron face with a steep talus slope descending towards a third order ephemeral creek at the base of the gully. There is evidence for disturbance by kangaroo within the chamber, which measures 3.2 m long, 3.2 m wide and 0.9 m high. The southern entrance (Entrance 1) measures 1.5 m by 1.0 m and is unblocked. Entrance 2 is 0.8 m by 1.2 m and is blocked by two large, horizontally stacked rocks with at least two smaller rocks beneath them. A shallow alcove about 2.3 m long occurred about 30 cm below the chamber. At the time of recording, the alcove contained two kangaroo tibiae, but these were not considered to be the result of cultural activity. No cultural material was recorded in the vicinity of the structure. Nyiyaparli representatives who participated in recording CB10-89 considered that the structure was intended to trap animals, with the alcove below possibly used for storing meat.

CB10-88 was first reported in April 2010 and excavated in July 2011 (Dias and Rapley 2013). Two artefacts were recorded on the surface, both BIF complete flakes. Four depth probes (two in each chamber) indicated the floor deposits varied between 7.5 cm and 14 cm. A single 1 × 1 m test pit was placed in the centre of Chamber 1, where deposits appeared to be deepest and the floor area was relatively free of roof fall. The excavation was described in Dias and Rapley (2013, 109–27) and this discussion draws on the information presented there.

Excavation results

The test pit was excavated in three excavation units (Figure A5.58). Bedrock began to appear in EU2 and extended over the whole square at a depth of 14 cm (Figure A5.59). The surface was dusty, dry and loose with scatted pieces of small roof fall, macropod scats, and dry twigs and leaf litter. The excavated sediments comprised dry, loose silty soil and gravel, with occasional larger rocks and areas of more compacted sediment. The deposits were yellowish red in EU1 and 2, darkening to reddish brown in EU3, and were acidic throughout (pH 5.5–6). No features were identified.

Stone artefacts were recovered from EU1 and 2 (Figure A5.60). Very fragmentary charcoal occurred throughout but with a marked peak in EU1. The only charcoal in EU3 came from the 3 mm sieve fraction. Other organic material included plant remains, non-diagnostic bone fragments, insect remains (EU1 only) and macropod scats (also EU1 only).

One in situ charcoal sample from the base of EU2 was sent to Waikato for dating (see Table 5.4). The resulting age determination was 499±25 (Wk-33652), giving a median calibrated age of 509 cal BP. This suggests that the shelter was used within the last 500 years ago.

Stone artefacts

Eighteen flaked stone artefacts were recovered from EU1 and 2, in addition to the two BIF flakes recorded on the surface (Table A5.28). Most of these came from the 6 mm sieve fraction. Three chert flakes were recovered from the sampled 3 mm sieve fraction. A basalt multiplatform core was found in situ on the surface of the square and a chert multiplatform core

was recovered from EU1. The chert core is relatively small (15.2 g, volume 5510 mm^3). However, the basalt core was 86 g (42,398 mm^3) and may well have been left at the site for future use. The remaining artefacts were complete or broken flakes of basalt, BIF, chert and dolerite. None showed any evidence of secondary modification.

Most of the artefacts were non-cortical. The chert multiplatform core retained a small amount of terrestrial cortex. One of the BIF flakes from the surface had a cortical platform and retained some cortex on the dorsal surface. This cortex was riverine, indicating the source material probably came from the nearby creek.

Discussion

CB10-88 and CB10-89 are part of a cluster of rockshelters on the west side of Kakutungutanta Creek and are about 250 metres south of Kakutungutanta (CB10-93) (Figure A5.54). They are about 200 metres north of another pair of shelters on the east side of the creek (CB10-92, CB10-98). CB10-88 seems to have been used briefly within the last 500 years. The cultural material is very sparse and thus difficult to interpret. The proximity of the site to CB10-89 might suggest that the main use of CB10-88 was as a temporary camp associated with hunting. The small number of artefacts from the 3 mm sieve fraction suggests that tool manufacture and maintenance was not a prominent activity at the site. The basalt core may indicate provisioning of the shelter, perhaps to ensure a supply of raw material for visits associated with activities at the more intensively used shelters nearby.

FIGURE A5.55: CB10-88: general view.

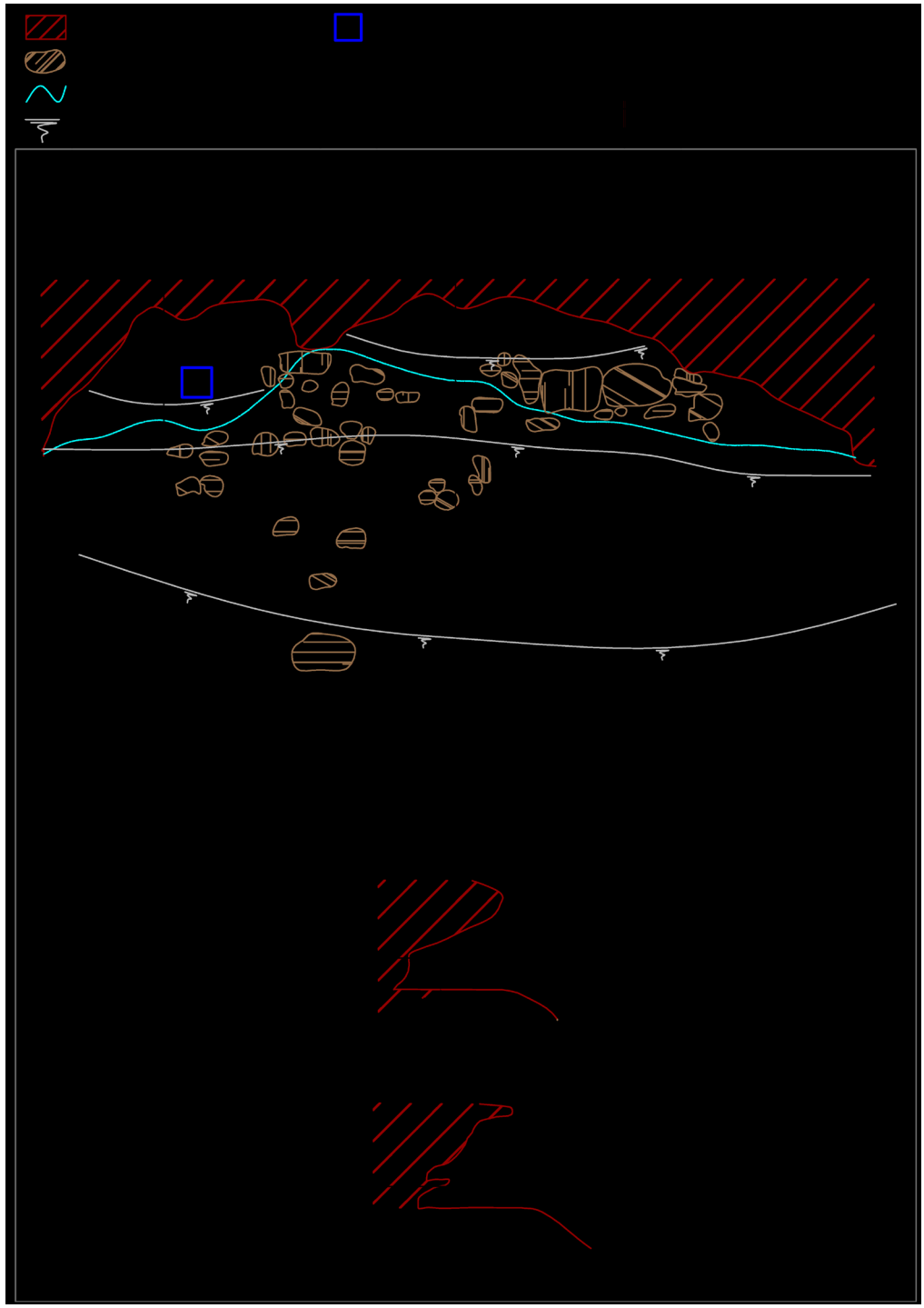

FIGURE A5.56: CB10-88: plan and profile. (Drawn by M. Jimenez-Lozano).

FIGURE A5.57: CB10-89: stone feature.

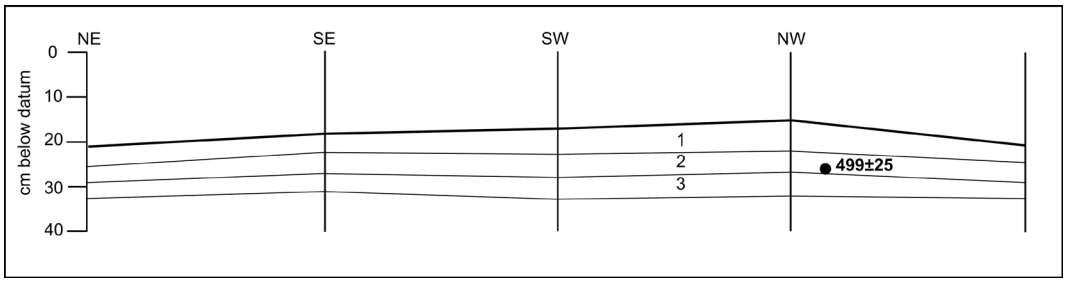

FIGURE A5.58: CB10-88: excavation units and position of in situ charcoal sample.

FIGURE A5.59: CB10-88: base of excavation (top) and south-west section (bottom).

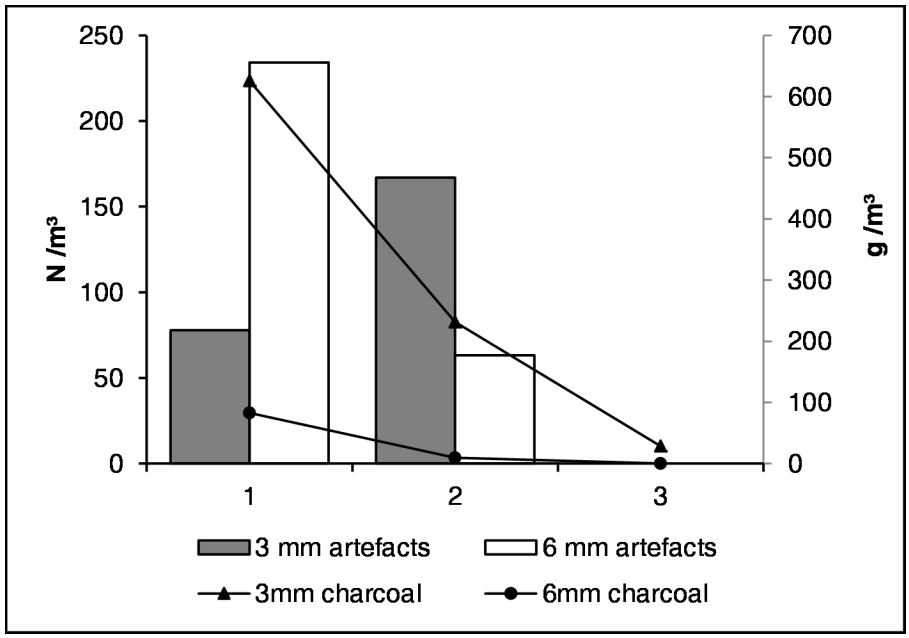

Figure A5.60: CB10-88: distribution of artefacts and charcoal.

Table A5.28: CB10-88: raw material composition and major artefact classes.

	3 mm	6 mm			Surface
	Complete flake	*Complete flake*	*Broken flake*	*Core*	*Total*	*Complete flake*
Basalt	0	1	1	1	3	0
BIF	0	7	0	0	7	2
Chert	3	2	1	1	4	0
Dolerite	0	1	0	0	1	0
Total	3	11	2	2	15	2

CB10-92 (DAA ID 29118)

CB10-92 is a small, west-facing rockshelter with associated surface artefact scatter on the south-east slope of a low hill, which forms part of the southern foothills of the Chichester Range (Figure A5.61). The shelter is 1.7 m high at the drip line, 9.4 m deep and 7.4 m wide. The walls and ceiling are exfoliating slabs of banded iron formation. Moderate-sized conglomerate boulders are present at the front of the shelter along the drip line. These appear to be roof fall and suggest that the configuration of the shelter roof in the past was different from its appearance today (Figure A5.62). The shelter overlooks a large valley that is incised by Kakutungutanta Creek, 40 m to the north. It was originally recorded and assessed as having potential for a subsurface archaeological deposit in 2010 (Sinclair and Wright 2012).

The talus is a gentle 10 m long slope that is covered by silt and gravel, with exposed patches of bedrock. The talus carries moderately dense stands of mulga (*Acacia aneura*) trees and an understorey of moderately dense *acacia* shrubs and spinifex (*Triodia* spp.) hummocks. The shelter itself is largely devoid of vegetation. Accordingly, ground surface visibility is estimated at 95% within the rockshelter and 20% on the talus slope. The surface artefact scatter extends down the slope from the entrance to the shelter (Figure A5.63). It measures 24 m by 40 m with an estimated area of 792 m^2. There are two main concentrations of artefacts, one at the entrance to the rockshelter and a second at the northern end of the scatter. A sample of artefacts was recorded from a 5 × 5 m square near the entrance to the shelter. These were mainly BIF complete flakes (Table A5.29).

Six depth probes indicated that there was up to 75 cm of deposit. A single 1 × 1 m test pit was excavated at the front of the shelter about 0.5 m inside the drip line. This area had sufficient space for human occupation and was devoid of major roof fall or disturbance. The surface of the test pit sloped down slightly towards the drip line and was covered with sparse small roof fall, macropod scats and small plant debris. The excavation was described by Dias and Rapley (2013, 61–85), and this discussion draws on data presented there.

Excavation results

The test pit was excavated in 17 excavation units which averaged 5 cm deep (Figure A5.64). Bedrock was reached at 85 cm below ground surface. The deposit (SU1) comprised a loose to lightly compact matrix of fine sediment and gravel. The deposits in EU1–2 were loose with large quantities of macropod scats and dark reddish brown in colour. The deposits became generally lighter and more compact with depth (Figures A5.65, A5.66). In EU3 a charcoal rich feature emerged in the north-west corner (SU2). This feature covered about 25% of the square and continued to the base of EU4. It was interpreted as a degraded hearth. At the base of EU6, a red deposit appeared along the eastern wall (SU3). Bedrock was first exposed immediately beneath this deposit in EU8. SU3 is interpreted as degraded bedrock. Bedrock and immovable roof fall were increasingly exposed in succeeding excavation units to EU17 at 85 cm below surface. Artefacts occurred in all excavation units to EU16. The deposits were acidic throughout (pH 4.5–5).

Three samples of charcoal were sent to Waikato Laboratory for AMS dating. All were obtained from the 6 mm sieve (see Table 5.4). The determinations from EU8 and EU10 were not in stratigraphic order but the substantial overlap in the distributions of the calibrated dates (Figure A5.67) suggests that these are the same age.

The distribution of artefacts and charcoal with depth shows a marked peak, particularly in the 3 mm charcoal in the upper excavation units, with a possible secondary peak in the lower part of the site (Figure A5.68). There is a marked trough in the distribution of material at EU8. As noted above, bedrock and large roof fall started appearing at EU8 (40 cm below surface) with increasing reduction in the area of the square below this until bedrock was reached at 85 cm below surface. The radiocarbon determinations suggest a relatively rapid accumulation of sediment over about a thousand years. Therefore, most or all of the cultural material from EU1–7 probably relates to a single time-averaged period of use 1000–2000 years ago. The small quantities of cultural material recovered below EU8 suggest possible earlier use of the shelter, but the restricted area excavated makes interpretation difficult.

Organic remains, including plant material, macropod scats, hair, and insect remains, were found throughout the sequence, but decreased with

depth. Evidence of termite activity suggests the possibility of disturbance through bioturbation. Bone was recovered from EU1–5 and EU7. Most was undiagnostic or could not be identified to species (Table A5.30). Twenty-five bone fragments were burnt. It is not clear how much of this material results from human activity.

Stone artefacts

Two hundred and sixty-six flaked stone artefacts were recovered from the excavation (Table A5.31). Of these, 161 came from the 6 mm sieve fraction and the remainder from the sampled 3 mm sieve fraction. When corrected for sampling, the estimated total of artefacts from the 3 mm sieve fraction is about 400. Most artefacts came from EU1–7, with only 45 from the lower spits (30 from the 6 mm fraction and 15 from the 3 mm sample). A granite hammer stone was found in EU7 (Figure A5.69).

Most flaked stone material is BIF, which occurred throughout the sequence in all excavation units. Chert and chalcedony are the next most common raw materials and occur in most spits. Mudstone was only found in EU1–7. CB10-92 is the only shelter investigated where quartzite is present in more than a trace amount, which is the case in four other shelter assemblages (see Chapter 5). Most raw materials are represented in both the 3 mm and 6 mm sieve fractions. However, dolerite, quartzite (except for one flake) and silcrete were only recovered from the 6 mm fraction, suggesting that these materials may not have been worked on site. By contrast, most basalt came from the 3 mm sieve fraction. Complete flakes were the most common artefacts. Four single platform cores were recovered from each of the top three excavation units, one each of BIF and chalcedony, and two of chert.

Figure A5.70 summarises raw material composition by sieve fraction for EU1–7 and EU8–16. In both, BIF is more common in the 6 mm sieve fraction, while chert and chalcedony are more common in the 3 mm fraction. The difference is statistically significant in EU1–7 (chi-square=24.643; df=7; $p<0.001$), but not in EU8–16 (chi-square=10.875; df=5; $p=0.054$).

Five artefacts show evidence of retouch. These include a BIF tula from EU1. The others were undiagnostic and included two chert retouched pieces from EU1 and EU3 and two of dolerite from EU3 and EU8. Three blades

were found in the excavation, one each of dolerite and BIF in EU5 and one of basalt in EU6. There was no other evidence of blade production and these artefacts were probably imported to the site.

There were four single platform cores from EU1–7. Two were chert (EU2 and 3) and there was one each of BIF and chalcedony. Both chert cores were small (1.8 g and 7.7 g) and non-cortical, and were probably discarded at the end of their life. The chalcedony core (EU3) by contrast weighed 38 g (volume 29,435 mm^3) and 20% of its surface retained terrestrial cortex. The BIF core (EU1) was 112 g (volume 78,435 mm^3) and 80% cortical. These cores may well have been left at the shelter for future use.

Most flakes and flake fragments are non-cortical (73%). Only mudstone flakes are mostly cortical (83%). Most cortex is terrestrial, with riverine cortex only represented by three BIF flakes. Most platforms are also non-cortical (Table A5.32). Table A5.33 summarises dimensions of complete flakes for raw materials where sample size is greater than two. There are no statistically significant differences between flakes of different raw materials or between EU1–7 and EU8–16.

Discussion

CB10-92 is one of the richest sites in the study area. Most cultural material probably comes from a period 1000–2000 years ago. Like Square C in CB10-133, the most recent date suggests that depositional history might vary in different parts of the shelter or that erosion has removed the most recent deposits. In the absence of more extensive archaeological excavation, this question cannot be pursued further. This highlights some of the problems of interpretation presented by limited test pitting of rockshelters in the Pilbara region when compliance archaeological work is undertaken. The small size of the test pit, coupled with the presence of large roof fall from EU8, also makes it difficult to interpret the material from earlier levels.

In the analysis of surface assemblages (see Chapter 4), Group 3B was defined by sites within a kilometre radius of CB10-92 (Figure A5.71). CB10-92 is one of a pair of rockshelters on the eastern side of Kakutungutanta Creek and is about 300 metres south of CB10-88 and CB10-89 on the western side of the creek. CB10-92 is within 500 metres of the point where

Kakutungutanta Creek enters the outwash plains and there are several large surface scatters and clusters of isolated artefacts immediately to the south-east as the valley widens. CB10-92 is thus close to the ecotone between the ranges and the plains and is the first shelter encountered moving up Kakutungutanta Creek, which has clearly been a key landscape feature in the study area for thousands of years.

Figure A5.61: CB10-92: general view.

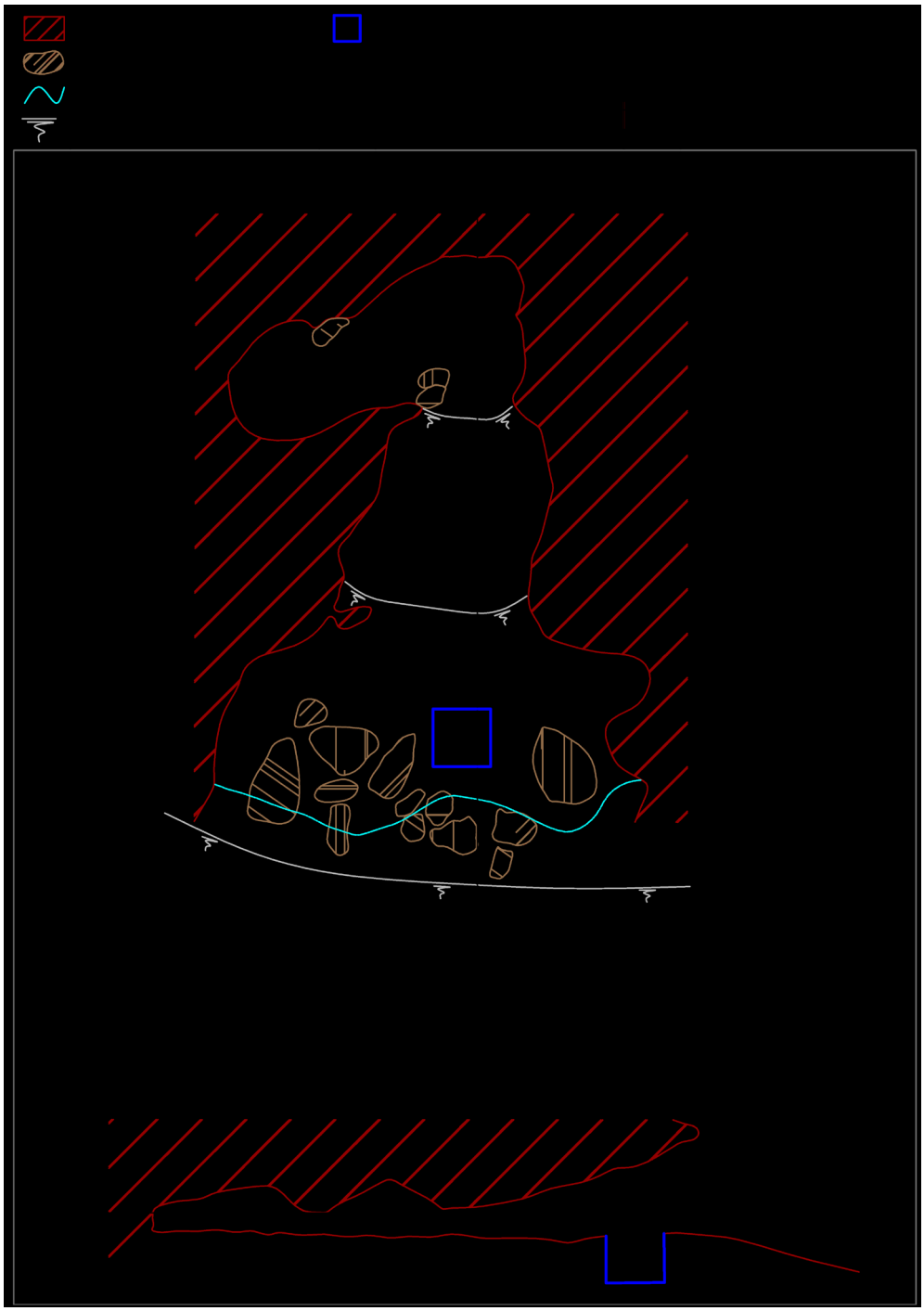

FIGURE A5.62: CB10-92: plan and profile of rock shelter. (Drawn by M. Jimenez-Lozano).

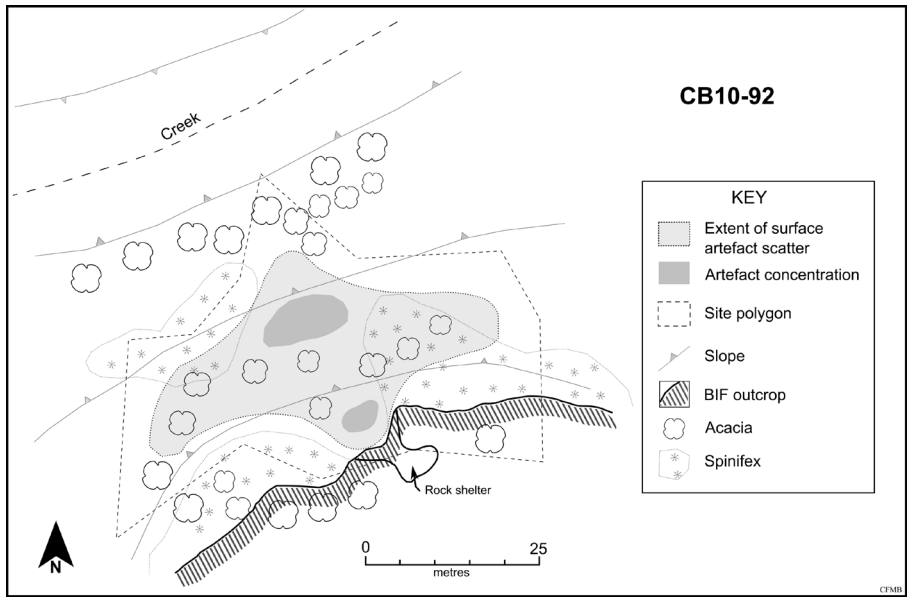

Figure A5.63: CB10-92: overall site plan.

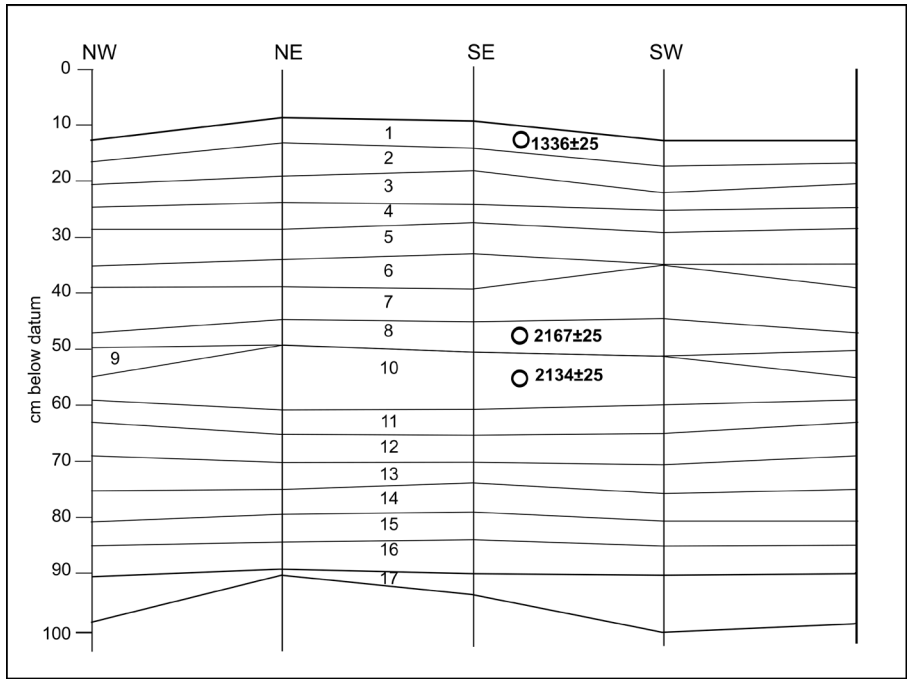

Figure A5.64: CB10-92: excavation units and approximate position of radiocarbon samples.

FIGURE A5.65: CB10-92, during excavation (top) and approaching bedrock (bottom).

Figure A5.66: CB10-92: south-west section.

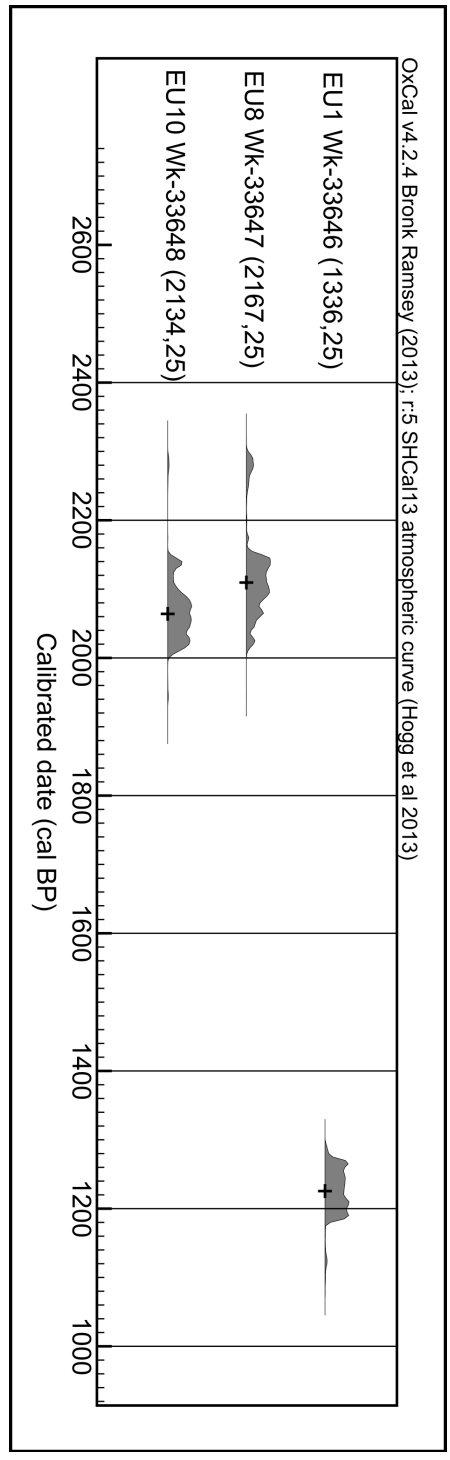

FIGURE A5.67: CB10-92: probability plot of radiocarbon determinations.

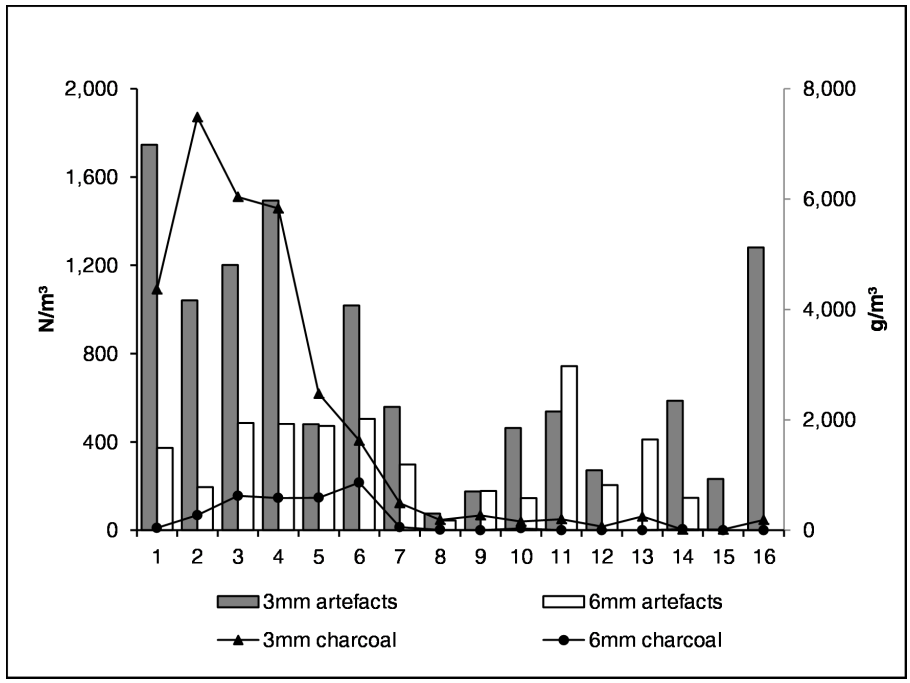

Figure A5.68: CB10-92: distribution of artefacts and charcoal.

FIGURE A5.69: CB10-92: granite hammer stone.

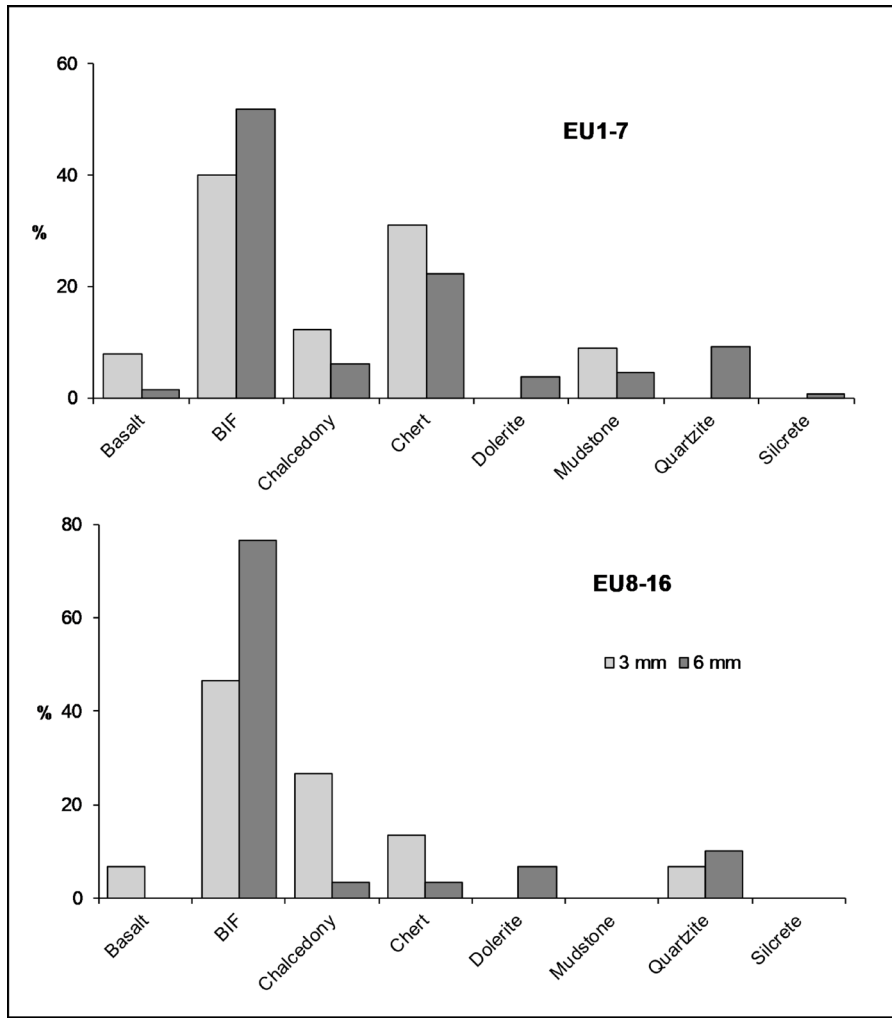

FIGURE A5.70: CB10-92: raw material composition by sieve fraction and excavation unit.

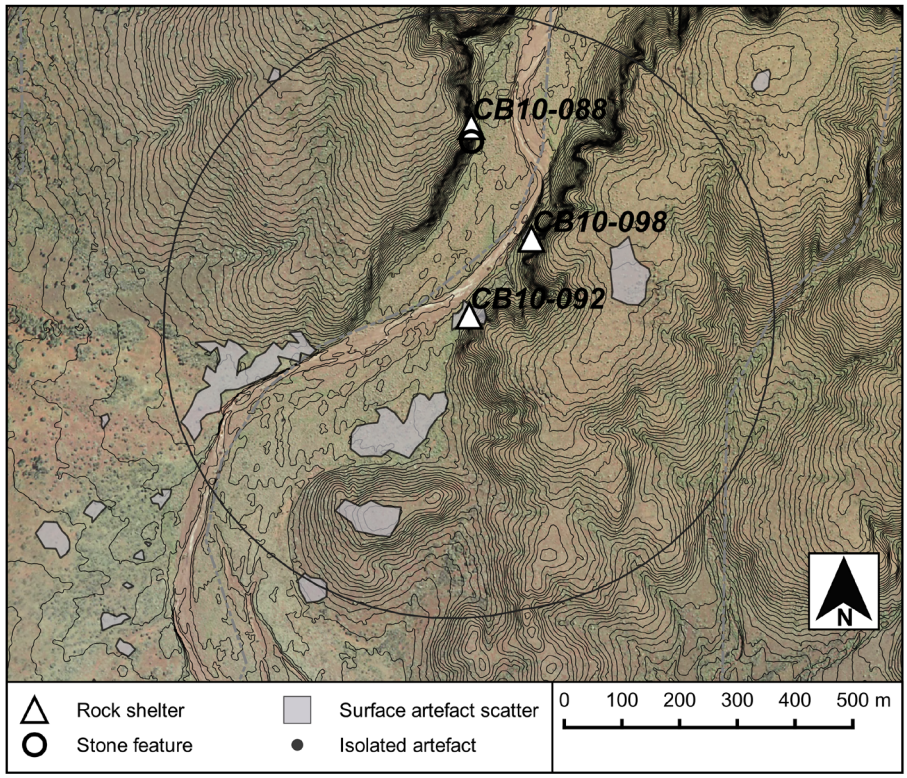

Figure A5.71: CB10-92: archaeological features within a 500-metre radius.

Table A5.29: CB10-92: surface sample.

	Complete flake	Flake fragment	Total
Basalt	1	0	1
BIF	9	2	11
Chert	1	1	2
	11	3	14

Table A5.30: CB10-92: animal bone.

	N	Weight (g)
Macropod	44	135.88
Mammal	29	6.45
Bird	6	0.23
Frog	2	0.02
Lizard	20	0.20
Snake	5	0.05
Unidentified reptile	18	0.18
Unidentified undiagnostic fragment	132	2.92
Total	256	146.93

Table A5.31: CB10-92: summary of assemblage composition.

	3 mm				6 mm			
	Debris	*Complete flake*	*Flake fragment*	*3 mm total*	*Complete flake*	*Flake fragment*	*Single platform core*	*6 mm total*
EU1–7								
Basalt	2	4	1	7	2	0	0	2
BIF	2	28	6	36	56	11	1	68
Chalcedony	1	9	1	11	3	4	1	8
Chert	3	18	7	28	20	7	2	29
Dolerite	0	0	0	0	2	3	0	5
Mudstone	0	8	0	8	4	2	0	6
Quartzite	0	0	0	0	11	1	0	12
Silcrete	0	0	0	0	1	0	0	1
Total	8	67	15	90	99	28	4	131
EU8–16								
Basalt	1	0	0	1	0	0	0	0
BIF	0	6	1	7	20	3	0	23
Chalcedony	0	2	2	4	1	0	0	1
Chert	0	1	1	2	1	0	0	1
Dolerite	0	0	0	0	2	0	0	2
Quartzite	0	1	0	1	3	0	0	3
Total	1	10	4	15	27	3	0	30
Total	9	77	19	105	126	31	4	161

Table A5.32: CB10-92: platform types.

	Cortex	Plain	Focal	Total
EU1–7				
Basalt	0	2	0	2
BIF	16	46	1	63
Chalcedony	0	4	1	5
Chert	4	18	1	23
Dolerite	0	3	0	3
Mudstone	0	6	0	6
Quartzite	1	10	1	12
Silcrete	0	1	0	1
Total	21	90	4	115
EU8–16				
BIF	4	19	0	23
Chalcedony	0	1	0	1
Chert	0	1	0	1
Dolerite	1	1	0	2
Quartzite	0	3	0	3
Total	5	25	0	30

Table A5.33. CB10-92: dimensions of complete flakes from EU1–7.

		Length (mm)	Width (mm)	Thickness (mm)
EU1–7				
BIF (N=56)	Mean	20.8	18.1	4.8
	SD	10.2	8.1	2.7
Chalcedony (N=3)	Mean	17.0	13.0	4.0
	SD	13.9	6.0	1.7
Chert (N=20)	Mean	16.9	15.7	3.7
	SD	8.3	6.2	2.1
Dolerite (N=3)	Mean	32.7	19.0	6.3
	SD	24.0	16.5	5.9
Mudstone (N=4)	Mean	13.8	12.3	3.8
	SD	5.1	4.7	2.2
Quartzite (N=11)	Mean	14.5	14.0	3.4
	SD	4.5	7.0	2.7
EU8–16				
BIF (N=20)	Mean	20.4	18.3	4.8
	SD	8.5	8.6	2.3
Quartzite (N=3)	Mean	28.0	18.3	5.3
	SD	16.1	11.1	4.5

CB10-98 (DAA ID 32031)

CB10-98 is a west-facing, banded iron formation rockshelter on the slope of a wide gully (Figure A5.72). At the base of the gully, about 20 metres to the north-west, is Kakutungutanta Creek. The shelter is 10.7 m long and 3.7 m wide with a floor area of about 39 m^2 (Figure A5.73). It is 1.4 m high at the drip line. The talus is 20 m by 15 m and has a gradient of 25˚. The talus slope and the gulley below carry a moderately dense understorey of spinifex (*Trioidia* sp.) grassland with scattered acacia trees and shrubs.

The shelter was first reported in April 2010 (Sinclair and Wright 2012, 117). A small scatter of surface artefacts was recorded on the talus slope extending north-west from the entrance to the shelter (Figure A5.74). A single platform dolerite core was also found on the surface, cached in the rear of the shelter (Figure A5.75). No other artefacts were found on the shelter floor and it is possible that this core was deliberately left in the shelter for future use as part of a strategy of provisioning places.

Artefact density peaks at 0.8/m^2 in the centre of the talus with fewer artefacts along the base of the gully or at the entrance to the shelter (Sinclair and Wright 2012, 118). A sample of 20 artefacts was recorded from a 5 × 5 m sample square. All were complete flakes or flake fragments (Table A5.34). Most (70%) were BIF with basalt, chalcedony and chert also occurring in small numbers. There were no cores in the surface sample on the talus. One BIF distal flake fragment had a short length of undiagnostic retouch.

A series of 10 depth probes within the shelter suggested the floor deposits varied between 4 cm and 51 cm. A single 1 × 1 m test pit was placed centrally just inside the drip line in an area that was thought to have the deepest deposit and was relatively free of roof fall. It was excavated in November 2011. The excavation was described in Dias and Rapley (2013, 109–27) and this discussion draws on the information presented in that report.

Excavation results

The test pit was excavated in 10 excavation units and was halted at 62 cm (EU10) when bedrock extended over 95% of the square (Figure A5.76). The surface was dry with medium-sized rocks and small gravel. EU1 comprised dry, loose, fine, dark reddish-brown sediment with localised areas of

compaction. Most of EU2 had a similarly loose matrix with localised areas of a darker damp deposit. In the south-east corner of EU2 a probable hearth feature was found (Figure A5.77, top). This comprised a concentration of degraded charcoal resting on white calcrete. The remainder of EU3 was loose, brown-red sediment with medium-sized gravel. This layer continued to bedrock, with increasing compaction and quantities of medium gravel and large rocks. A large rock was first uncovered in EU4 and progressively revealed down to EU10, greatly restricting the area excavated (Figure A5.77, bottom). The deposits were acidic throughout (pH 4.5–5).

Stone artefacts and charcoal were confined to the top five excavation units (Figure A5.78). There is a marked peak in EU2 and 3, perhaps associated with the possible hearth in EU2. Organic material, including charcoal, insect remains, bone, macropod scats and plant material, were found in all excavation units, but it is considered unlikely to be cultural in origin.

Two radiocarbon determinations were obtained. Like several other shelters in the study, these are quite widely separated in time, though not depth (Figure A5.79). This could be interpreted as very slow accumulation of sediments, or as episodic use of the shelter. The possible hearth and artefacts in EU1–3 represent a recent episode of occupation dated to about 1500 years ago, while there may be evidence of an earlier episode of use about 5000 years ago.

Stone artefacts

Most of the excavated assemblage comes from EU1–3, with the ten artefacts from EU4–5 representing a possible earlier occupation of the shelter (Table A5.35). Most artefacts were chert or BIF. There were also small quantities of basalt, chalcedony, dolerite, ironstone, quartz and quartzite. Most artefacts were complete flakes with small quantities of debris and flake fragments. The only core was an undiagnostic quartz core fragment. One BIF complete flake in EU1 also had a short length of undiagnostic retouch.

The artefacts from the 3 mm sieve fraction dominate the assemblage; when sampling is taken into account the extrapolated total is 120 (Dias and Rapley 2013, 116). There is considerable disparity between the 3 mm and 6 mm fractions in terms of raw material composition (Figure A5.80). The

6 mm fraction has a wider range of raw materials and the largest single category is BIF (41%). By contrast, the 3 mm fraction is dominated by chert (58%), and BIF only makes up 24%. Both shelter assemblages are different from the surface sample from the talus, which is 70% BIF.

Most artefacts are non-cortical in both the excavated and surface assemblages. All cortex is terrestrial in the excavated assemblage and cortical flakes occur in all materials except chalcedony. In the surface assemblage, most cortical pieces are BIF and all except one are riverine in origin. Generally, complete flakes from the surface assemblage are larger than those from the excavation (Table A5.36). BIF and ironstone flakes are larger than those of chert and chalcedony.

Discussion

CB10-98 was probably used intermittently with a recent episode of occupation about 1500 years ago, and a possible earlier one about 5100 years ago. This pattern occurs at several other sites in the study area (see discussion in Chapter 5). There was no evidence for occupation in deeper deposits at the shelter, but it should be noted that the presence of large roof fall in the excavated square meant only a very small part of the older sediments was sampled. CB10-98 is close to the much more intensively occupied CB10-92 (Figure A5.71).

The presence of relatively large numbers of artefacts in the 3 mm sieve fraction indicates that tool maintenance and core preparation were carried out at the site. However, the disparity between the 3 mm and 6 mm raw materials probably implies that episodes of use were brief. The dolerite core left in the rear of the shelter is evidence for provisioning of the place and suggests that return visits were planned.

FIGURE A5.72: CB10-98: general view of shelter setting (top) and entrance (bottom).

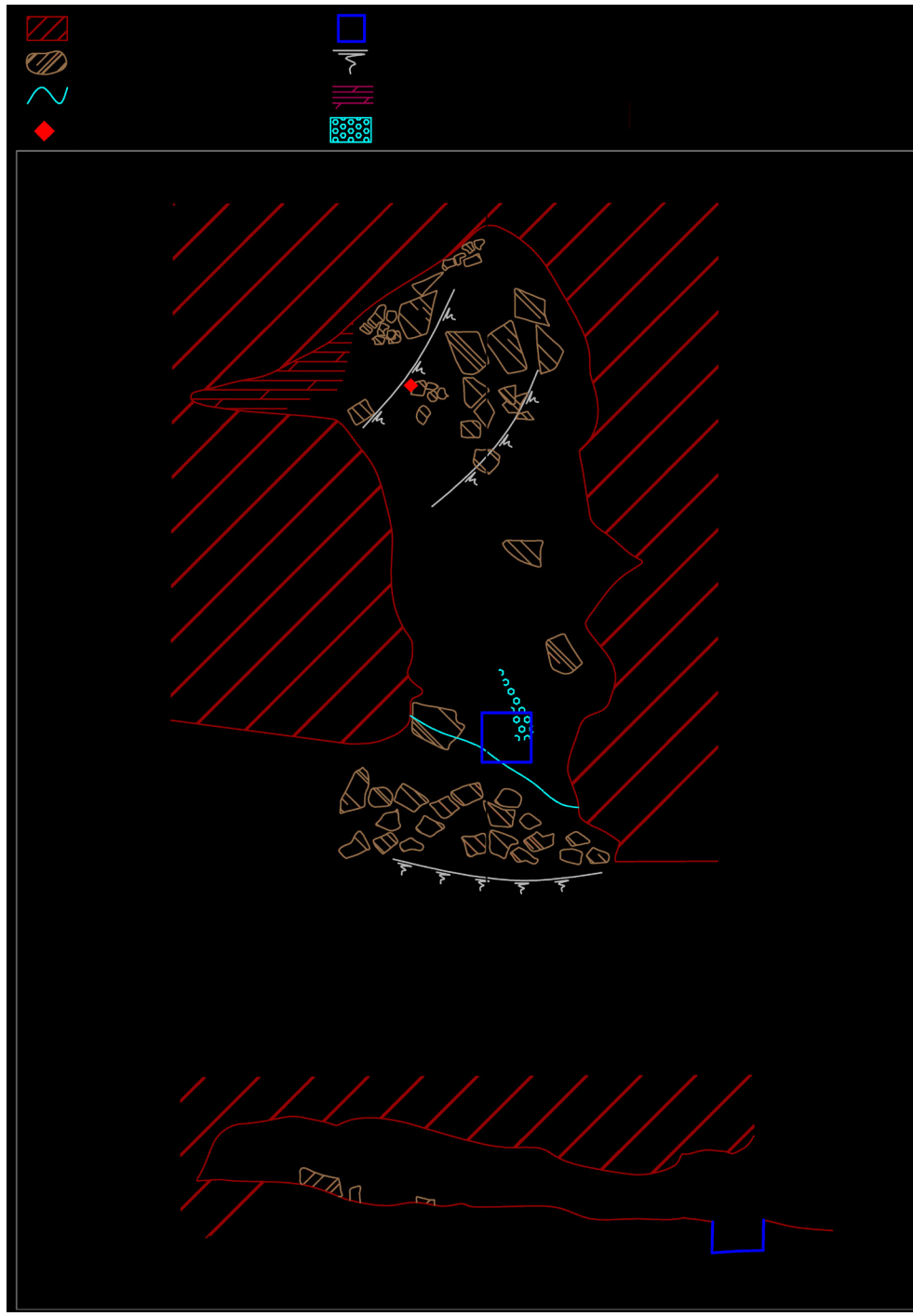

FIGURE A5.73: CB10-98: shelter plan and profile. (Drawn by M. Jimenez-Lozano).

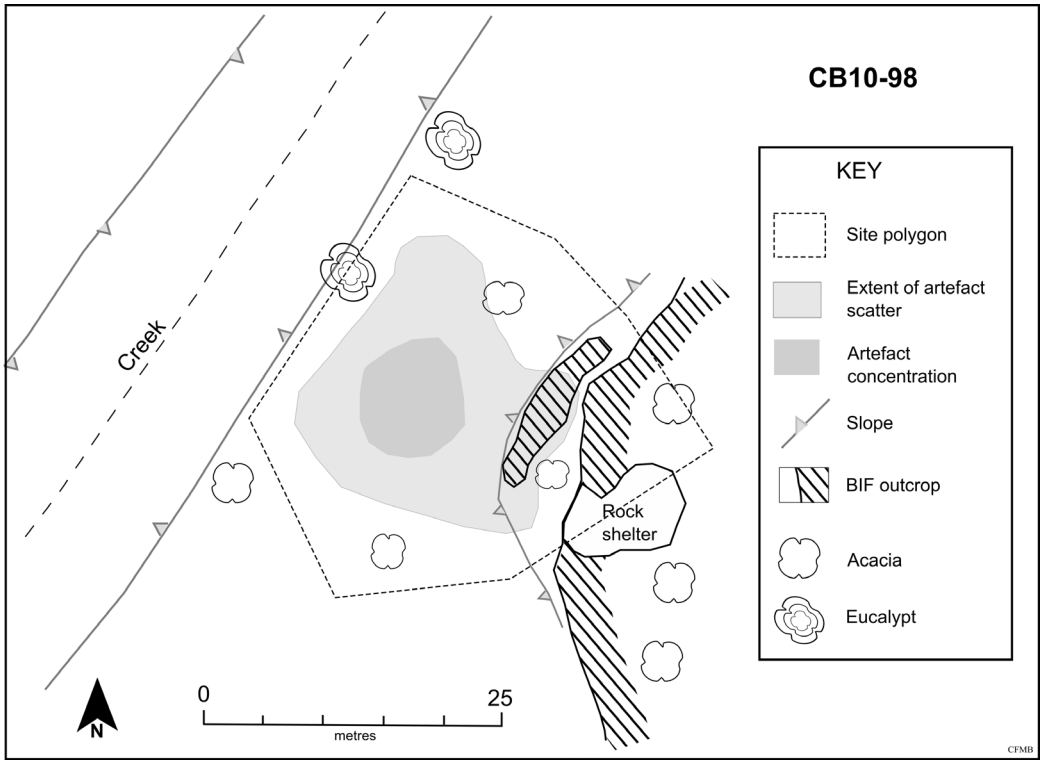

FIGURE A5.74: CB10-98: overall site plan.

FIGURE A5.75: CB10-98: single platform dolerite core cached in rear of shelter.

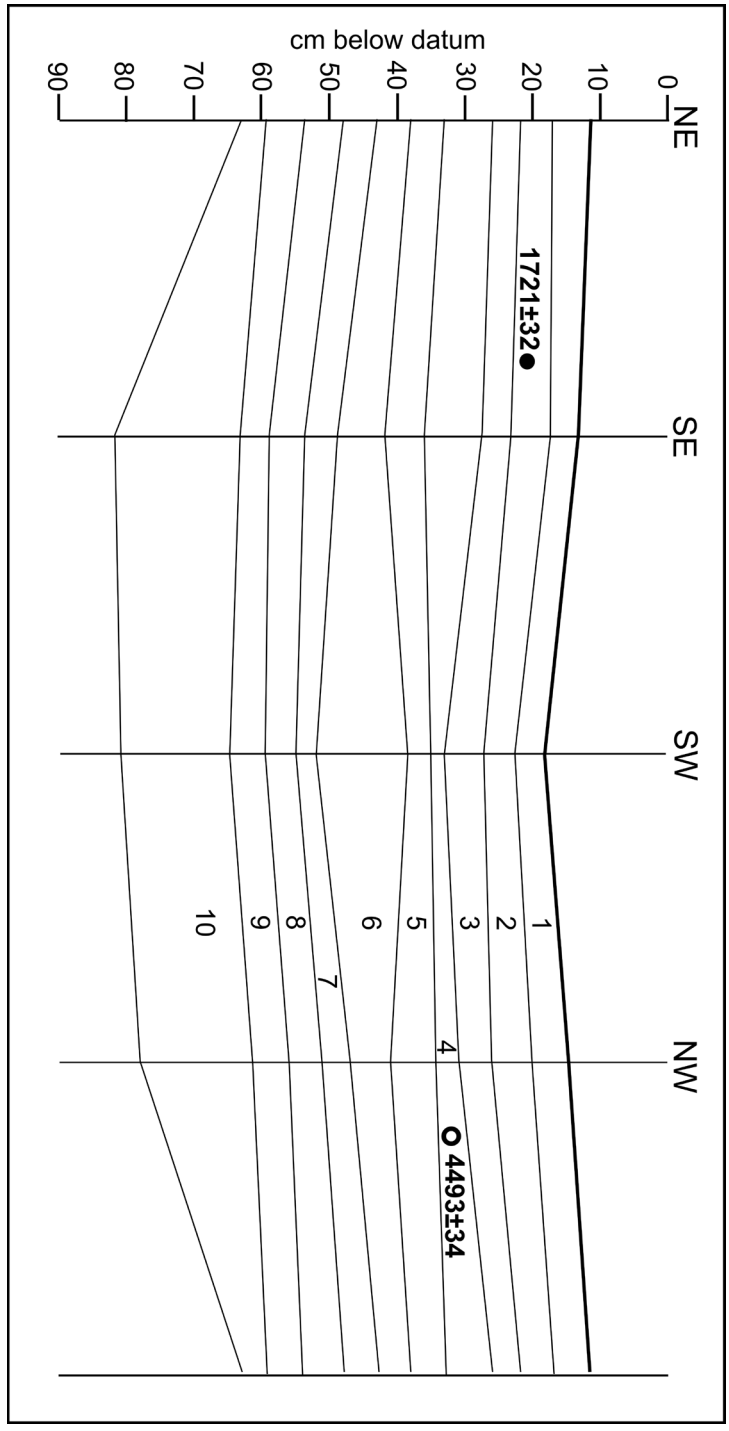

FIGURE A5.76: CB10-98: excavation units and approximate position of radiocarbon determinations.

FIGURE A5.77: CB10-98, during excavation: possible degraded hearth feature (top), base of excavation (bottom).

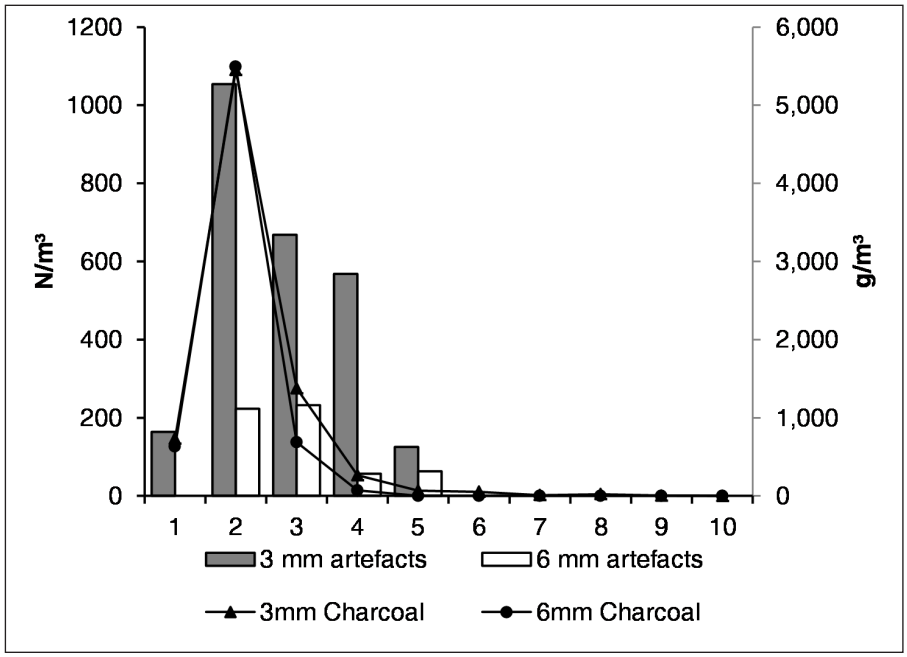

Figure A5.78: CB10-98: distribution of artefacts and charcoal.

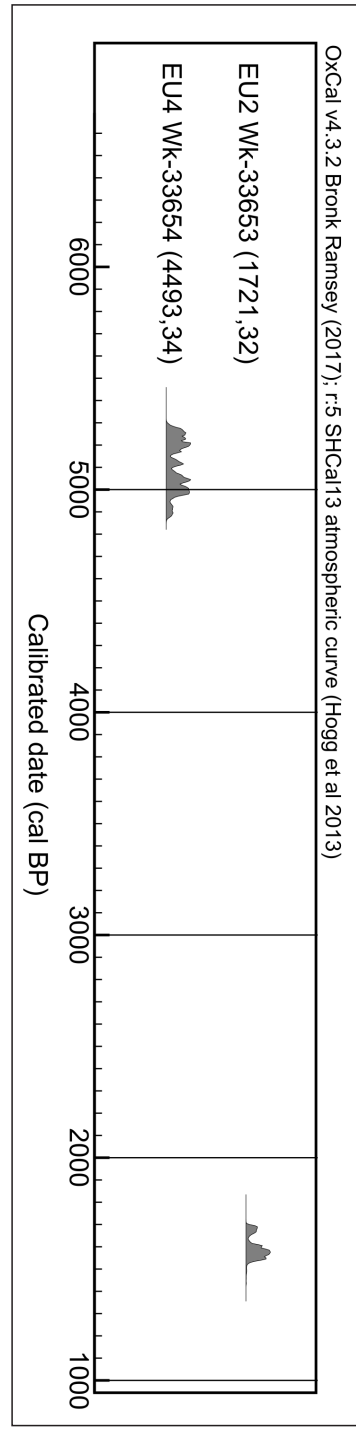

FIGURE A5.79: CB10-98: probability distribution of radiocarbon determinations.

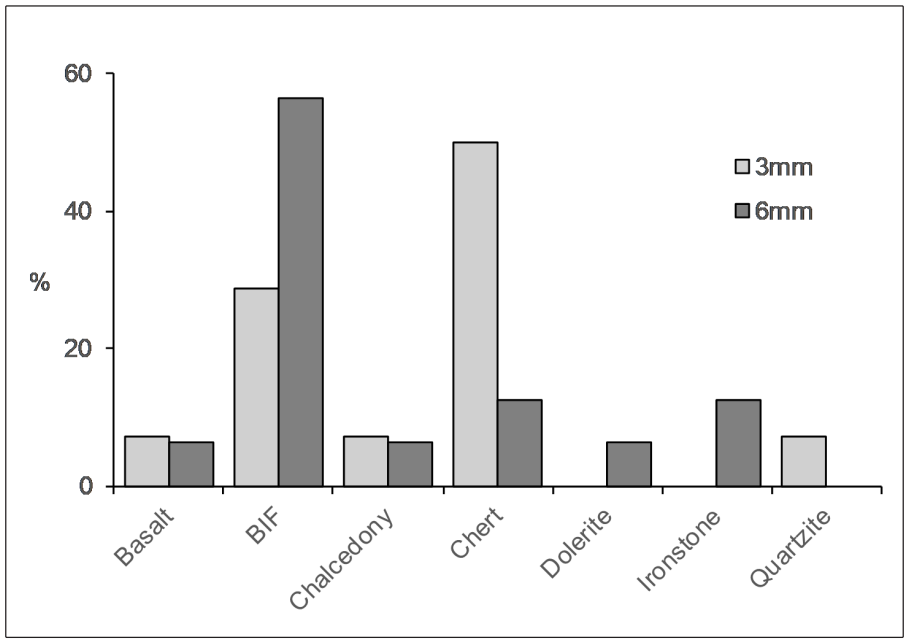

Figure A5.80: CB10-98: raw material composition by sieve fraction.

Table A5.34: CB10-98: surface assemblage sample from talus.

	Complete flake	Broken flake	Total
Basalt	0	1	1
BIF	11	3	14
Chalcedony	2	2	4
Chert	1	0	1
Total	14	6	20

Table A5.35: CB10-98: artefacts by raw material and major artefact class.

	3 mm				6 mm				
	Debris	*Complete flake*	*Broken flake*	*Total*	*Debris*	*Complete flake*	*Broken flake*	*Core fragment*	*Total*
EU1–3									
Basalt	0	1	2	3	0	0	2	0	2
BIF	0	2	3	5	0	3	5	0	8
Chalcedony	0	1	1	2	0	0	2	0	2
Chert	3	5	9	17	1	1	3	0	5
Dolerite	0	0	0	0	0	0	1	0	1
Ironstone	0	0	0	0	0	2	0	0	2
Quartz	0	0	0	0	0	0	2	1	3
Sub-total	3	9	15	27	1	6	15	1	23
EU4–5									
BIF	1	1	1	3	0	3	0	0	3
Chert	0	2	0	2	1	0	0	0	1
Quartzite	0	1	0	3	0	0	0	0	0
Sub-total	1	4	1	6	1	3	0	0	4
Total	4	13	16	33	2	9	15	1	27

Table A5.36. CB10-98: mean dimensions (mm) of complete flakes from excavated and surface samples.

Excavated	N	Length	SD	Width	SD	Thickness	SD
BIF	6	33.7	18.5	17.5	7.4	7.7	6.0
Chert	1	12.0		14.0		4.0	
Ironstone	2	32.0	11.3	26.0	2.8	14.5	10.6
Surface							
BIF	11	39.0	13.6	30.7	10.4	11.3	5.9
Chalcedony	2	26.0	19.8	15.5	7.8	4.0	0.0
Chert	1	23.0		25.0		10.0	

CB10-147 (DAA ID 29124)

CB10-147 is a west-facing rockshelter on the slope of a low banded iron formation hill which forms part of the southern half of the Chichester Range (Figure A5.81). It overlooks the wide north–south oriented valley of Kakutungutanta Creek, 140 m to the west. A first order ephemeral drainage line lies 25 m north-west of the site. The shelter is 11.0 m long, 8.0 m wide, with a floor area about 54 m² and is 2.1 m high at the drip line (Figure A5.82).

The talus has a moderate gradient (20°), 10 m wide, 15 m long and its surface is banded iron formation gravel with small exfoliated slabs of banded iron formation similar to the shelter walls and ceiling. Vegetation on the talus consists of a scrub of scattered *Grevillea* spp. trees, with an understorey of *Acacia* spp. and *Cassia* spp. shrubs and spinifex (*Triodia* spp.) grassland. Ground surface visibility here is estimated at 90%. There is no vegetation in the shelter.

CB10-147 was first recorded in April 2010 (Sinclair and Wright 2012, 124). Three depth probes indicated subsurface deposits 16–18 cm deep. In November 2011, a single test pit (1 × 0.5 m) was excavated in the south-west portion of the shelter in an area that was free of roof fall or disturbance. The results of the excavation were described by Dias and Rapley (2013, 145–59), and this discussion draws on information presented there.

Six artefacts were recorded on the surface. All were BIF cores, four single platform and two multiplatform.

Immediately to the south of CB10-147 is a walled enclosure (CB11-93) (DAA 303920) (Figure A5.83). CB11-93 was recorded in 2011 (Sinclair and Wright 2012, 161–63). A partially collapsed wall of boulders blocks off a single chamber. The chamber is 4.3 m long, 2.9 m wide and 1.0 m high at the drip line. The wall comprises a minimum of 30 stacked BIF stones at the opening of the niche. They range in size from 55 × 56 × 20 cm to 10 × 10 × 5 cm. Several larger rocks to the north of the opening appear to be repositioned roof fall. The wall has collapsed in the centre and to the south of the opening, allowing a view into the chamber. There was no other cultural material associated with the structure or within the chamber. Depth probes within the chamber and below the structure indicated that there was little accumulation of deposit.

Excavation results

The deposits were excavated in five arbitrary excavation units of about 6 cm (Figure A5.84). The surface of the test pit was dry and covered in small roof fall, fine, loose soil and degraded BIF dust, as well as leaf litter, twigs, macropod scats, and a bone. The deposits were uniform throughout and became more compact with depth (Figure A5.85). They were characterised by an acidic (pH 4.5–5), dry matrix of silty, strong, brown soil, interspersed with small pieces of gravel. Bedrock appeared in EU4 and covered most of the square at the base of EU5 about 32 cm below ground surface. As no cultural material was recovered in EU4 and EU5, the test pit was abandoned.

Small quantities of organic material were found throughout and, as well as charcoal, included bone, insect nests and remains, macropod scats and plant fragments (including leaves, roots and seeds). Bone was recovered from all units except EU1 and was found in both the 6 mm and 3 mm sieves. All bone was highly fragmented and most was unidentifiable, with the exception of one femur fragment, four unidentified macropods and one unidentified mammal bone. None of the bone had any evidence of human modification and may not be cultural in origin. Insect remains were found in all units, with a relatively high amount in EU4 and the remnants of a termite nest in the north-east corner of EU5. Macropod scats occurred in EU1, EU2 and EU3, with the most in EU1. Plant fragments also occurred in all units, with leaves throughout, roots in EU1, EU2 and EU4, and seeds in EU1. None of this material is thought to be cultural.

Artefacts were only recovered from EU1 and EU3 (Figure A5.86). Charcoal was found in all units and was mostly very fragmented. The largest amount came from EU2. No discrete hearths were noted. Two samples of charcoal were sent to Waikato Laboratory for dating from the two excavation units with cultural material. The results suggest that the shelter saw two brief episodes of use, one in the recent past and an earlier mid-Holocene occupation (Figure A5.87).

Stone artefacts

Only 13 artefacts were recovered from the excavation, two from EU1 and 11 from EU3. Most were complete flakes from the 6 mm fraction (Table A5.37). The 3 mm sieve fraction sample only yielded one chalcedony complete flake from EU1 and a BIF distal flake fragment from EU3. Two of the three basalt flakes from EU3 were partly cortical. The presence of riverine cortex indicates these derive from river cobbles brought to the site.

Discussion

The small size of the test pit in CB10-147 and the sparse cultural remains limit our understanding of the site. However, the most likely interpretation is that, as at several other sites in the study area, there were two brief episodes of use, one recent and one mid-Holocene. The surface artefacts suggest that the most recent use of the shelter is evidence of the provisioning of places with raw material, in the form of a stockpile of BIF cores. CB10-147 and CB11-93 make up a pair of rockshelters in a small gully off Kakutungutanta Creek. Immediately to the east, another larger gully system also contains a small rockshelter, CB10-145. CB10-145 has no deposit and the only cultural material within the shelter is a river cobble manuport. CB10-147 and CB10-145 thus both seem to be examples of provisioning places, while the walled structures at CB11-93 may also be for storage. This section of Kakutungutanta Creek has no archaeological material on the valley floor, while there is a sparse scatter of isolated artefacts on higher ground.

Figure A5.81: CB10-147: general view.

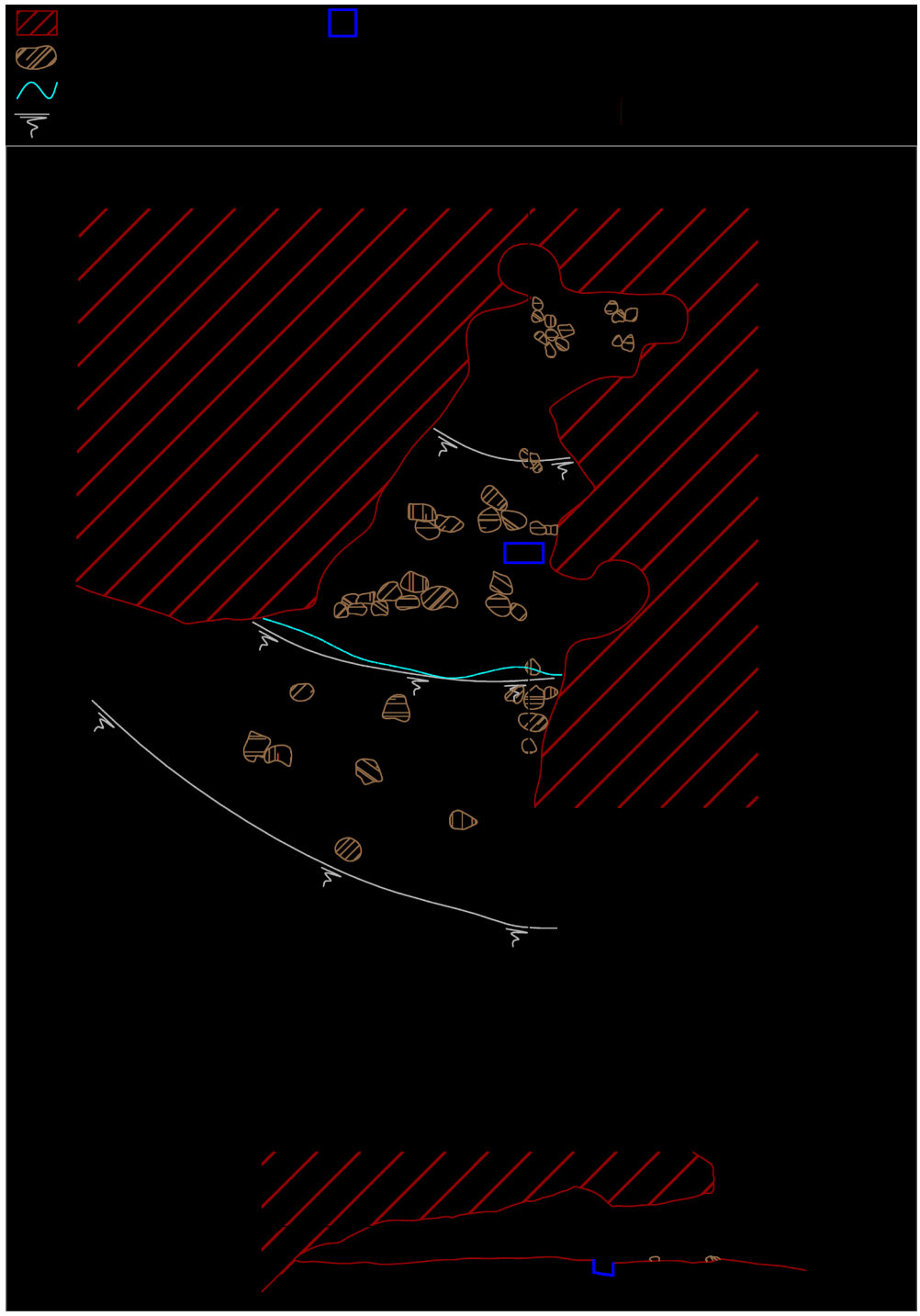

FIGURE A5.82: CB10-147: site plan and profile. (Drawn by M. Jimenez-Lozano).

Figure A5.83: CB11-93: general view.

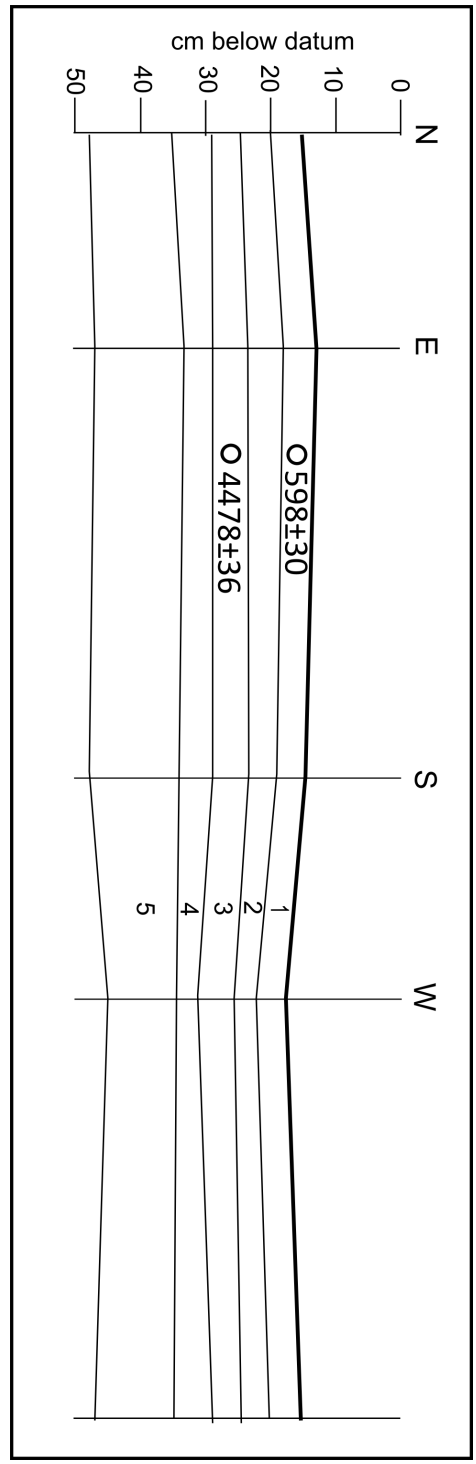

Figure A5.84: CB10-147: excavation units and position of carbon samples.

FIGURE A5.85: CB10-147 excavation: south-east section.

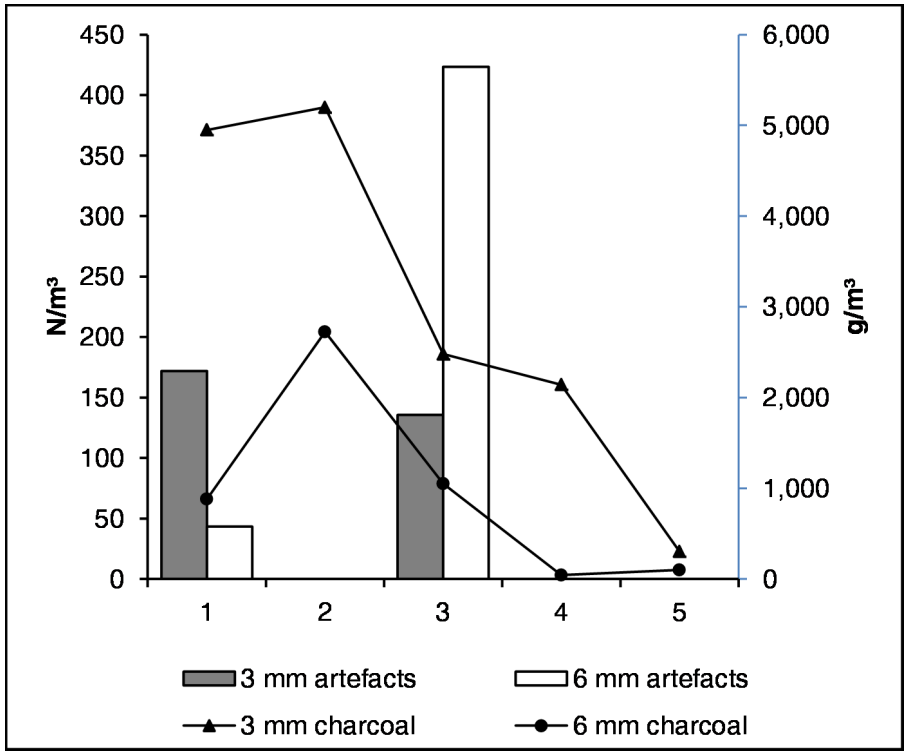

FIGURE A5.86: CB10-147: distribution of stone artefacts and charcoal.

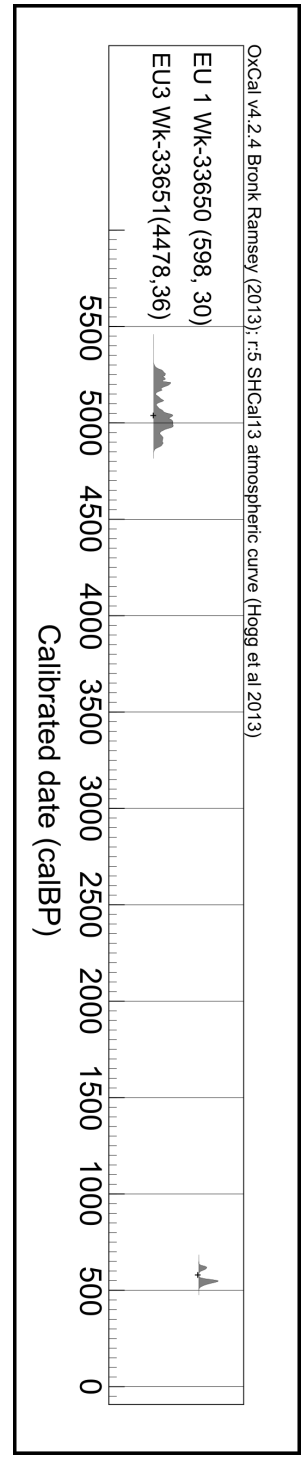

Figure A5.87: CB10-147: probability plot for radiocarbon determinations.

Table A5.37. CB10-147: complete flakes from the 6 mm sieve fraction.

	EU1	EU3
Basalt	0	3
BIF	0	6
Chalcedony	0	1
Chert	1	0
Total	1	10

GROUP 4

Group 4 is defined by the area within 1 km radius of CB09-55. This site is located roughly 2 km west of CB10-133, the northernmost shelter on Kakutungutanta Creek. No other shelters with cultural material were identified in this creek catchment and other archaeological remains only comprise a small number of surface artefact scatters and isolated artefacts, as well as a small BIF quarry (CB09-61) located 600 m north of CB09-55 (Rapley, McHarg and Edwards 2009, 168–72) (Figure A5.88).

CB09-55 (DAA ID 28044)

CB09-55 is a small banded ironstone overhang in the side of a north–south oriented gully (Figure A5.89). The site faces east towards a second order ephemeral stream about 6 m away. The shelter is 3.7 m high at the drip line, and 9.6 m wide by 4 m deep (floor area about 22 m^2) (Figure A5.90). Much of the floor is bedrock or large roof fall. The central area is characterised by small heat fractured roof fall or degraded macropod scats within a loose dusty matrix. The steep rocky talus slope carries dense *Acacia* spp. and *Hakea* spp. and scattered *Eucalyptus* spp. trees with an understorey of spinifex (*Triodia* sp.) and seasonal grasses. Ground surface visibility was estimated at 75%.

The shelter was originally recorded in 2009 (Martens and Craig 2015; Rapley, McHarg and Edwards 2009). Six depth probes in the area free of bedrock towards the centre of the shelter showed that depth of deposit varied between 10 cm to 19 cm. In 2011, an 1 × 1 m test pit was excavated in the area with the deepest deposit (Edwards and Hook 2011, 6–49).

The surface assemblage comprised 13 artefacts (11 complete BIF flakes, one complete chalcedony flake and one BIF multiplatform core). A piece of charred wood was found in a niche at the rear of the shelter (Figure A5.91).

Excavation results

The test pit was excavated in five excavation units (Figure A5.92). The single stratigraphic unit was characterised by a loose, reddish-brown matrix of dusty sediment, roof fall, plant material and degraded macropod scats. The size and frequency of rubble and roof fall decreased with depth, although

no difference in compaction of the deposit was evident. The deposits were acidic (pH 5–6) throughout. Bedrock was exposed over the whole of the square, except the south-east corner, at the base of EU4, about 15 cm below the surface (Figure A5.93). The south-east corner was excavated as EU5 and bedrock was reached about 22 cm below the surface. No features were noted.

Fine charcoal occurred throughout the deposit, mostly in EU1 and 2, and thereafter decreasing markedly with depth. Two samples from the 6 mm fraction in EU2 and EU4 were submitted to Waikato Laboratory for radiometric dating (Figure A5.94). The determinations are in stratigraphic sequence and suggest that occupation of the shelter occurred sometime within about the last 1500 years.

Organic material included charcoal, bone, insects, plant material and macropod scats. The plant material and macropod scats are not considered to be cultural in origin. These occurred only in EU1 and 2. The bone comprised two macropod tooth fragments and two undiagnostic bone fragments, and was found only in EU1 and 2.

The distribution of cultural material with depth shows a marked peak in the distribution of artefacts from the 3 mm sieve fraction in EU3, with artefacts from the 6 mm sieve fraction more evenly distributed (Figure A5.95).

Stone artefacts

Forty-eight stone artefacts were recovered from the excavation. Thirty-five came from the 6 mm sieve fraction, while the remainder were found in the sampled 3 mm sieve fraction. When sampling is taken into account, the estimated total for the 3 mm sieve fraction rises to 53. Forty-four of the artefacts came from EU1, 2 and 3; three came from EU4 and only a single artefact was recovered from EU5. Sample size is therefore very small.

Most of the artefacts are BIF with chert, chalcedony, basalt and mudstone also occurring (Table A5.38, Figure A5.96). All the artefacts are complete flakes, flake fragments or undiagnostic debris with the exception of a BIF single platform core from EU1. The core is 145 g (93,184 mm^3) and retains about 70% cortex. It is likely that, like the core recovered from the surface, it was left in the shelter to be re-used. No retouched artefacts were identified.

The relative proportions of different raw materials differ slightly between the sieve fractions (Figure A5.96). The 3 mm sieve fraction has a slightly higher proportion of BIF while mudstone only appears in the 6 mm sieve fraction. However, chi-square indicates that the differences are not statistically significant (chi-square=3.6382, df=4, p=0.457). Just over half the artefacts (57%) in the 6 mm sieve fraction are non-cortical. The highest percentage of cortical artefacts is in the BIF assemblage where 56% retain at least some cortex. Most cortex is terrestrial but one BIF and one mudstone flake have cortex of unknown origin. Platforms are mostly plain (Table A5.39).

BIF flakes are the largest, and basalt the smallest, with chert and mudstone similar in size (Table A5.40). However, sample size is small and ANOVA suggests that the size differences are not statistically significant (F=3.826, df=2, p=0.063).

Discussion

The shallow deposits, small quantity of cultural material and radiocarbon determinations all suggest that the assemblage from CB09-55 should be treated as a single analytical unit representing intermittent use within the last 1500 years. The high proportion of material from the 6 mm sieve fraction indicates that tool maintenance and core preparation were not prominent activities at the site. The two cores, together with the cached wood, suggest provisioning of the place in anticipation of regular visits.

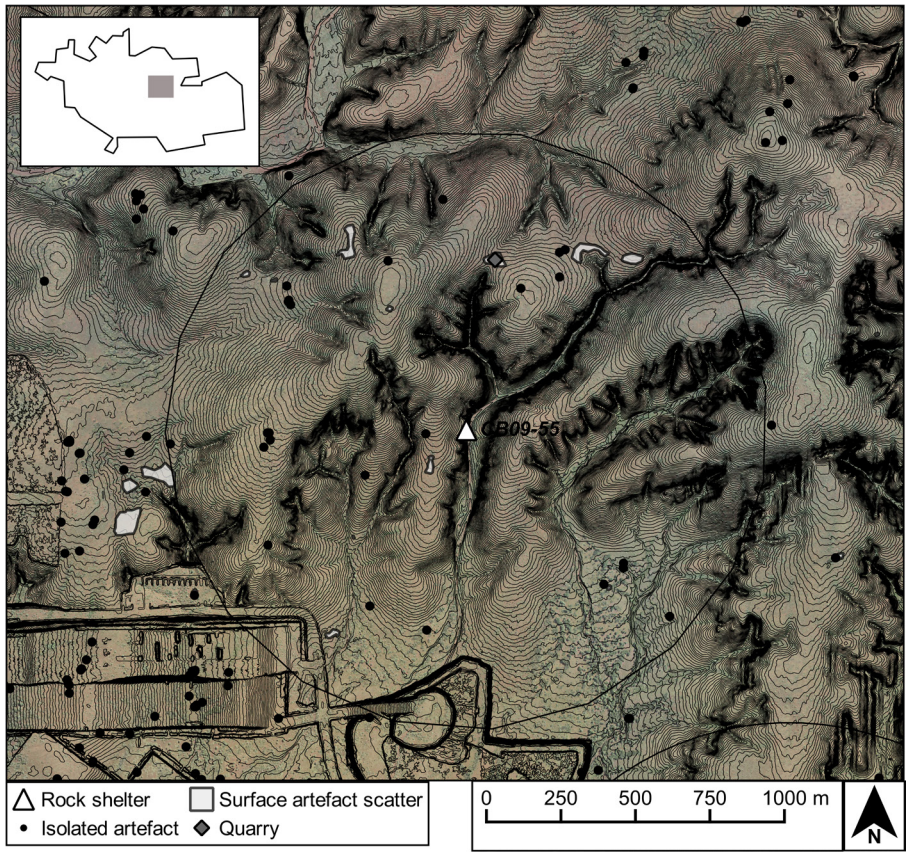

Figure A5.88: Group 4.

Figure A5.89: CB09-55: general view.

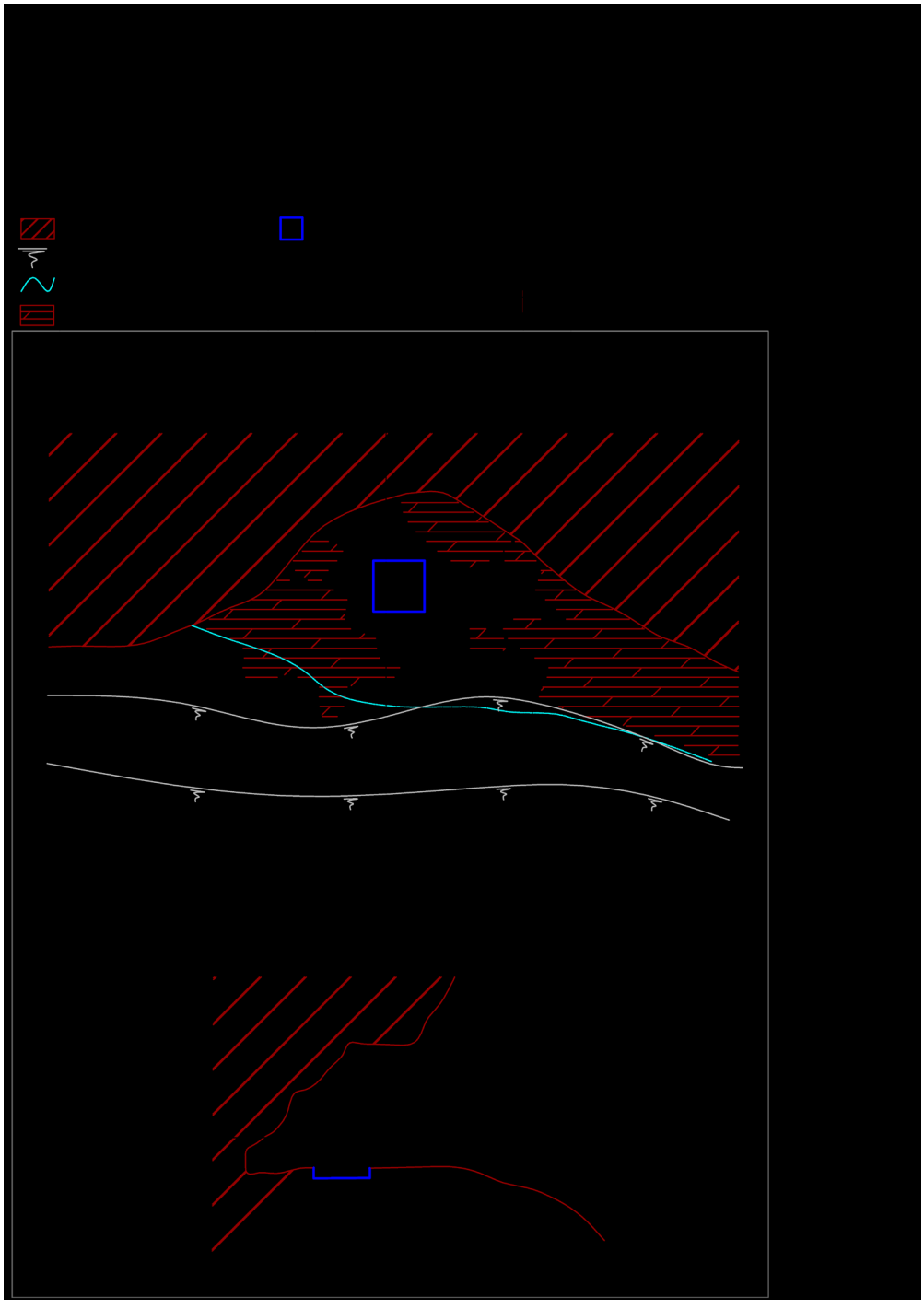

FIGURE A5.90: CB09-55: plan and profile. (Drawn by M. Jimenez-Lozano).

FIGURE A5.91: CB09-55: charred wood cached on a ledge at the rear of the shelter.

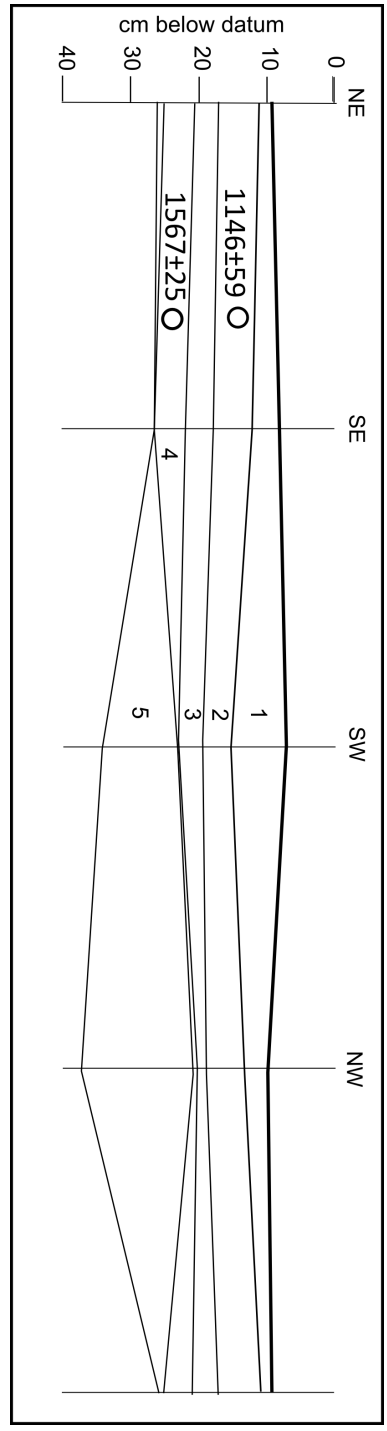

Figure A5.92: CB09-55: excavation units and approximate position of radiocarbon samples.

FIGURE A5.93: CB09-55: during excavation (top) and west section (bottom).

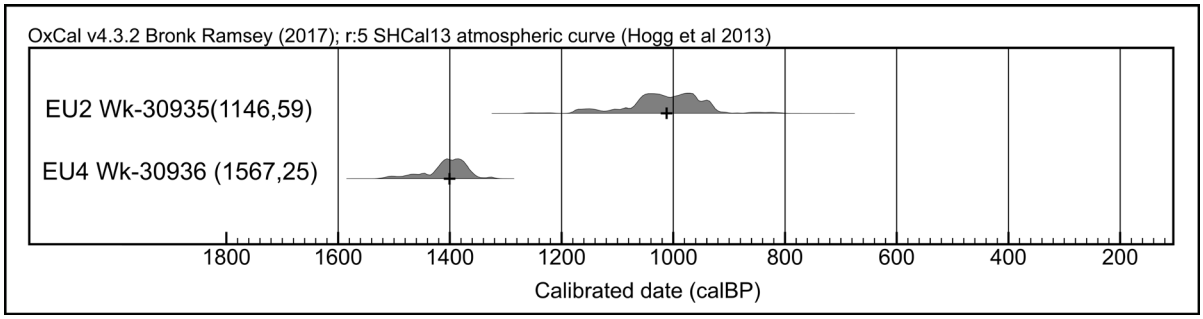

Figure A5.94: CB09-55: probability plot of calibrated radiocarbon determinations.

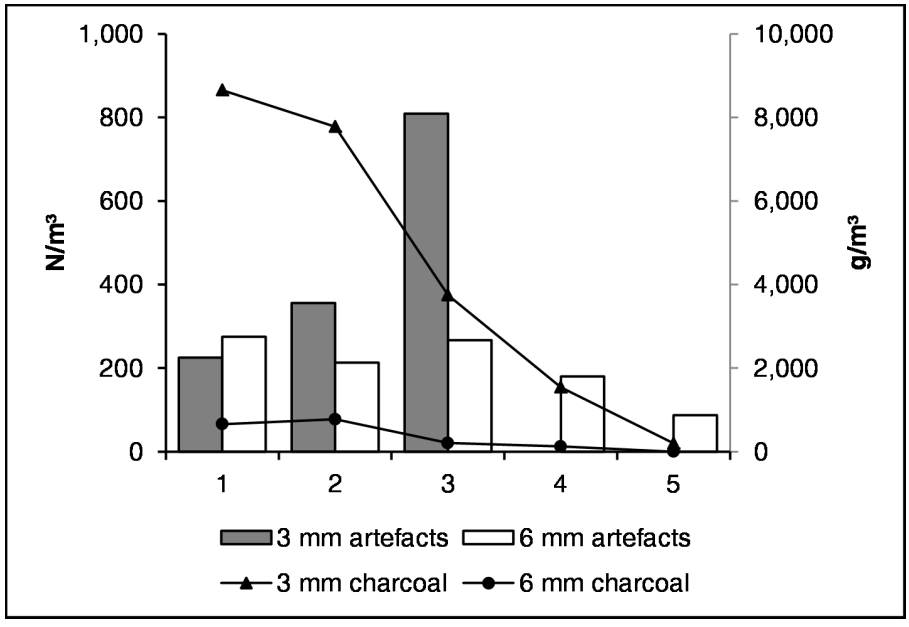

Figure A5.95: CB09-55: distribution of charcoal and flaked stone with depth.

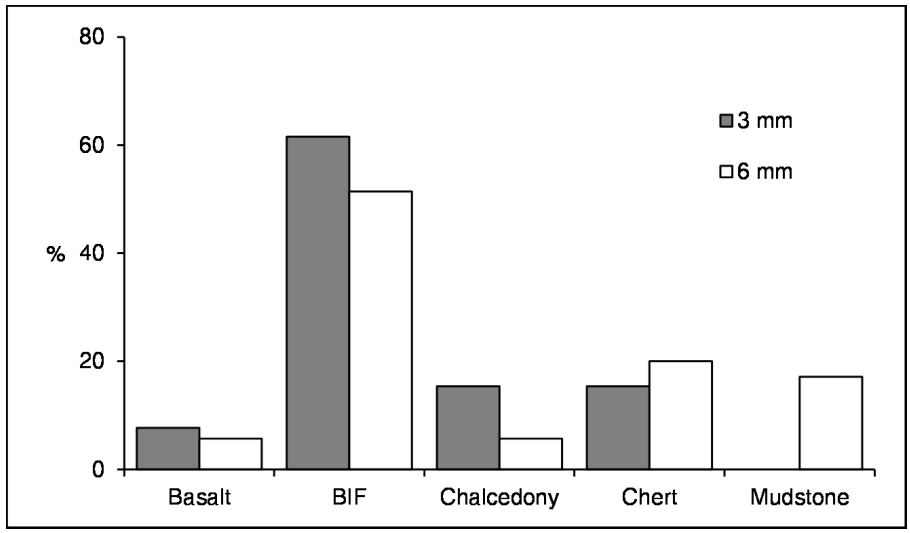

Figure A5.96: CB09-55: raw material by sieve fraction.

Table A5.38: CB09-55: assemblage composition.

	3 mm		6 mm			
	Complete flake	*Flake fragment*	*Complete flake*	*Flake fragment*	*Single platform core*	*Debris*
Basalt	0	1	2	0	0	0
BIF	4	4	10	3	1	4
Chalcedony	2	0	1	0	0	1
Chert	1	1	3	0	0	4
Mudstone	0	0	4	0	0	2
Total	7	6	20	3	1	11

Table A5.39: CB09-55: platform type.

	Cortex	Plain	Crush	Focal	Total
Basalt	0	2	0	0	2
BIF	2	11	0	0	13
Chalcedony	0	0	0	1	1
Chert	0	1	1	1	3
Mudstone	0	4	0	0	4
Total	2	18	1	2	23

Table A5.40: CB09-55: mean dimensions (mm) of complete flakes (6 mm sieve fraction).

	N	Length	SD	Width	SD	Thickness	SD
Basalt	2	10.5	0.7	10.5	3.5	4.0	1.4
BIF	7	26.6	9.6	19.9	7.4	6.3	2.8
Chert	2	16.0	0.0	7.5	0.5	2.0	0.0
Mudstone	3	16.0	5.0	18.3	6.4	4.0	0.0

GROUP 5

There are two excavated shelters in Group 5 (CB08-427 and CB09-249) (Figure A5.97). Both show the pattern of intermittent occupation with an earlier episode in the early to mid-Holocene, and a more recent use of the shelter within the last 1500–1000 years. The Group 5A surface sample was defined by the area within a 500 m radius of CB08-427, and included two large artefact scatters. One is on the high ground to the east of the shelter, which also has a scarred tree associated with it, and a second on the floor of the valley to the south-west. There is a cluster of rockshelters to the east of this site complex and associated with CB09-249 (see Chapter 5). This cluster also includes stone features and quarries, but surface artefact scatters are absent and the only surface material is sparse, isolated artefacts. The primary focus of activity in this part of the ranges seems therefore to be procurement of raw material.

CB09-249 (DAA ID 28055)

CB09-249 is a small west-facing rockshelter, 50 m from a third order ephemeral creek. There is a gently sloping talus, vegetated with scattered acacia and eucalypts, with an understorey of spinifex grassland. Immediately outside the shelter to the south there are several pieces of large roof fall (Figure A5.98). The shelter is 2.4 m high at the drip line and is 6 m wide by 9.5 m deep (estimated total floor area 56 m^2). However, the roof height drops to 1 m about 3 m in and the rear of the shelter is unlikely to have been used. The front part of the shelter has a protected floor area of about 13.5 m^2 (Figure A5.99). When first recorded, a BIF grinding slab (Figure A5.100) and a chert single platform core were noted at the entrance to the shelter (Rapley, McHarg and Edwards 2009, 193–97). These artefacts could not be relocated at the time of excavation, but a manuport was noted.

Seven depth probes in the front of the shelter indicated that depth of deposit ranged from 9–27 cm. A single 1 × 1 m test pit was excavated close to the drip line in the area of deepest deposit. The site was excavated in 2010 and described by Edwards (2011). This discussion draws on information reported there, but reaches markedly different conclusions.

Near CB09-249, there is another rockshelter, CB09-250, with an arrangement of stacked stones (Rapley, McHarg and Edwards 2009, 198–202). This

shelter has an upper and lower chamber. The stacked stones block a hole in the floor of the upper chamber leading to the chamber below (Figure A5.101). Also close by is a third rockshelter, CB09-240 (Figure A5.102). This shelter has evidence of quarrying of both BIF and chert, taking advantage of heat-fracturing of nodules (Figure A5.103a, b; Figure A5.104) (Rapley, McHarg and Edwards 2009, 183–87).

Excavation results

The test pit was excavated in five excavation units (Figure A5.105). The surface comprised roof fall, plant material and degraded macropod scats. Below this the sediments were loose and fine with fine gravel, scattered rocks and small quantities of charcoal. Bedrock began to appear in EU4 and was completely exposed at the base of EU5, about 24 cm below the surface. The deposits were acidic throughout (pH 6–6.5) (Figure A5.106). Small quantities of organic material were found throughout the deposit including plant material, bone and insect remains. Degraded macropod scats were abundant in EU1. All this material is considered to be non-cultural.

A feature was noted at the base of EU2, along the northern edge of the square, which consisted of lightly compacted fine-grained charcoal. This was interpreted as a hearth. Another small concentration of charcoal was also noted in the north-west part of EU3 (Figure A5.107).

Radiocarbon determinations were obtained for four in situ samples (see Table 5.4, Figure A5.108). Two of these gave dates within the last 1000 years, while the other two were early to mid-Holocene in age. The interpretation of these results is confused as the depth below surface appears to indicate that Wk-28867 and Wk-28868 are close together in depth but differ greatly in age, while Wk-28868 and Wk-28869 appear to be stratigraphically inverted. Inspection of the field records and the section drawings, however, indicates that the deposits slope perceptibly and that the excavation units followed this slope. The actual positions of the samples, as shown on Figure A5.105 and Figure A5.107, suggest that Wk-28866 and Wk-28867 both relate to the most recent deposits in EU1 and 2. Wk-28869 provides a date for the hearth at the base of EU2, while Wk-28868 is closer to the base of the sequence.

Stone artefacts

Very few flaked stone artefacts were recovered from the excavation and most came from the 6 mm sieve fraction (Table A5.41). All were complete or broken flakes. In EU1 and 2 all artefacts were BIF or chert, while in EU3 and 4, basalt and BIF were the raw materials represented. All but two of the 14 complete or proximal flakes had plain platforms. One basalt and one BIF flake from EU3 had cortical platforms. Most artefacts (71%) were non-cortical and all cortex was terrestrial in origin. Sample size was too small for comparisons of size.

Discussion

CB09-249 is a small shelter with evidence for brief episodes of occupation in the last thousand years and in the early to mid-Holocene. The absence of material from the 3 mm sieve fraction indicates that tool maintenance and core preparation were not prominent activities. The millstone, manuport and core found on the surface suggest periodic revisits to the shelter. The shelter is clearly part of a complex of sites that were probably associated with procurement of raw material.

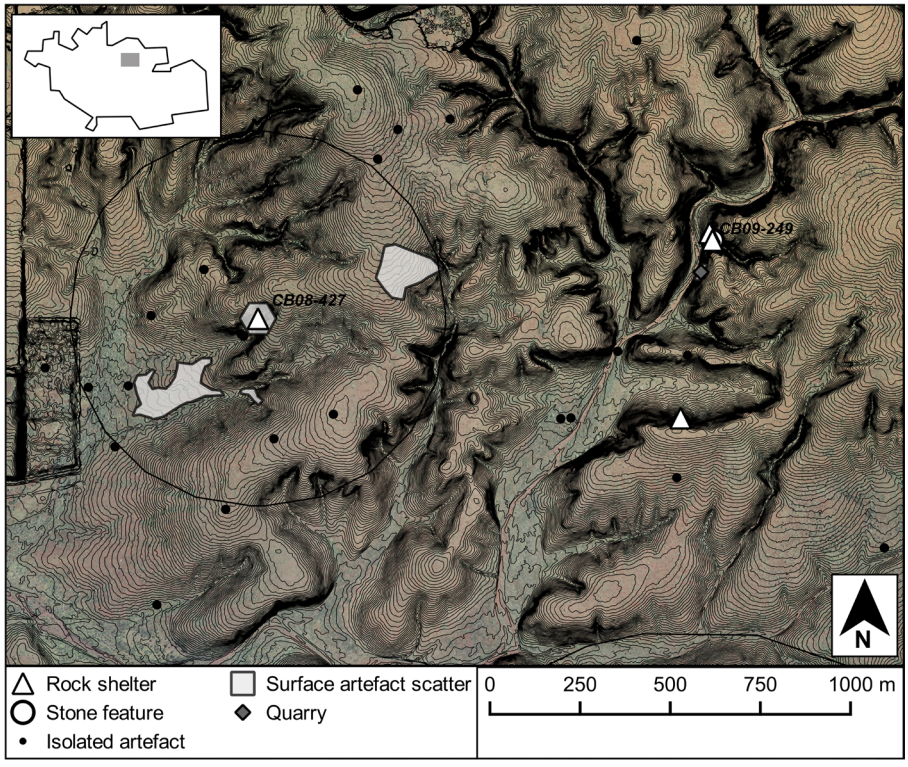

Figure A5.97: Group 5.

Figure A5.98: CB09-249: general view.

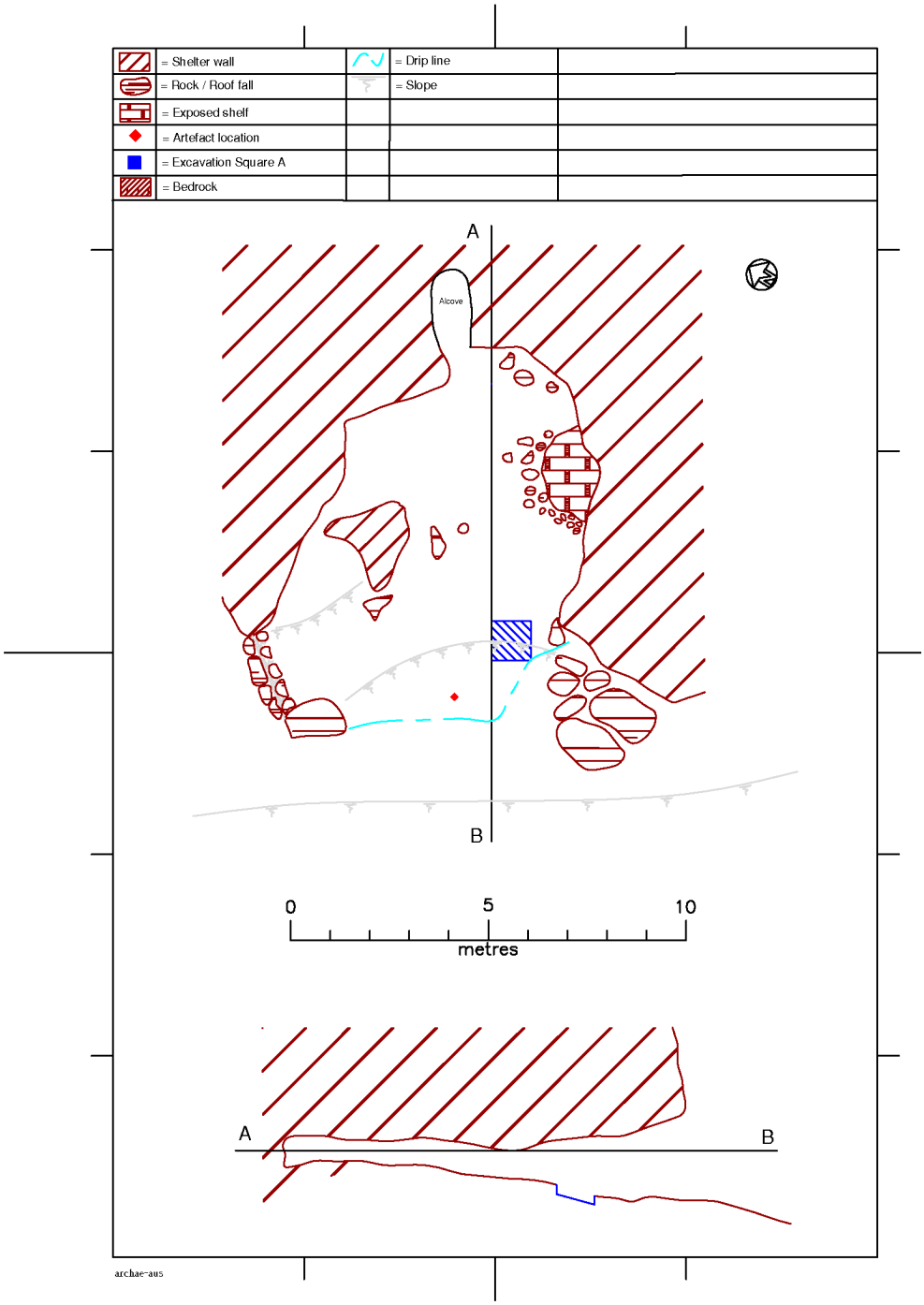

FIGURE A5.99: CB09-249: plan and profile. (Drawn by M. Jimenez-Lozano).

FIGURE A5.100: CB09-249: millstone on shelter floor.

FIGURE A5.101: CB09-250: arrangement of stacked stones in upper chamber.

FIGURE A5.102: CB09-240: general view of shelter.

FIGURE A5.103: CB09-240: quarried BIF outcrop (top) and chert exfoliating nodule (bottom).

Figure A5.104: CB09-240: flaking floor.

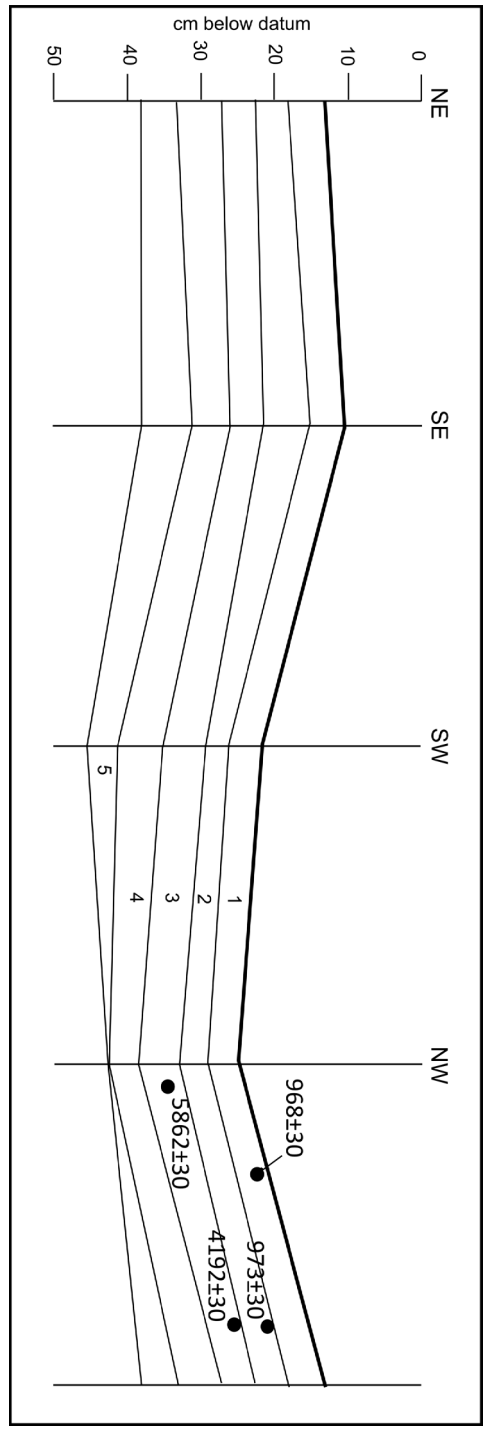

FIGURE A5.105: CB09-249: excavation units and position of radiocarbon samples.

FIGURE A5.106: CB09-249 during excavation (top) and section (bottom).

◆	= Dated charcoal location
	= Stratigraphic Unit 1
	= Stratigraphic Unit 2
	= Bedrock
	= Plant roots
	= Loose rocks
1	= Wk-28866 (848 cal BP)
2	= Wk-28867 (850 cal BP)
3	= Wk-28869 (4692 cal BP)
4	= Wk-28868 (6627 cal BP)

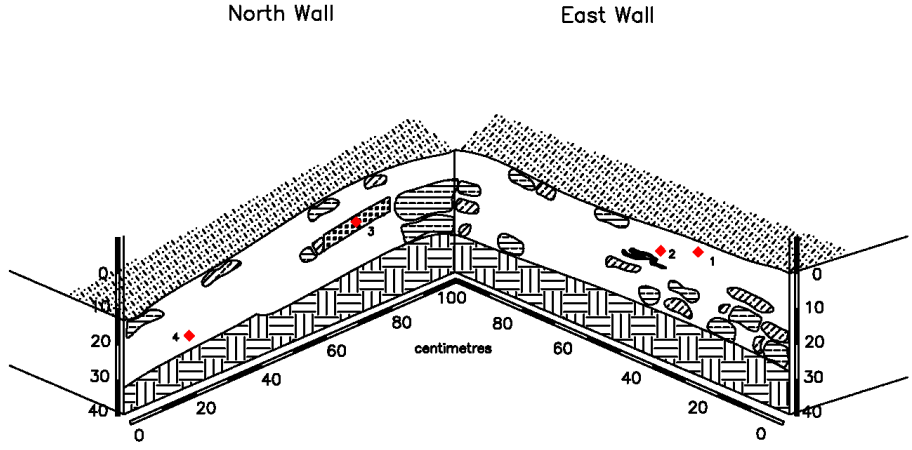

FIGURE A5.107: CB09-249: section. (Drawn by M. Jimenez-Lozano).

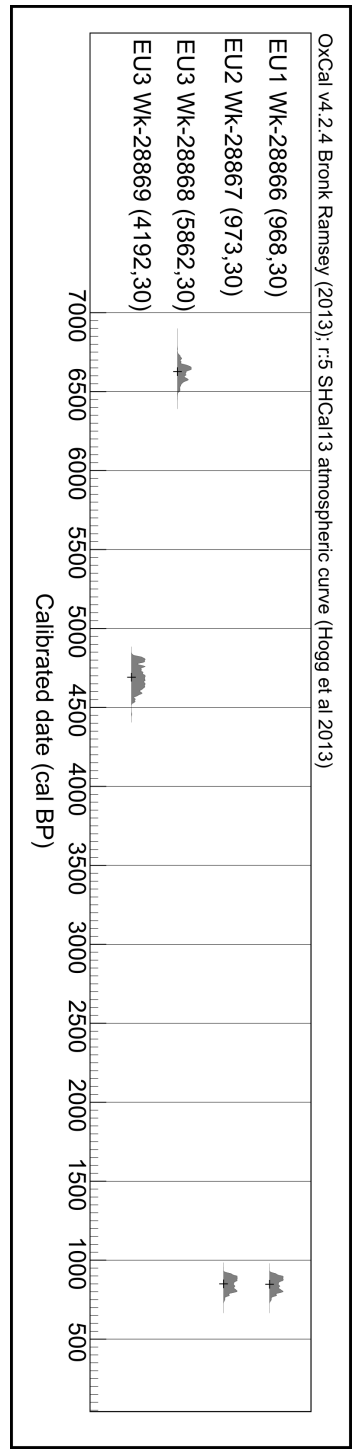

FIGURE A5.108: CB09-249: probability plot of radiocarbon determinations.

Table A5.41: CB09-249: assemblage composition.

	3 mm	6 mm	
	Complete flake	*Complete flake*	*Flake fragment*
EU1–2			
BIF	0	5	3
Chert	0	3	2
EU3–4			
Basalt	0	3	1
BIF	2	2	0
Total	2	13	6

CB08-427 (DAA ID 29203)

CB08-427 is a small, south-east-facing rockshelter formed in banded iron formation conglomerate on the side of a low hill (Figure A5.109). The talus slope is about 10 m long and borders a first order ephemeral creek at its base. This area carries a dense understorey of spinifex grassland with scattered eucalypts. Ground surface visibility here is low, estimated at about 25%. The shelter is devoid of vegetation. It measures 2.6 m wide by 4.6 m deep (total floor area 21 m^2) and is 1.4 m high at the drip line. While the interior is relatively well-protected from wind and rain, there is an opening in the western portion of the ceiling roughly 75 cm across. The floor area is relatively flat and generally free of large roof fall (Figure A5.110). Roughly 7 m^2 of exposed, sloping bedrock appears at the rear western portion and several large pieces of roof fall lie beyond the drip line and on the talus slope (Figure A5.111). A well-lit, well-ventilated, flat and roof fall free area of roughly 8 m^2 in the front portion of the shelter was judged most likely to contain evidence of occupation and five depth probes suggested the presence of subsurface material. In 2010, an 1 × 1 m test pit was excavated about 50 cm in from the drip line in an area free of roof fall. The excavation was described by Dias (2010) and this description draws on information presented there.

Excavation results

The test pit was excavated in six excavation units 2–4 cm deep (Figure A5.112). The surface of the test pit was covered in loose leaf litter in the east and small roof fall in the centre. The western half was swept clear by kangaroo activity. Below this the deposit was a compressed matrix of fine silt with small, degraded conglomerate gravel. The southern portion of the square was heavily cemented and difficult to dig, although generally resembling the rest of the square in all other respects. Numerous insect burrows, probably termite, were identified in the south. This matrix continued to bedrock, reached at 20 cm below surface (Figure A5.113). The eastern portion of EU4 (11–15 cm below ground surface) contained a high proportion of loose charcoal and included two small concentrations of charcoal. This narrow band of charcoal can be interpreted as the remains of a degraded hearth (Figure A5.114).

Radiocarbon determinations (AMS) were obtained for 6 mm sieve samples from EU1 and EU5 and for an in situ sample from the likely remains of the degraded hearth from EU4. The resulting age estimates were in sequence (see Table 5.4, Figure A5.115).

The distribution of cultural material with depth shows a marked peak in charcoal corresponding to EU4 (Figure A5.116). Most of the artefacts occurred in EU2–4. Except perhaps for the single chert complete flake in EU1, the artefacts can thus be considered as a single time-averaged assemblage, probably associated with the degraded hearth in EU4, and dated to about 6000 years ago. The chert flake in EU1 and the surface assemblage indicate a more recent episode of occupation, probably within the last 1000 years.

Stone artefacts

The stone assemblage from CB08-427 was sparse. Eleven surface artefacts were recorded on the floor of the shelter. All were BIF and included seven complete flakes, one distal flake fragment and three single platform cores. One of the cores was very large (1,137,528 mm^3), while the other two (105,792 and 68,324 mm^3) were at the upper end of the range for BIF core volume in the study area (see Chapter 4, Table 4.11). All cores and most flakes retained some terrestrial cortex (82%). There were no cortical platforms on the flakes; all were plain (4) or faceted (3).

Twenty-two artefacts were recovered from the excavation, all from the 6 mm sieve fraction (Table A5.42). Most artefacts were complete or broken flakes with one piece of undiagnostic debris. Apart from a single quartzite flake, all were basalt, BIF or chert. About a third retained some terrestrial cortex (36%). Just over half the platforms were plain (52%), with focal platforms the next largest category (26%). BIF complete flakes are larger on average than basalt or chert (Table A5.44). However, ANOVA for length suggests the differences are not statistically significant ($F=0.988$, $df=2$, $p=0.3983$). No cores or retouched artefacts were recovered during excavation.

Discussion

CB08-427 is a small shelter which seems to show evidence of two episodes of use, widely separated in time. The absence of artefacts from the 3 mm sieve fraction suggests that tool maintenance and core preparation were not important activities at the site. The BIF cores in the surface assemblage indicate possible storage of raw material in the shelter.

Figure A5.109: CB08-427: general view.

FIGURE A5.110: CB08-427: interior of the shelter showing the hole in the roof.

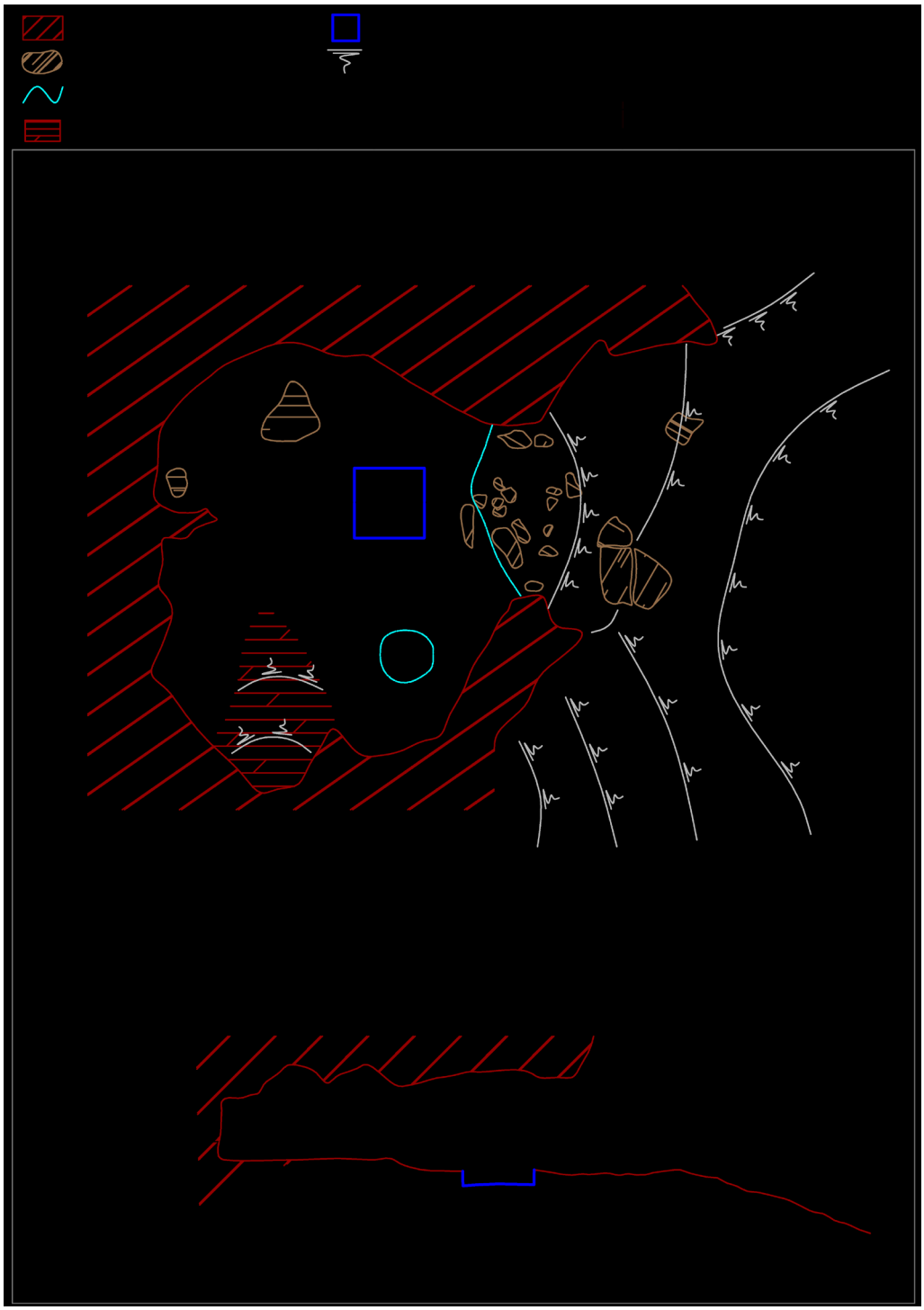

FIGURE A5.111: CB08-427: plan and profile. (Drawn by M. Jimenez-Lozano).

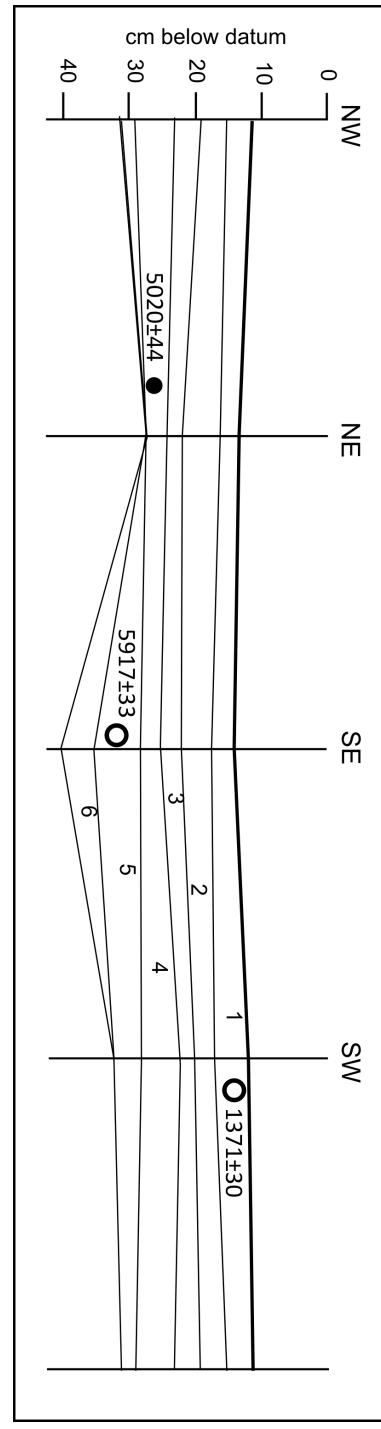

FIGURE A5.112: CB08-427: excavation units and approximate position of carbon samples.

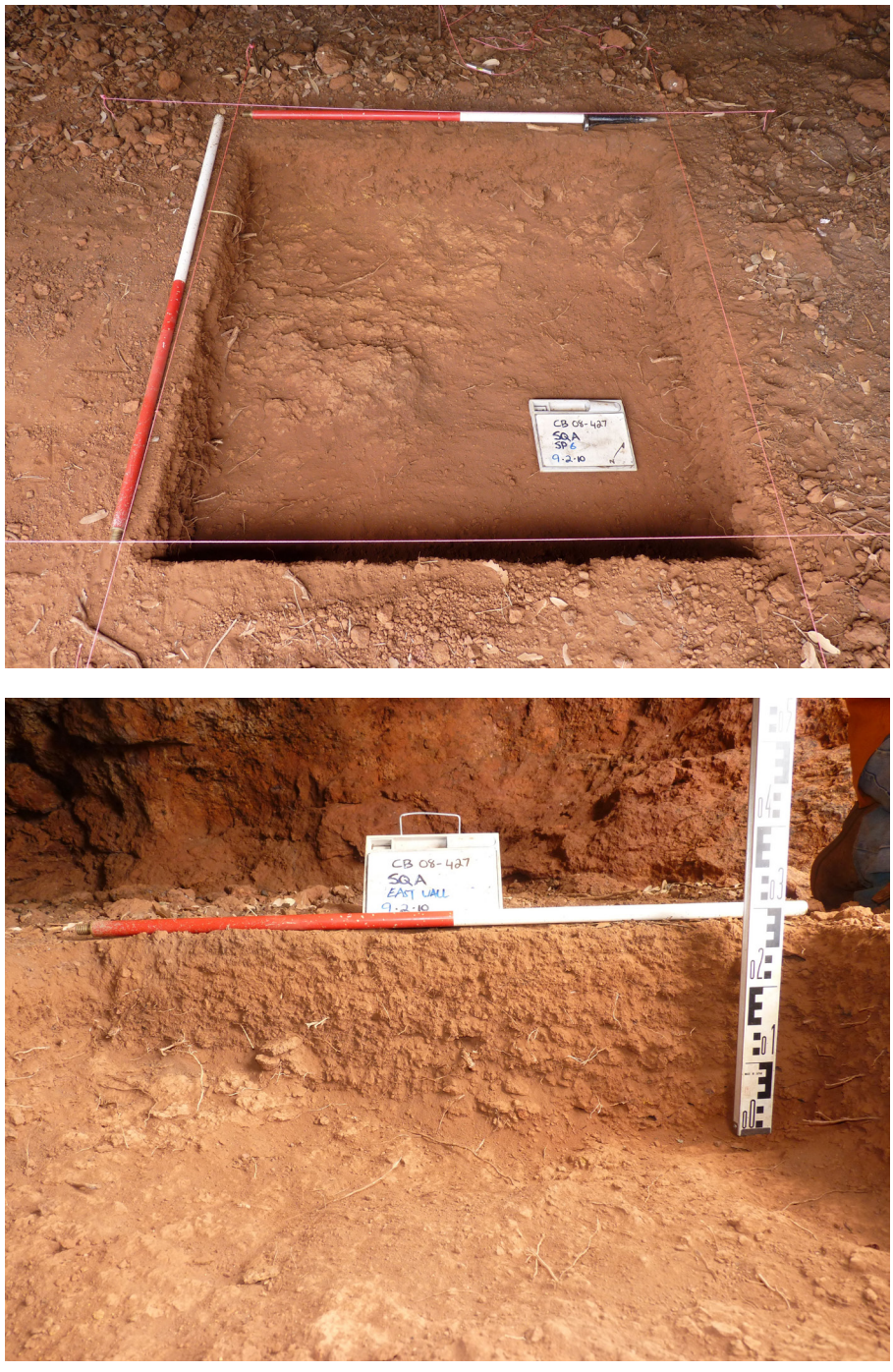

FIGURE A5.113: CB08-427 during excavation (top) and east section (bottom).

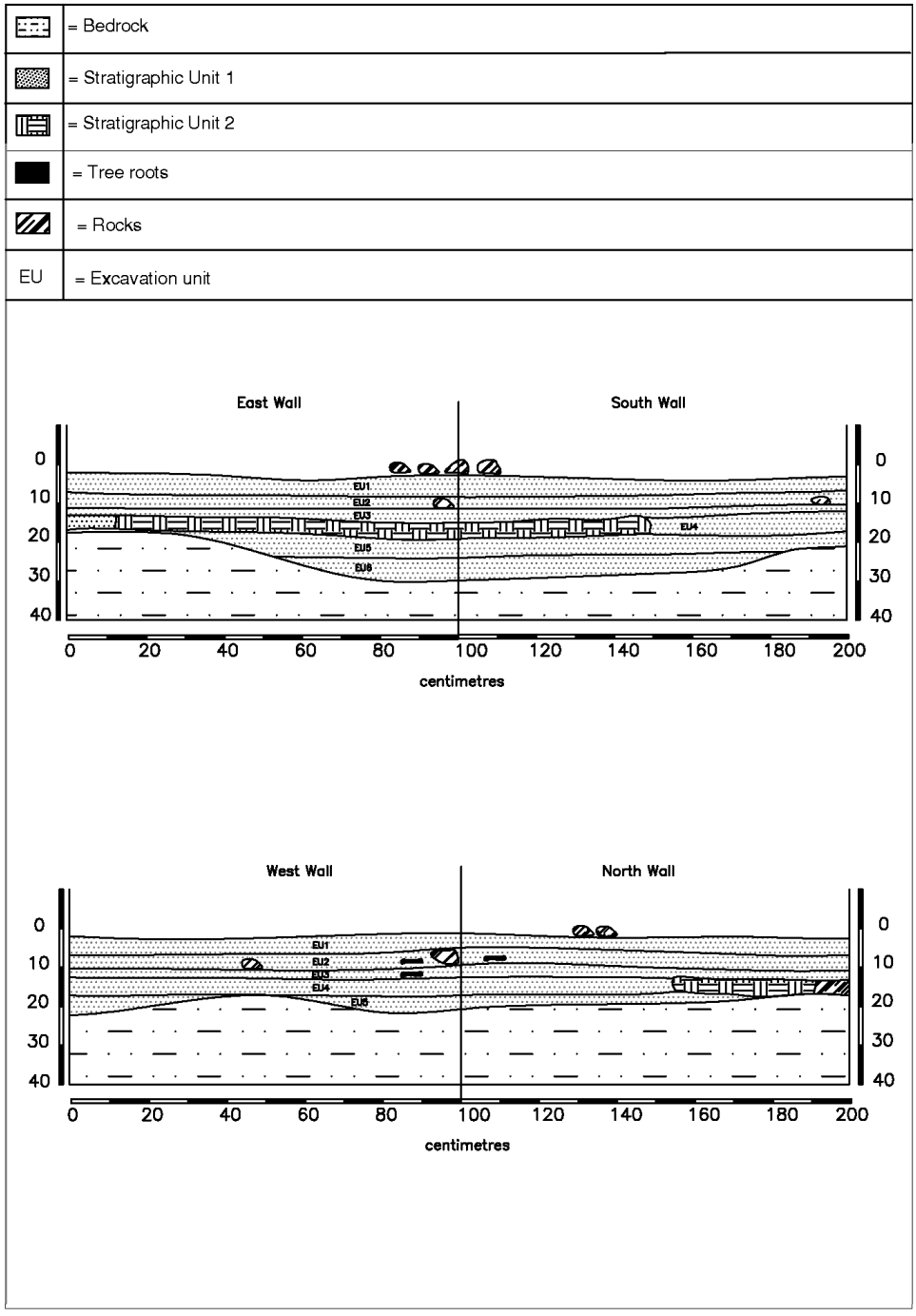

Figure A5.114: CB08-427: section drawings. (Drawn by M. Jimenez-Lozano).

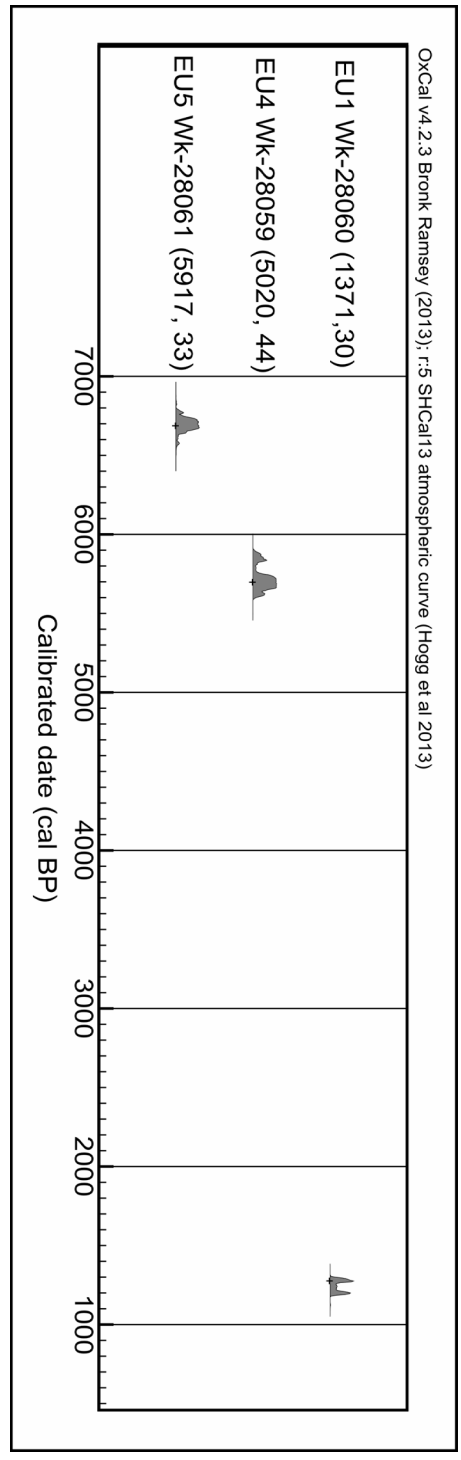

FIGURE A5.115: CB08-427: probability plot of calibrated dates.

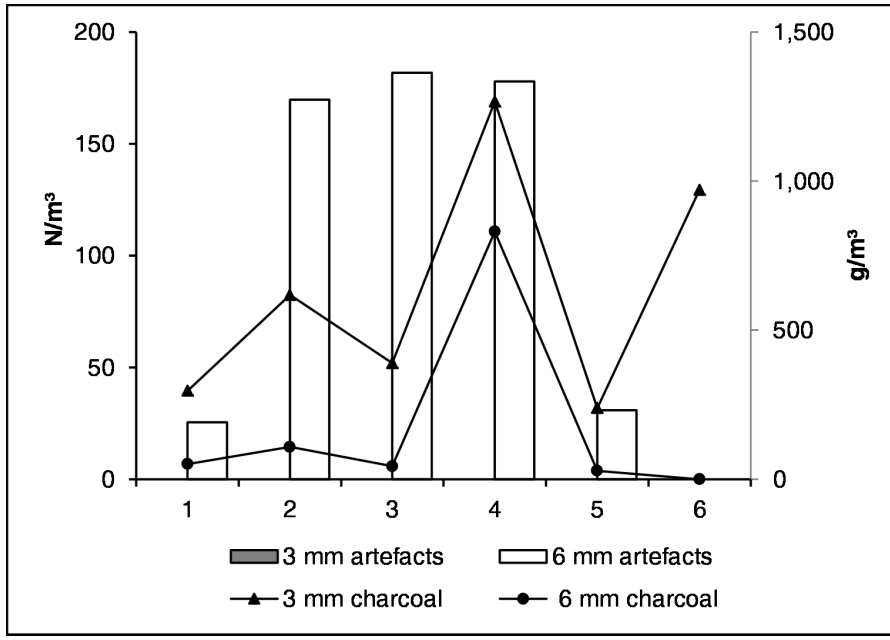

Figure A5.116: CB08-427: distribution of artefacts and charcoal.

Table A5.42: CB08-427: assemblage composition.

	Debris	Complete flake	Broken flake	Total
Basalt	1	5	2	8
BIF	0	8	0	8
Chert	0	3	2	5
Quartzite	0	1	0	1

Table A5.43: CB08-427: platform types.

	Cortex	Plain	Facet	Crush	Focal	Total
Basalt	0	2	1	1	2	6
BIF	1	5	0	1	1	8
Chert	0	2	0	0	2	4
Quartzite	0	1	0	0	0	1
Total	1	10	1	2	5	19

Table A5.44: CB08-427: summary of dimensions of complete flakes.

		Length (mm)	Width (mm)	Thickness (mm)
Basalt (N=5)	Mean	20.6	15.8	4.6
	SD	7.0	8.3	3.9
BIF (N=8)	Mean	31.6	21.5	5.8
	SD	17.4	9.1	3.0
Chert (N=3)	Mean	24.3	9.7	3.3
	SD	11.8	6.7	1.5

MARANDU CREEK SHELTERS

There is a cluster of shelters on Marandu Creek (Figure A5.117). CB10-40 is about a kilometre north of a large complex of surface artefact scatters at the point where Marandu Creek leaves the ranges. The complex of shelters at CB10-41 is situated about 300 m upstream. A large surface artefact scatter on the valley floor and a few isolated artefacts lie between the two sites. There is little other archaeological material in the vicinity. There are no formal reports for these sites. Changes in administrative procedure meant that documentation associated with the excavations was included as part of the Heritage Information Submission Form (HISF) lodged at the Department of Aboriginal Affairs when the sites were reported. This discussion draws on that information and primary field records.

CB10-40

CB10-40 is a north-west-facing rockshelter, approximately 35 metres from Marandu Creek (Figure A5.118). The talus is about 20 m long, mostly consisting of loose pieces of coarse BIF gravel. It carries scattered *Acacia* shrubs and dense seasonal grasses. Ground surface visibility on the talus is estimated at about 25%. The shelter itself has no surface vegetation except for some seasonal grasses. It is 3.75 m wide, 5.5 m deep and is 1.75 m high at the drip line. There is an area of large roof fall at the southern end of the entrance (Figure A5.119). The floor area comprised dry sediments with scattered small pieces of roof fall and occasional tufts of seasonal grasses. Seven depth probes indicated there were up to 23 cm of deposit.

CB10-40 was initially identified and recorded in 2010, and excavated in 2013. The surface assemblage comprised four stone artefacts, including two single platform cores of dolerite and BIF, and two complete flakes of dolerite and basalt. All have riverine cortex except for the BIF core which had terrestrial cortex. Both cores are large, the dolerite core is 390,320 mm^3 and the BIF core is 171,236 mm^3, and have more than 80% cortex.

Excavation results

The test pit was excavated down to bedrock in seven excavation units (EU) to a depth of 35 cm (Figure A5.120). The surface of the square comprised

scattered small pieces of roof fall on fine, dark brown sediment, and some tufts of grass. The deposit comprised a single stratigraphic unit, dark brown in colour and increasingly compact with depth. The deposits were looser at the drip line and contained fine roots. At the base of EU1 and continuing into EU2, was a 20 cm by 20 cm area of fine charcoal and ash, interpreted as a degraded hearth (Feature 1). Bedrock was eventually exposed across the entire base of the pit at 35 cm below surface (Figure A5.121). The sediments were neutral to alkaline throughout (pH 7–8.5). Two samples of charcoal from the 6 mm fraction of EU1 and EU2 were sent for radiometric dating (see Table 5.4). The resulting age determinations are clearly the same age and indicate that the site was used about 200 years ago (Figure A5.122).

Most of the charcoal and artefacts were recovered from EU1–3. Most charcoal was fine and came from the 3 mm sieve fraction. None was found below EU5. The distribution of artefacts was similar and cultural material was completely absent from EU5–7 (Figure A5.123). Small quantities of organic material including plant material, insect remains and macropod scats were found, mostly in EU1 and 2. This material is considered to be non-cultural. No bone was found.

Stone artefacts

A total of 151 flaked stone artefacts came from the excavation, 108 from the 6 mm sieve fraction and the remainder from the sampled 3 mm fraction. When corrected for sampling, the estimated total of artefacts from the 3 mm fraction is 406.

Most of the flaked stone artefacts were complete or broken flakes of chert or BIF with small quantities of basalt, chalcedony and dolerite (Table A.45). The proportions of different raw materials are markedly different in the 3 mm and 6 mm sieve fractions and this is statistically significant (chi-square=12.758, df=4, p=0.013) (Figure A5.124). Most artefacts are non-cortical. Only 14% of the 6 mm sieve fraction retains some terrestrial cortex. Plain flat platforms are most common (Table A5.46). There were no cores or secondarily retouched artefacts. BIF complete flakes are larger than chert and chalcedony flakes, and ANOVA on length indicates this difference is statistically significant (F=3.557, df=2, p=0.03956) (Table A5.47).

Discussion

The shallow deposits and distribution of cultural material suggest that CB10-40 was used in the recent past as a short-term campsite. The cores found on the surface indicate provisioning of the place. The artefact density is high in comparison to most shelters in the study area, although it is comparable to artefact densities from the nearby CB10-41 shelter complex. The disparity in raw material composition between the 3 mm and 6 mm sieve fractions suggests that occupation was brief. The high proportion of material from the 3 mm sieve fraction indicates that tool maintenance and core preparation were prominent activities at the site.

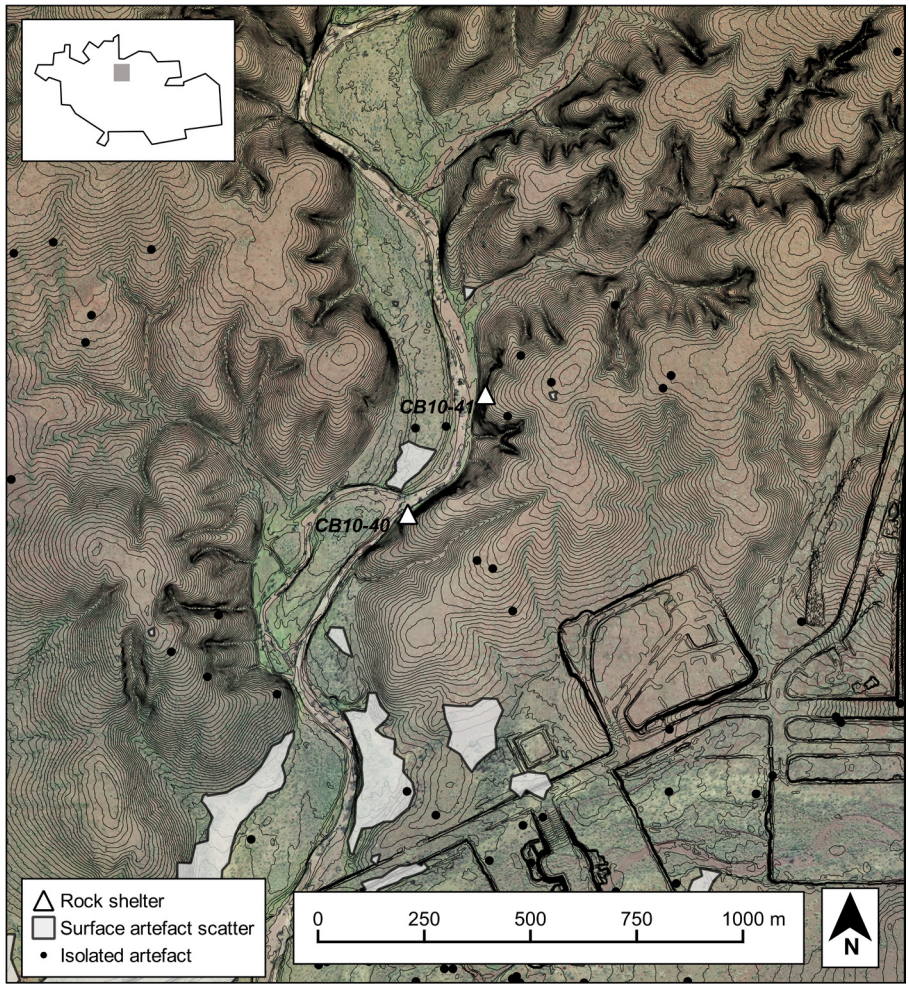

FIGURE A5.117: Complex of shelters on Marandu Creek.

Figure A5.118: CB10-40: general view.

FIGURE A5.119: CB10-40: plan and profile. (Drawn by M. Jimenez-Lozano).

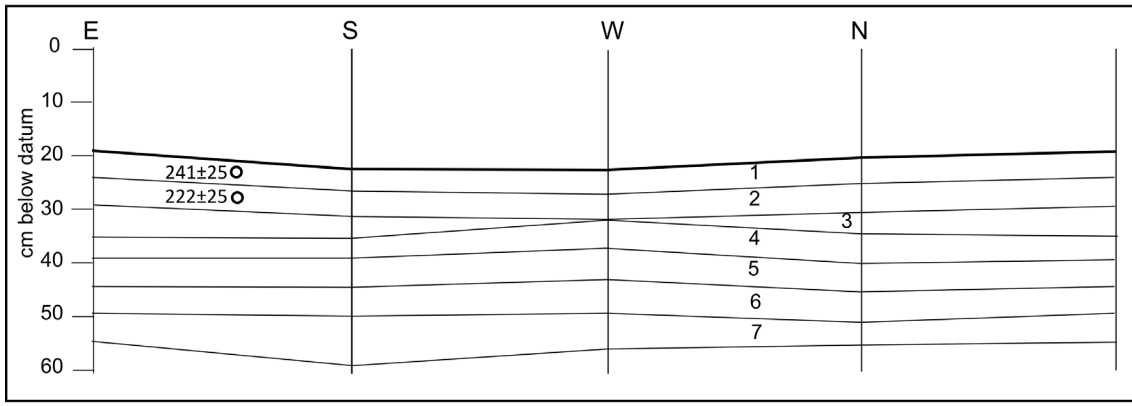

FIGURE A5.120: CB10-40: excavation units and position of radiocarbon samples.

FIGURE A5.121: CB10-40 during excavation: base of EU2 (top) and south-west section (bottom).

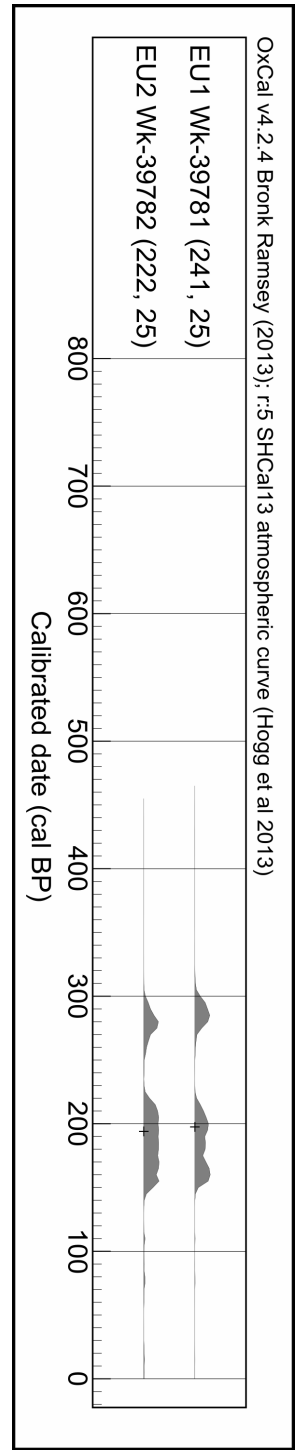

Figure A5.122: CB10-40: probability plot of radiocarbon determinations.

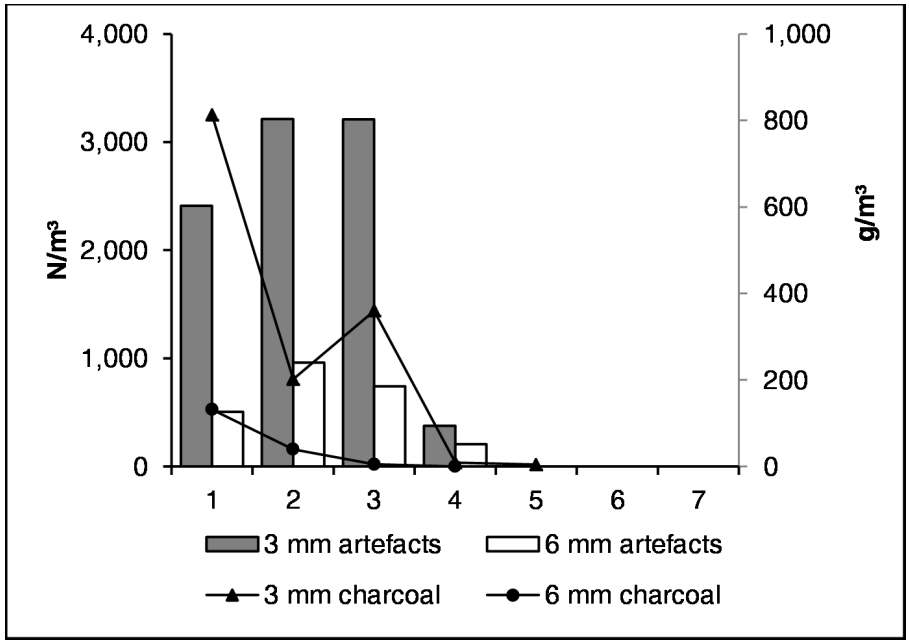

Figure A5.123: CB10-40: distribution of artefacts and charcoal.

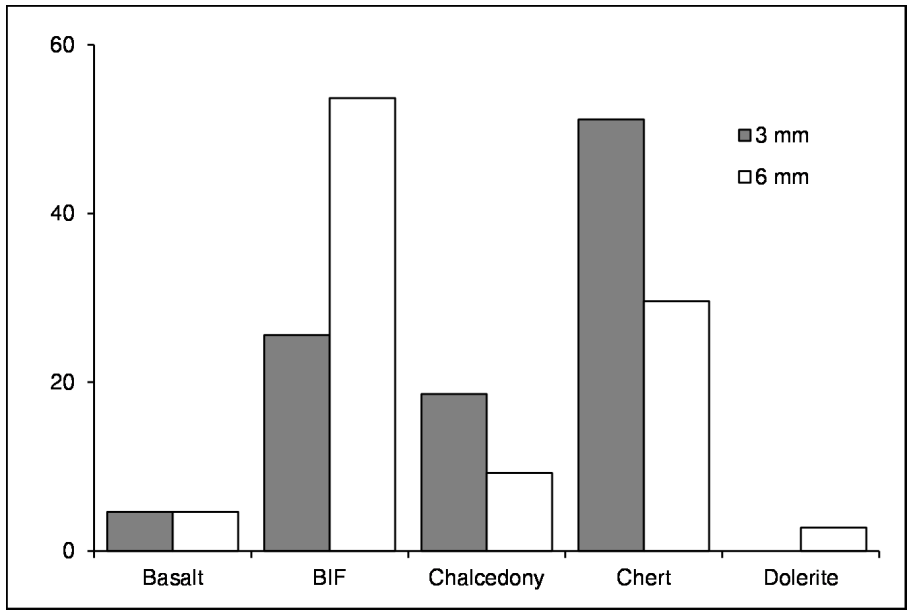

Figure A5.124: CB10-40: assemblage composition by sieve fraction.

Table A5.45. CB10-40: assemblage composition.

	3 mm		6 mm		
	Complete flake	*Broken flake*	*Debris*	*Complete flake*	*Broken flake*
Basalt	1	1	2	1	2
BIF	4	7	7	21	30
Chalcedony	4	4	3	2	5
Chert	6	16	7	14	11
Dolerite	0	0	1	1	1
Total	15	28	20	39	49

Table A5.46: CB10-40: platform type.

	Cortical	Plain	Faceted	Crushed	Focal
Basalt	0	2	0	0	0
BIF	3	28	0	1	0
Chalcedony	0	4	0	0	0
Chert	0	12	1	0	3
Dolerite	1	0	1	0	0
Total	4	46	2	1	3

Table A5.47: CB10-40: dimensions of complete flakes (6 mm sieve fraction, N>1).

		Length (mm)	Width (mm)	Thickness (mm)
BIF (N=21)	Mean	17.2	14.8	3.9
	SD	6.3	5.8	1.8
Chalcedony (N=2)	Mean	10.0	8.0	1.5
	SD	2.8	1.4	0.7
Chert (N=14)	Mean	12.4	13.5	3.1
	SD	5.5	7.2	2.5

CB10-41

CB10-41 is on the western slope of a ridge that forms part of the Chichester Range (Figure A5.125). There are five rockshelters within this 100-metre stretch of hill (Figure A5.126). The walls and ceilings of all shelters are banded iron formation and all five shelters face west. There is an open scatter on the talus below them leading into the eastern wash zone of Marandu Creek, an ephemeral third order creek. Vegetation on the talus is Low Woodland, with scattered *acacia*, hakea and snappy gum (*Eucalyptus leucophloia*) trees that border Marandu Creek. The understorey consists of a dense cover of seasonal grass. Tufts of seasonal grasses were present at the drip lines of all the shelters.

The surface scatter is about 120 m by about 17 m and extends over an area about 1935 m^2. Two dense concentrations were recorded, one at the southern end of the site outside RS1 and the other at the northern end from immediately in front of RS4 to RS5 (Figure A5.126). The surface assemblage comprises a wide range of artefact types, including flakes, cores, manuports and grinding material.

CB10-41 was identified in 2010. Depth probes indicated shelters RS2, RS3 and RS4 had excavation potential with deposits up to 27 cm, 19 cm and 43 cm respectively. These three rockshelters were test excavated in October 2013 and February 2014.

RS2 has two chambers (Figure A5.127). The width across the entrance is 7.9 m and the height at the dripline is 1.7 m. The northern chamber is open and shallow, while the southern chamber is more protected, extending 4.2 m back from the drip line (Figure A5.128). RS3 is a large shelter, 7.1 m wide, 4.3 m deep and 3.0 m high at the dripline (Figure A5.129, Figure A5.130). RS4 is a smaller shelter, 5.8 m wide, 6.3 m deep and 1.6 m high at the drip line (Figure A5.131, Figure A5.132).

Figure A5.125: CB10-41: general view.

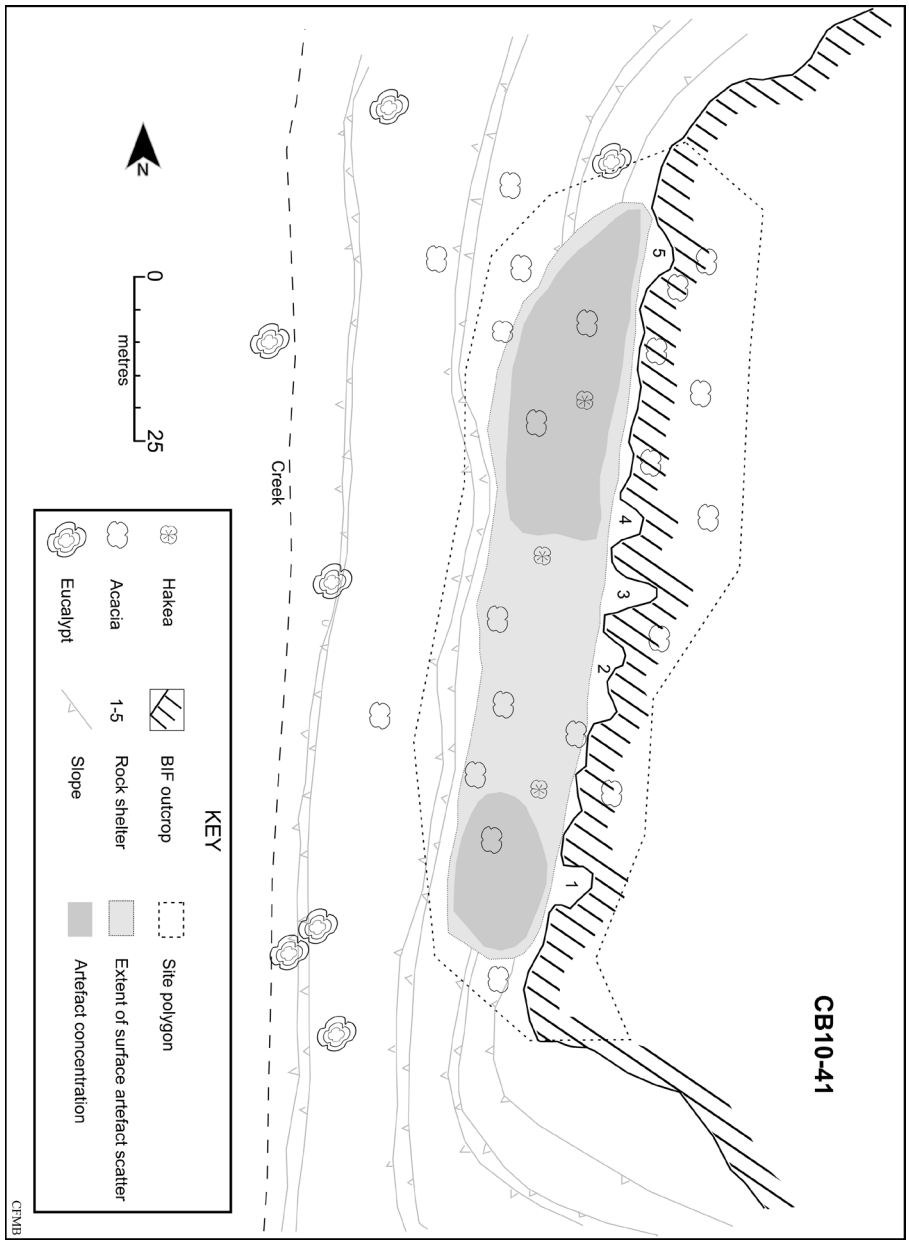

Figure A5.126: CB10-41: overall site plan.

Figure A5.127: CB10-41/2: general view.

FIGURE A5.128: CB10-41/2: plan and profile. (Drawn by M. Jimenez-Lozano).

Figure A5.129: CB10-41/3: general view.

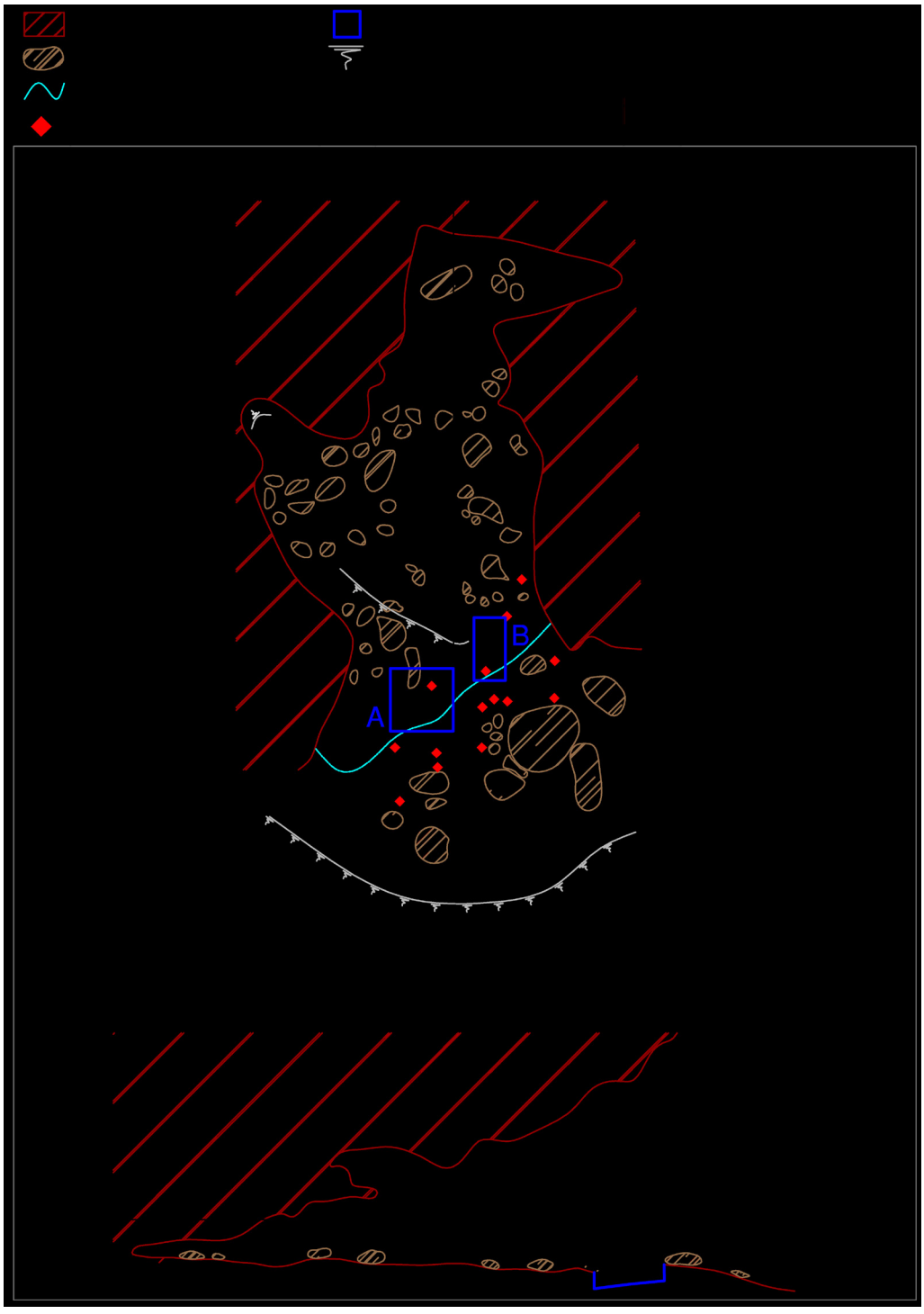

FIGURE A5.130: CB10-41/3: plan and profile (Drawn by M. Jimenez-Lozano)

Figure A5.131: CB10-41/4: general view.

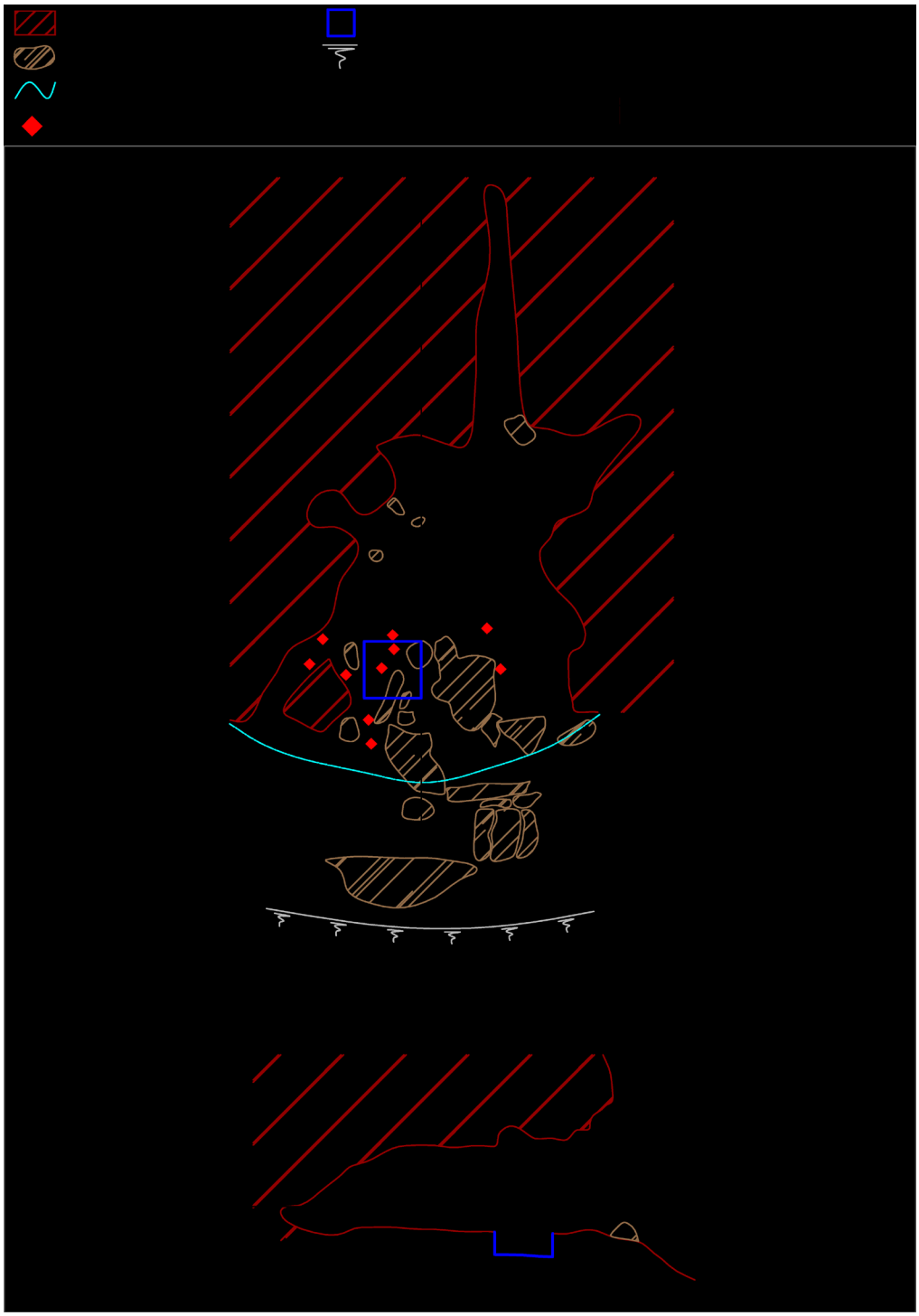

FIGURE A5.132: CB10-41/4: plan and profile. (Drawn by M. Jimenez-Lozano).

Excavation results: RS2

A 1 × 1 m test pit was excavated in the flat open area at the entrance to the southern chamber of RS2, about 70 cm back from the drip line. It was excavated down to bedrock in four units, averaging 4 cm deep, to a depth of 17 cm (Figure A5.133).

The sediments were generally uniform throughout, red-brown in colour and moderately compact with small roof fall (Figure A5.134). The deposits were neutral or weakly acidic (pH 6.5–7). Organic material was mostly confined to EU1. Very little charcoal was recovered during the excavation and when present it was generally very fine and friable. Two samples were sent for dating from EU1 (6 mm sample) and EU2 (in situ sample) (see Table 5.4, Figure A5.135). The results returned have median date values of 286 cal BP and 384 cal BP, respectively, but the calibration range indicates that these samples can be considered to be contemporaneous.

Artefacts were found in all excavation units, but there are noticeable peaks of material from the 3 mm sieve fraction in EU2 and EU4 (Figure A5.135).

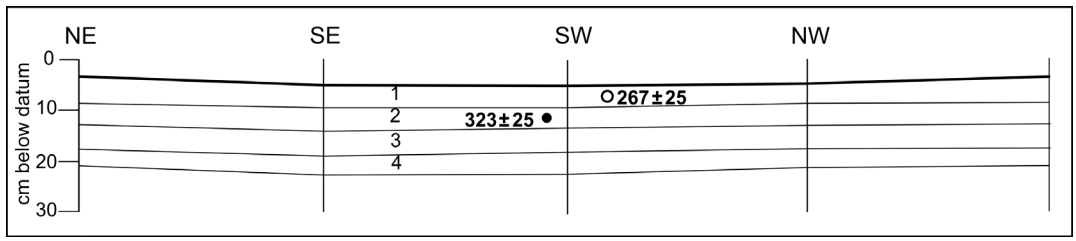

Figure A5.133: CB10-41/2: excavation units and position of radiocarbon samples.

FIGURE A5.134: CB10-41/2, during excavation (top) and south-east section (bottom).

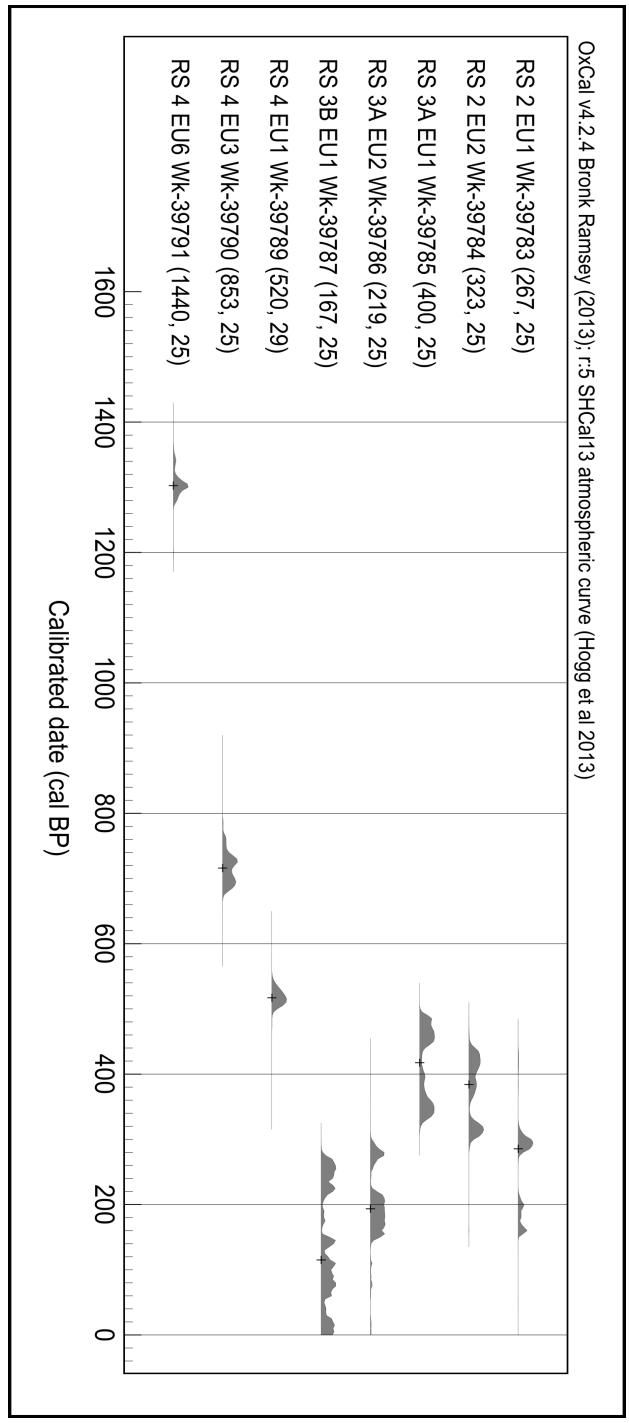

FIGURE A5.135: CB10-41: probability plot of calibrated radiocarbon determinations.

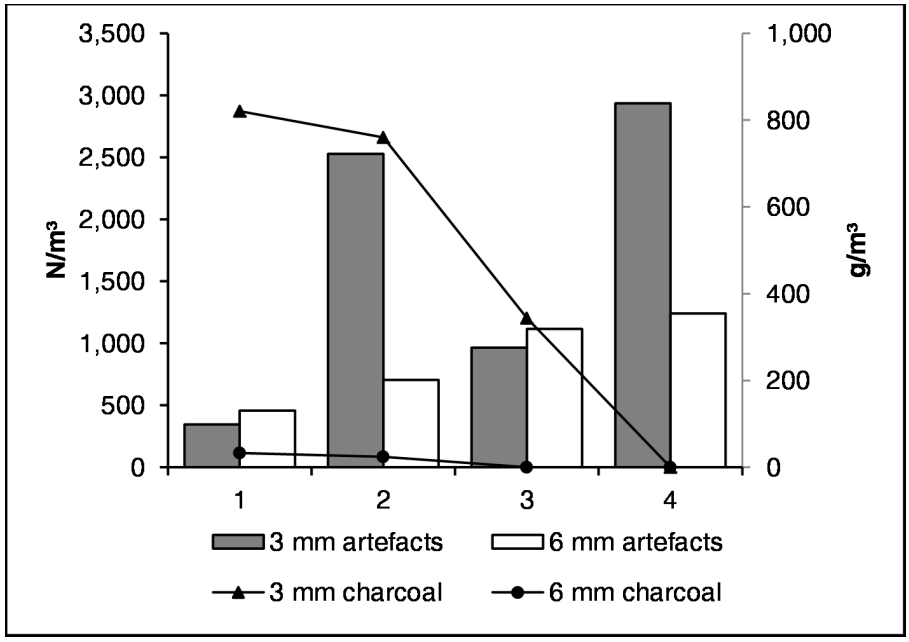

Figure A5.136: CB10-41/2: distribution of artefacts and charcoal.

Excavation results: RS3

Two test excavation pits were placed across the drip line at the entrance to the shelter, 0.35 m apart and offset by 0.8 m (Figure A5.130). Square A measured 1 × 1 m and was excavated down to bedrock (22 cm below the surface) in five units that averaged 4 cm in depth; Square B measured 1 × 0.5 m and was excavated down to bedrock (26 cm below the surface) in five units that averaged 5 cm in depth (Figure A5.137).

The matrix of both squares was similar, with scattered organic material on the surface and small roof fall on fine red-brown sediment. Below the surface, the deposit was homogenous with no major changes in stratigraphy but becoming slightly yellowish in colour with increasing rubble towards the bedrock which was a smooth conglomerate (Figure A5.138). The sediments were acidic (pH 5–6) and charcoal was mostly confined to the upper levels. Four samples (three charcoal and one wood) were sent for radiometric dating. The results returned late Holocene dates between 418 cal BP and modern (see Table 5.4, Figure A5.135). The modern date may relate to modern root intrusion.

Artefacts were found throughout the deposits in both squares (Figure A5.139). Artefacts from the 3 mm fraction peaked in the upper part of the sequence, particularly in Square B. The 6 mm artefacts were more evenly distributed, but did peak in EU3 and 4 in Square A and EU3 in Square B.

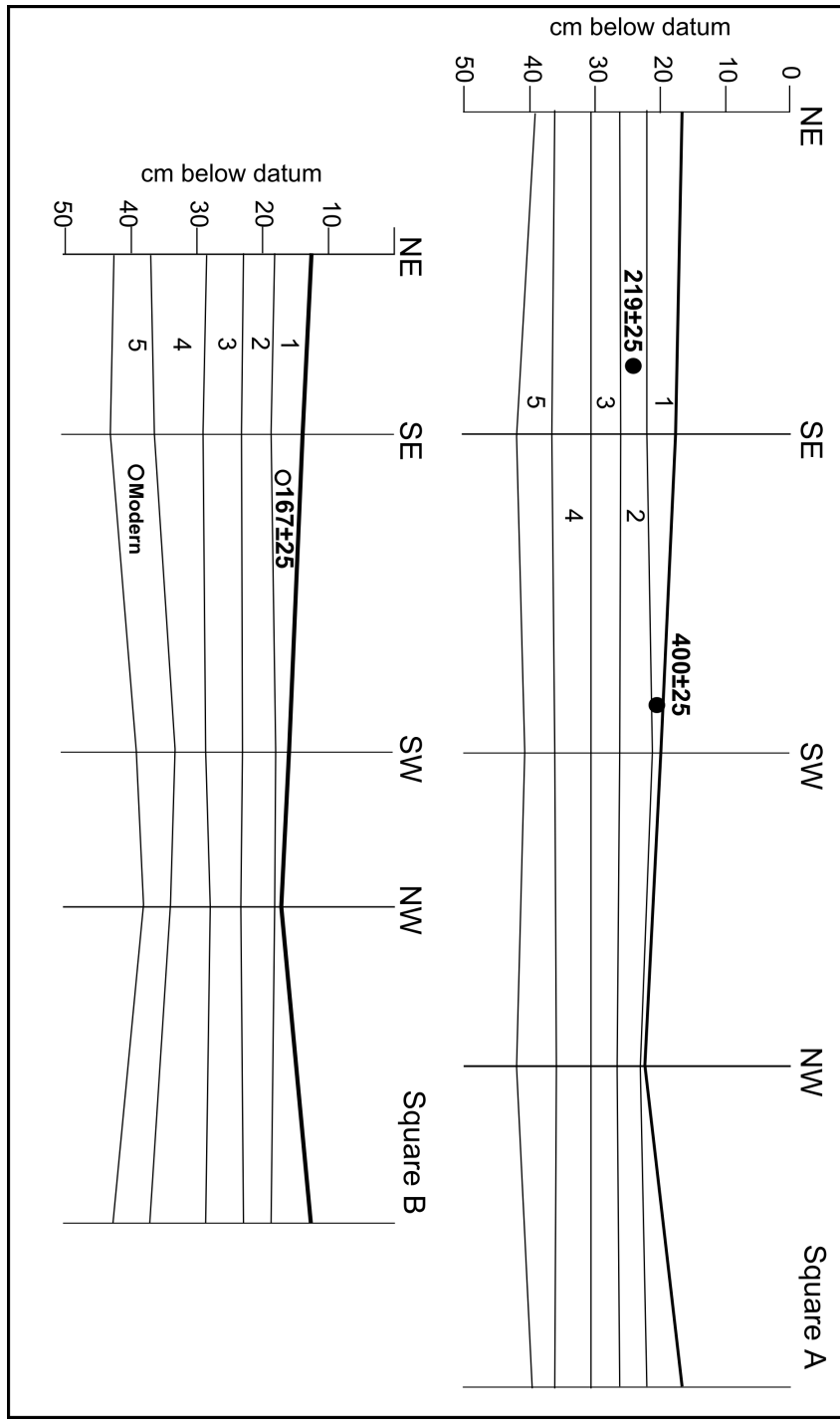

Figure A5.137: CB10-41/3: excavation units and position of radiocarbon samples.

FIGURE A5.138: CB10-41/3, Square A during excavation (top) and south-east section (bottom).

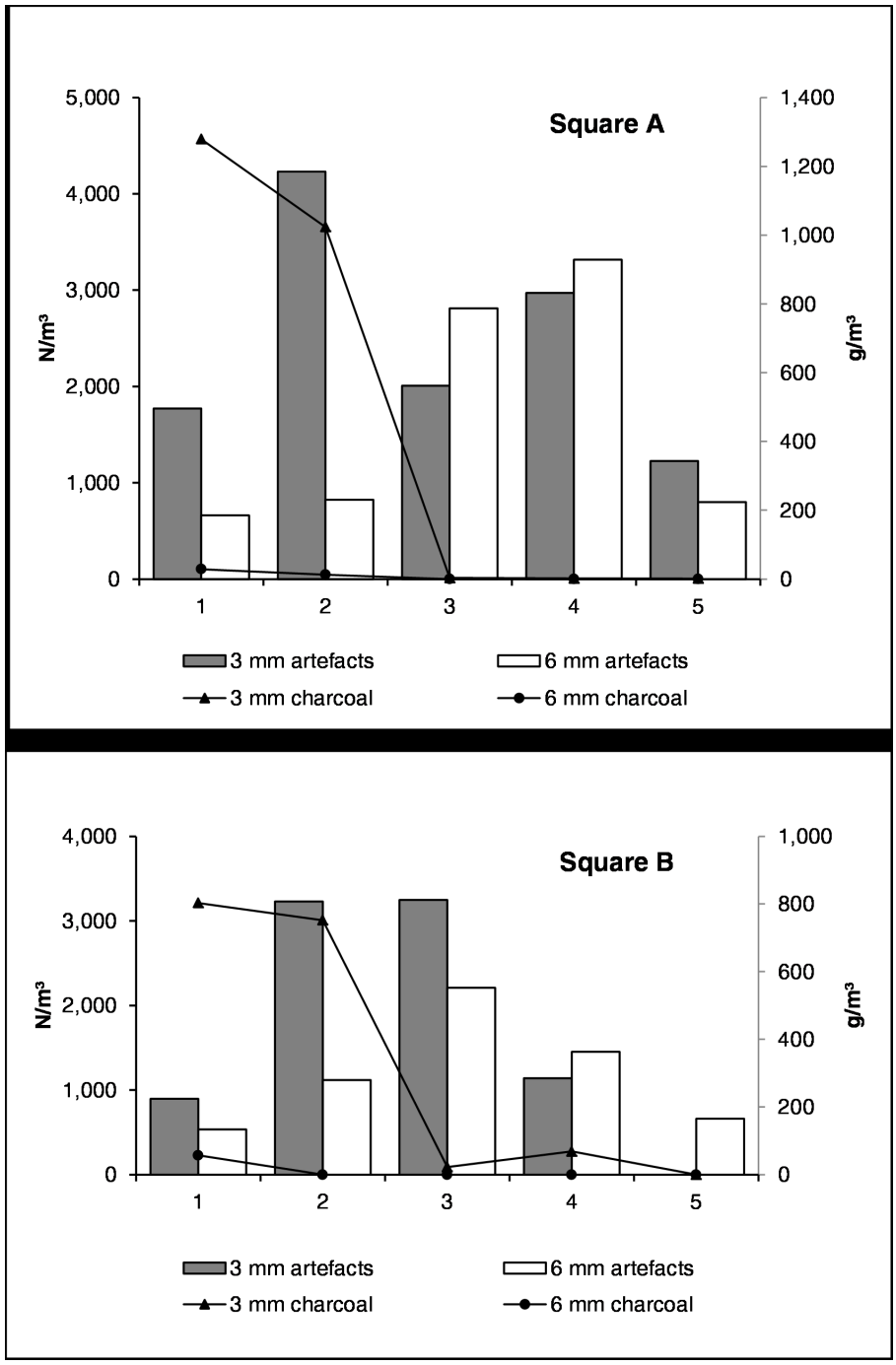

FIGURE A5.139: CB10-41/3: distribution of artefacts and charcoal.

Excavation results: RS4

A 1 × 1 m test excavation pit was placed just inside the large slabs of roof fall at the entrance. It was excavated down to bedrock in nine units, averaging 5 cm deep, to a depth of 42 cm (Figure A5.140). The surface of the square comprised scattered small pieces of roof fall on fine, brown sediment with dispersed organic material. Below the surface, the deposit was very loose and slightly acidic throughout (pH 5.5–6.5). Bedrock started to appear in EU7 and was exposed across the entire base of the pit by EU9 (Figure A5.141).

Charcoal in RS4 was fine and friable, with most recovered from the 3 mm fraction in EU2–4. Of the scattered larger charcoal pieces recovered, three samples (in situ and 6 mm samples) were sent for radiometric dating from the 6 mm fraction of EU1, EU3 and EU6. The dates returned are in sequence at 517 cal BP, 716 cal BP and 1303 cal BP (Figure A5.135).

Artefacts were found throughout the deposits (Figure A5.142). Their distribution mirrored the distribution of charcoal with a peak at EU6. Artefacts from the 6 mm sieve fraction were predominate in most excavation units. Only at the top of the sequence were artefacts from the 3 mm sieve fraction more common.

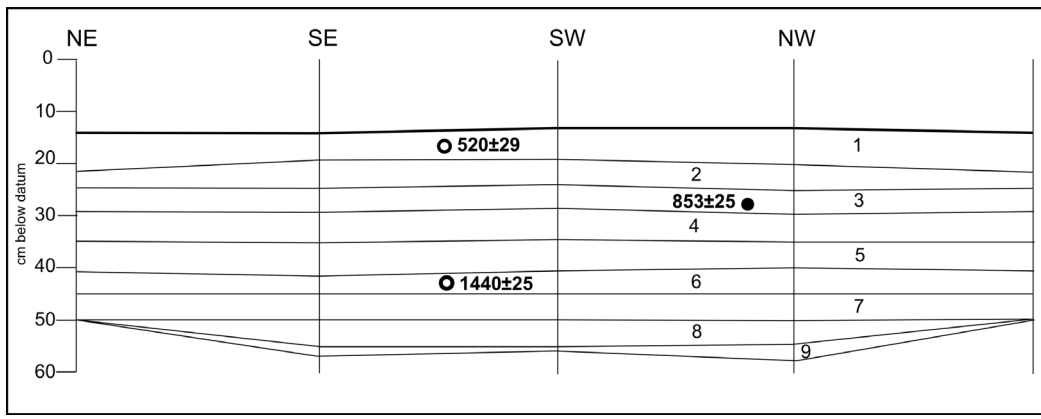

Figure A5.140: CB10-41/4: excavation units and position of radiocarbon samples.

FIGURE A5.141: CB10-41/4 during excavation (top) and at the base of EU9 (bottom).

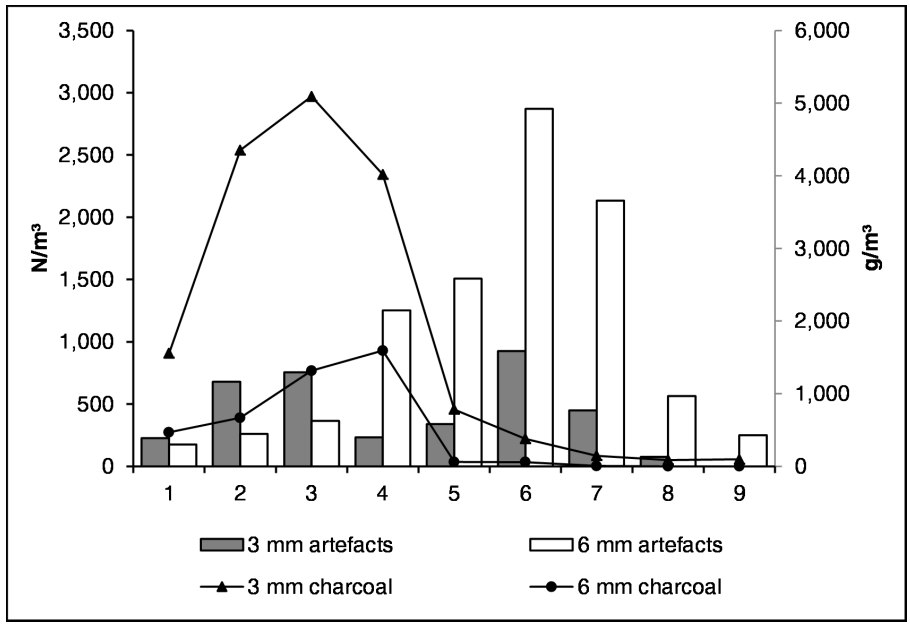

Figure A5.142: CB10-41/4: distribution of artefacts and charcoal.

Stone artefacts: RS2

A total of 197 flaked stone artefacts were recovered from the excavation, 147 from the 6 mm fraction and 50 from the analysed sample from the 3 mm sieve fraction. When corrected for sampling the estimated total of artefacts from the 3 mm fraction is 275.

Most of the flaked stone artefacts were complete or broken flakes. There were three cores (one BIF multiplatform core, one chert multiplatform core and a chert core fragment), all small and without cortex and therefore probably discarded at the end of their useful lives. Most flaked stone was BIF, chalcedony or chert, with smaller quantities of basalt. Quartz and quartzite were also present in trace amounts. The raw material composition of the 3 mm and 6 mm sieve fractions differed markedly (chi-square=65.833, df=5, p=<0.01) (Figure A5.143). Only 12% of the assemblage retained any cortex, all of which was terrestrial. Platforms were mostly plain (Table A5.49). Unusually, basalt and chalcedony complete flakes were the largest (Table A5.50). However, a single, unusually large, basalt flake and small sample size for chalcedony probably account for the anomalous results. ANOVA on length suggests that the size differences are not statistically significant (F=2.036, df=3, p=0.1154).

A chert tula adze slug was recovered from EU1. This was heavily reduced and had been worked from two margins. A BIF millstone fragment was excavated in EU2 (Figure A5.144). It is very unusual to find these artefact types in excavated assemblages.

Stone artefacts: RS3

The excavation of Square A yielded 475 flaked stone artefacts, 400 from the 6 mm fraction and the rest from the analysed sample of the 3 mm fraction. When corrected for sampling, the estimated total from the 3 mm sieve fraction was 541. Square B yielded 206 flaked stone artefacts, 160 from the 6 mm fraction. When corrected for sampling, the estimated total from the 3 mm fraction was 220. In both squares, BIF and chert were the most common raw materials, with chalcedony and basalt also present. A range of materials, including crystal quartz, dolerite, granite, mudstone, quartzite and silcrete, also occurred in small amounts in the 6 mm sieve fraction only (Table

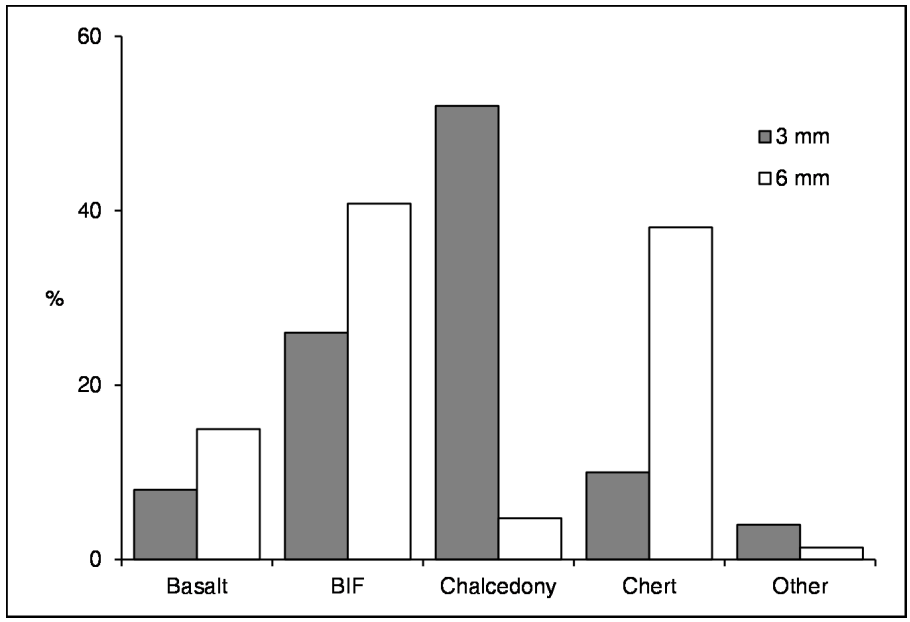

FIGURE A5.143: CB10-41/2: raw material composition by sieve fraction.

FIGURE A5.144: CB10-41/2: millstone excavated in EU2.

Table A5.48: CB10-41/2: assemblage composition.

	3 mm total			6 mm total			
	Debris	*Complete flake*	*Broken flake*	*Debris*	*Complete flake*	*Broken Flake*	*Core*
Basalt	1	0	3	0	15	7	0
BIF	1	7	5	2	36	21	1
Chalcedony	8	8	10	0	4	3	0
Chert	0	1	4	7	29	18	2
Quartz	0	0	1	0	0	0	0
Quartzite	1	0	0	0	1	1	0
Total	11	16	23	9	85	50	3

Table A5.49: CB10-41/2: platform type.

	Cortex	Plain	Focal
Basalt	2	13	3
BIF	1	44	0
Chalcedony	2	4	1
Chert	4	33	3
Quartzite	0	2	0
Total	9	96	7

Table A5.50: CB10-41/2: dimensions of complete flakes (N>1).

		Length (mm)	Width (mm)	Thickness (mm)
Basalt (N=15)	Mean	17.8	12.8	3.0
	SD	11.8	6.5	3.6
BIF (N=36)	Mean	15.8	14.5	3.9
	SD	6.6	6.0	3.7
Chalcedony (N=4)	Mean	18.3	12.0	1.8
	SD	9.0	5.4	1.5
Chert (N=29)	Mean	12.4	11.5	2.7
	SD	6.6	4.6	1.8

A5.51). Assemblage composition in both squares was markedly different in the 3 mm and 6 mm sieve fractions (Square A: chi-square=84.957, df=4, p=<0.01; Square B: chi-square=41.216, df=4, p=<0.01) (Figure A5.145).

Most flaked stone was non-cortical (81% in Square A, 72% in Square B) and the results were generally similar for the most common raw materials (BIF, chalcedony and chert). Cortex was all terrestrial, except for one quartzite flake in Square A. Most platforms were plain, with cortical platforms the next largest category (Table A5.52).

Basalt and BIF flakes are largest and chert flakes are smallest (Table A5.53). Flakes from Square A tend to be slightly larger. However, two-way ANOVA for length indicates that the size differences between the two squares are not statistically significant (F=0.2955, p=0.5871), although the differences between raw materials are significant (F=14.92, p<0.01).

Eleven cores or core fragments were excavated in total, nine from Square A and two from Square B (Table A5.54). Most were BIF single platform cores, but two BIF multiplatform cores were also found. These cores varied in size from 11 g to 287 g (mean 106.1±105.5); three were more than 100 g. A chert single platform core and core fragment came from Square A.

An unusually high number of formal tools were recovered from this shelter. Twelve retouched artefacts were recorded. These included two chert geometric microliths (EU3 and EU4), two tula adze slugs (EU3 and EU4) and a scraper (EU4) all from Square A. Square B yielded a chert tula adze slug and a chert notched artefact from EU2.

The excavated assemblage also included a number of manuports in a range of raw materials as well as a granite hammer stone and a BIF grinding stone (Table 5.55). These may have been brought to the site as a source of raw material.

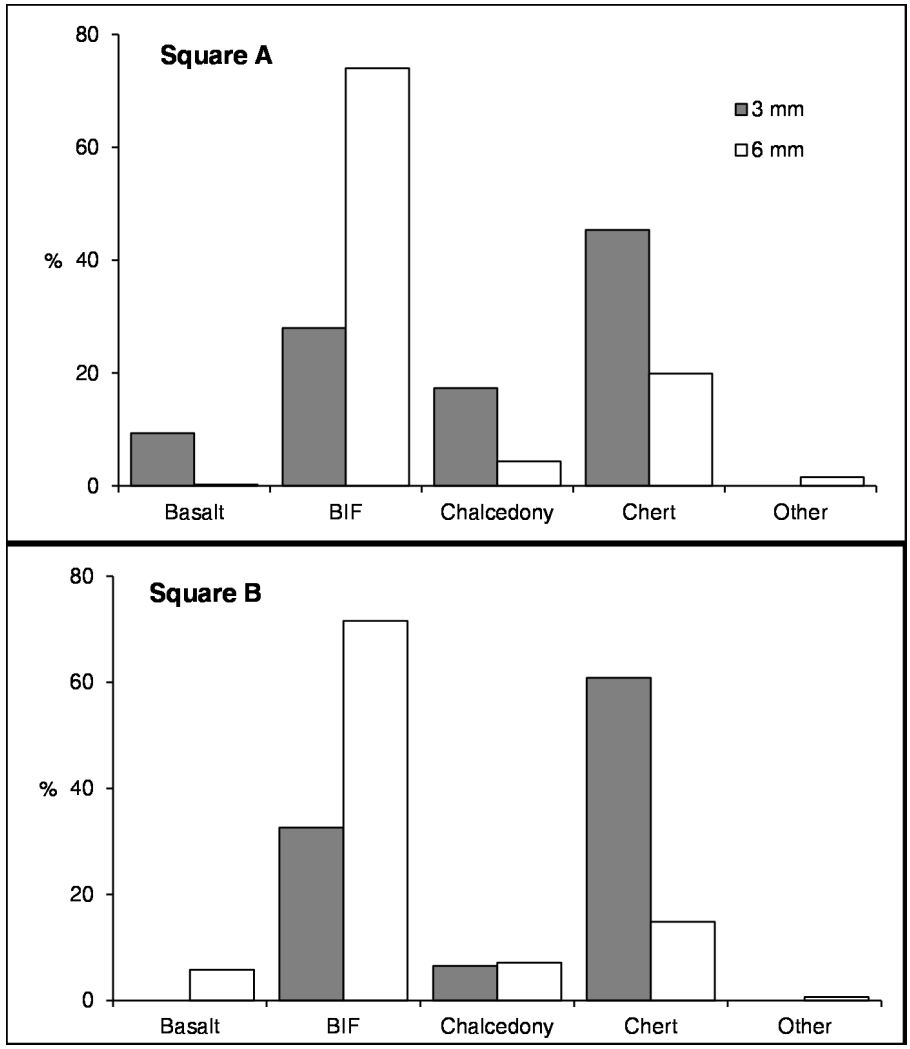

Figure A5.145: CB10-41/3: raw material composition by sieve fraction.

Table A5.51: CB10-41/3: assemblage composition.

	3 mm			6 mm			
	Debris	*Complete flake*	*Broken flake*	*Debris*	*Complete flake*	*Broken flake*	*Core*
Square A							
Basalt	0	2	5	0	0	1	0
BIF	0	4	17	8	156	119	7
Chalcedony	1	4	8	0	8	9	0
Chert	1	19	14	9	42	25	2
Crystal quartz	0	0	0	1	1	1	0
Dolerite	0	0	0	1	0	0	0
Mudstone	0	0	0	0	0	1	0
Quartzite	0	0	0	0	1	0	0
Total	2	29	44	19	208	156	9
Square B							
Basalt	0	0	0	0	8	1	0
BIF	1	6	8	5	62	42	2
Chalcedony	0	2	1	1	8	2	0
Chert	3	13	12	2	10	11	0
Crystal quartz	0	0	0	0	0	1	0
Total	4	21	21	8	88	57	2

Table A5.52: CB10-41/3: platform types.

	Cortical	Plain	Faceted	Crushed	Focal
Square A					
BIF	30	169	1	2	7
Chalcedony	1	9	0	0	0
Chert	3	47	0	0	1
Crystal quartz	0	1	0	0	0
Quartzite	1	0	0	0	0
Total	35	226	1	2	8
Square B					
Basalt	4	5	0	0	0
BIF	23	52	0	0	5
Chalcedony	2	7	0	0	0
Chert	1	15	0	0	0
Crystal quartz	0	1	0	0	0
Total	30	80	0	0	5

Table A5.53: CB10-41/3: dimensions of complete flakes.

		Length (mm)	Width (mm)	Thickness (mm)
Square A				
BIF (N=156)	Mean	19.6	17.6	5.1
	SD	10.5	9.4	4.0
Chalcedony (N=8)	Mean	16.1	13.8	3.3
	SD	5.1	6.5	1.9
Chert (N=42)	Mean	11.9	11.4	2.8
	SD	5.1	4.2	1.8
Square B				
Basalt (N=8)	Mean	18.8	17.6	4.4
	SD	10.0	5.7	2.2
BIF (N=62)	Mean	18.7	18.1	5.4
	SD	9.4	8.1	4.0
Chalcedony (N=8)	Mean	13.6	14.6	2.8
	SD	4.7	5.2	1.7
Chert (N=10)	Mean	11.0	12.0	3.1
	SD	5.8	3.9	1.7

Table A5.54: CB10-41/3: core types.

	A	B	Total
BIF			
Multiplatform	1	1	2
Single platform	5	1	6
Core fragment	1	0	1
Total	7	2	9
Chert			
Single platform	1	0	1
Core fragment	1	0	1
Total	2	0	2

Table A5.55: CB10-41/3: retouched pieces.

	A	B	Total
BIF			
Tula	1	0	1
Retouch	2	0	2
Chert			
Tula	1	1	2
Geometric	2	0	2
Retouch	4	1	5
Total	10	2	12

Table A5.56: CB10-41/4: non-flaked stone.

		A	B	Total
BIF	Manuport	0	3	3
	Millstone	0	1	1
Granite	Hammer	1	0	1
	Manuport	2	0	2
Mudstone	Manuport	2	1	3
Quartzite	Manuport	2	0	2
Silcrete	Manuport	1	0	1
Total		8	5	13

Stone artefacts: RS4

Four hundred and twenty-four flaked stone artefacts were recovered from the excavation of RS4, 380 from the 6 mm sieve fraction and 44 from the analysed sample of the 3 mm sieve fraction. When corrected for sampling the estimated total number of artefacts from the 3 mm sieve fraction is 167. Most artefacts are BIF, basalt chalcedony or chert, with small quantities of dolerite, mudstone, quartz and quartz crystal also present (Table A5.57). Assemblage composition by raw material is markedly different in the two sieve fractions (chi-square=46.78, df=7, p=<0.01) (Figure A5.146).

Most flaked stone is non-cortical (71%). All cortex was terrestrial except for a BIF flake and a basalt distal flake fragment which had riverine cortex. Two-thirds of platforms were plain with a further 30% cortical (Table A5.58). Most cores are single platform and most are BIF (Table A5.59). As usual, BIF and basalt flakes are larger than chalcedony or chert (Table A5.60). The large mean size of mudstone flakes is most probably a result of sample size. However, ANOVA on length, excluding mudstone, suggests that the differences were not statistically significant (F=1.981, p=0.1191).

Only three retouched artefacts were found – a BIF tula adze slug and two retouched basalt flakes. Thirty manuports were also found in the excavation in all excavation units. Most of these are small mudstone river pebbles, with a mean weight of 2.8±0.4 g (Table A5.61). Mudstone is only a small component (2%) of the flaked stone assemblage. By contrast, the BIF and dolerite manuports are large. The BIF river pebble weighs 310 g, the dolerite river pebble weighs 42 g and the other dolerite manuport weighs 193 g.

Discussion

The evidence from the CB10-41 shelter complex suggests relatively intense occupation within about the last 1500 years. The disparity in raw material composition between the sieve fractions can be interpreted to indicate that occupation episodes were relatively brief. The high number of formal tools is unusual for the study area and suggests that maintenance and repair of wooden tools, including replacement of stone adzes, was an important activity at the site. The presence of cores, manuports, hammer stones and grinding material suggests provisioning of the place.

Table A5.57: CB10-41/4: flaked stone assemblage composition.

	3 mm		6 mm			
	Complete flake	*Broken Flake*	*Debris*	*Complete flake*	*Broken flake*	*Core*
Basalt	3	1	3	42	36	1
BIF	3	12	2	94	101	8
Chalcedony	4	5	3	19	22	1
Chert	4	12	1	8	14	2
Dolerite	0	0	0	0	3	0
Mudstone	0	0	0	2	5	0
Crystal quartz	0	0	0	1	1	1
Quartz	0	0	0	1	1	0
Total	14	30	17	167	183	13

Table A5.58: CB10-41/4: platform type.

	Cortex	Crushed	Flat	Focal
Basalt	24	1	36	1
BIF	51	4	95	1
Chalcedony	4	0	26	0
Chert	1	0	12	1
Crystal quartz	0	0	1	0
Dolerite	0	0	2	0
Mudstone	1	0	6	0
Quartz	0	0	2	0
Total	81	5	180	3

Table A5.59: CB10-41/4: cores.

	Single platform	Multi-platform	Core fragment	Total
Basalt	0	1	0	1
BIF	7	1	0	8
Chalcedony	0	1	0	1
Chert	1	0	1	2
Crystal quartz	1	0	0	1
Total	9	3	1	13

Table A5.60: CB10-41/4: dimensions of complete flakes (N>1).

	N	Length (mm)	Width (mm)	Thickness (mm)
Basalt (N=42)	Mean	21.4	19.0	5.5
	SD	11.3	9.9	4.5
BIF (N=94)	Mean	22.5	18.7	6.1
	SD	11.3	9.9	4.5
Chalcedony (N=19)	Mean	18.2	14.3	3.9
	SD	8.8	5.6	3.3
Chert (N=8)	Mean	14.4	13.9	3.8
	SD	5.2	10.9	2.9
Mudstone (N=2)	Mean	34.5	26.5	8.0
	SD	24.7	9.2	2.8

Table A5.61: CB10-41/4: manuports.

	River pebble	Other	Total
BIF	1	0	1
Dolerite	1	1	2
Mudstone	24	2	26
Silcrete	0	1	1
Total	26	4	30

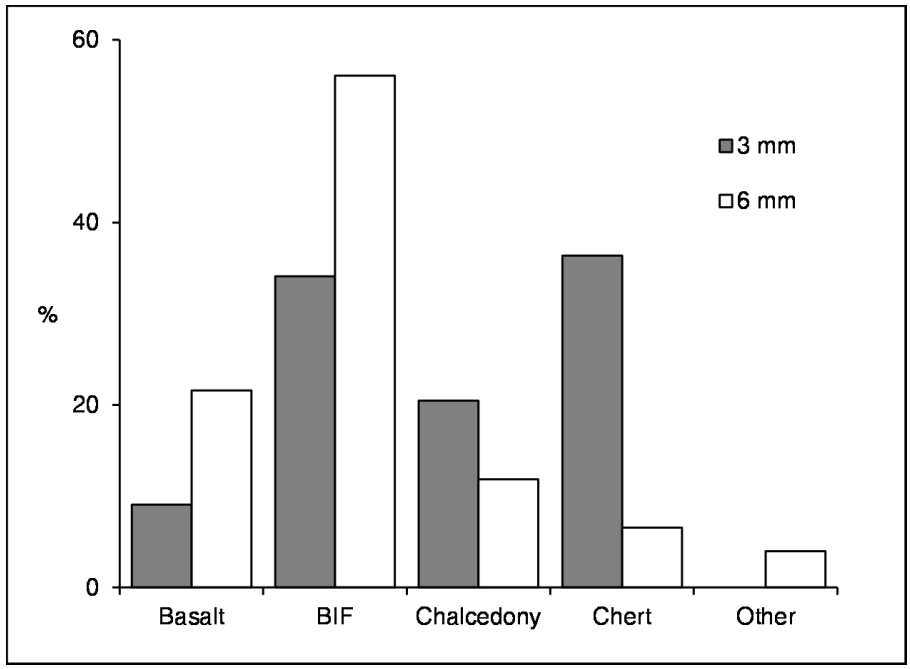

Figure A5.146: CB10-41/4: raw material composition by sieve fraction.

OTHER SHELTERS

Two other shelters (CB09-94 and CB11-89) were excavated in the Christmas Creek study area. Both are single shelters with relatively limited evidence of recent occupation. There are no formal reports for these sites. Documentation associated with the excavations was included as part of the Heritage Information Submission Form (HISF) lodged at the Department of Aboriginal Affairs when the sites were reported. This discussion draws on that information and primary field records.

CB09-94

CB09-94 is a moderate-sized, north-west-facing rockshelter in the southern foothills of the Chichester Range. It looks out over an undulating plain that has only small, ephemeral creeks and soaks, the nearest of which is 150 m to the west. The talus slope and gully below the rockshelter carry scattered *Eucalyptus* spp. trees and *Acacia* spp. trees and shrubs, with a dense understorey of spinifex (*Triodia* sp.) grassland. Surface visibility on the slope was therefore low (<50%). Surface visibility within the shelter is high (90%) because, except for very sparse seasonal grasses (*Eragrostis* spp.) close to the entrance, the floor is devoid of vegetation (Figure A5.147). The walls and ceiling of the shelter are exfoliating slabs of conglomerate BIF. Bedrock outcrops just outside the drip line of the shelter. The main chamber is 5 m wide, 4 m deep and 2 m in height at the drip line with an area of 18 m^2. This allows enough room for several people to stand and move around. There are two other small chambers opening off the main chamber (Figure A5.148). The floor of the shelter consists of a matrix of fine sediment, gravel, kangaroo faeces and small roof fall.

CB09-94 was first recorded in 2009 and excavated in 2014. The surface assemblage within the shelter comprises two complete flakes (one with retouch), a multiplatform core of chert, a complete flake and a single platform BIF core (Figure 5.5). A series of depth probes gave results ranging from 3 cm to 25 cm. Square A (1 × 1 m) was placed 0.6 m inside the drip line to sample the area with the greatest depth and clear of large roof fall and outcropping bedrock.

Figure A5.147: CB09-94: general view.

FIGURE A5.148: CB09-94: site plan and profile. (Drawn by M. Jimenez-Lozano).

Excavation results

The test pit was excavated in five excavation units (Figure A5.149). The surface of the square was mostly covered with gravel-sized pieces of exfoliated roof fall, with medium-sized rocks and some seasonal vegetation in the eastern corner. The deposit was fairly homogenous, comprising compacted dark brown sediment with very fine charcoal pieces. No features were identified during excavation. Bedrock was first exposed in the northern portion of the test pit (nearest to the drip line) near the base of EU2 and completely exposed within EU5, at an average depth of 27 cm below ground surface (Figure A5.150). The sediments were acidic throughout (pH 5).

Several pieces of charcoal were recovered in situ and two of these (from EU2 and EU4) were sent for radiocarbon dating (Figure A5.151). The sample from EU2 suggests that the main occupation occurred about 500 years ago. The determination from EU4 indicates an earlier episode of occupation about 2500 years ago.

Very small amounts of organic material (such as plant debris, macropod scats and scattered insect casings) were found throughout the test pit. This material is considered to be non-cultural. Fine charcoal pieces were the most common organic component, with most coming from EU2 and EU3 (Figure A5.152). There was no clear evidence for a discrete hearth. Artefact distribution with depth shows no clear peaks, although there is a marked increase in the material from the 3 mm sieve in both EU2 and EU5.

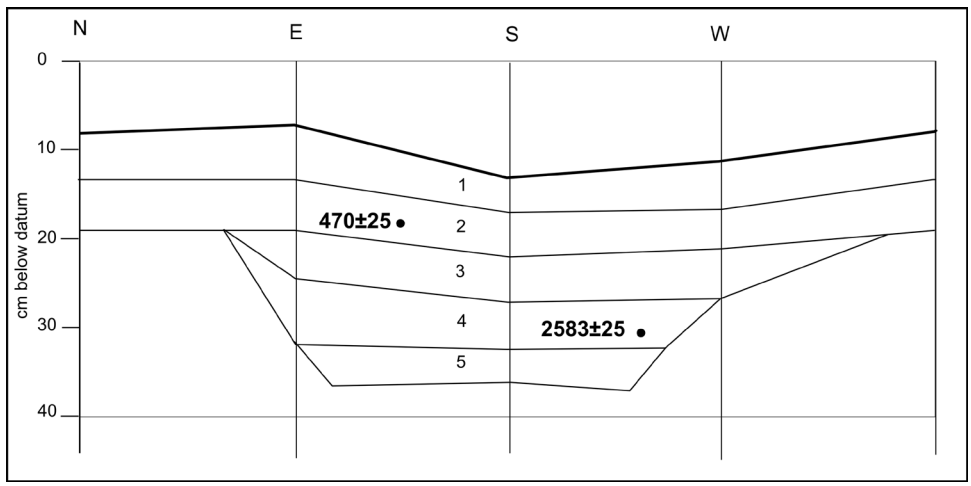

Figure A5.149: CB09-94: excavation units and position of radiocarbon.

FIGURE A5.150: CB09-94 during excavation (top) and north-east section (bottom).

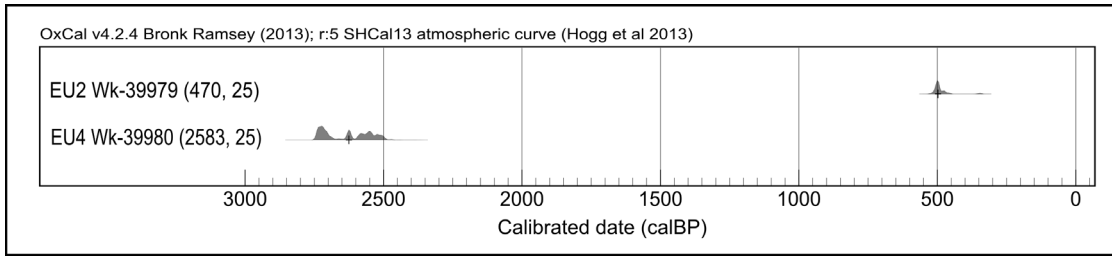

Figure A5.151: CB09-94: probability plots of radiocarbon determinations.

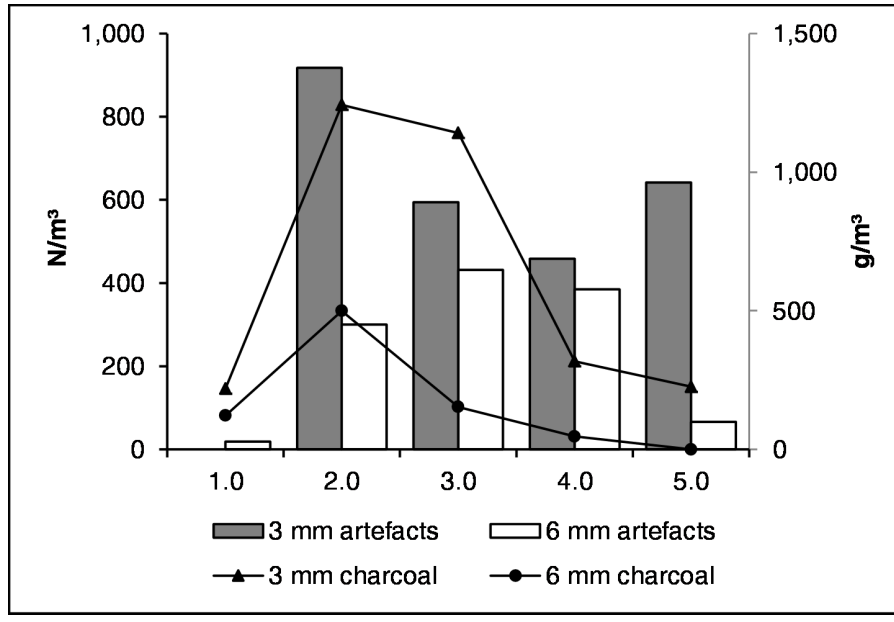

Figure A5.152: CB09-94: distribution of artefacts and charcoal.

Stone artefacts

A total of 125 artefacts was recovered from the excavation, 44 from the 6 mm sieve fraction and the remainder from the 3 mm sieve fraction. When corrected for sampling the estimated total of artefacts from the 3 mm fraction is 91. Ninety-seven artefacts came from EU1–3, with a small number from the possible earlier occupation in EU4–5.

Most flaked stone artefacts are complete or broken flakes of BIF with small quantities of chalcedony, chert and mudstone (Table A5.62). The proportions of different raw materials are broadly similar in the 3 mm and 6 mm sieve fraction (Figure A5.153). Chi-square is not significant for EU4–5 (chi-square=3.8613, df=3, p=0.279), but is significant at the 5% level for EU1–3 (chi-square=10.64, df=4, p=0.031). It seems likely that this reflects the absence of chalcedony in the 6 mm fraction and of mudstone in the 3 mm, together with the small total numbers of artefacts.

Most artefacts (80% of the 6 mm fraction) are non-cortical. Only terrestrial cortex is represented. Platforms are mostly plain (Table A5.63). There is a single basalt core fragment. None of the flaked stone showed any evidence of retouch.

BIF complete flakes are larger than basalt and chalcedony, but the sample size for materials other than BIF is very small. ANOVA on length suggests the differences are not statistically significant (F=0.3518, df=2, p=0.7082) (Table A6.64).

Discussion

The shallow deposits, small number of artefacts and radiocarbon determinations separated widely in time suggest at least two brief episodes of occupation at CB09-94, one about 2500 years ago and the other within the last 500 years. The cores in the surface assemblage suggest raw material may have been left in the shelter for future use.

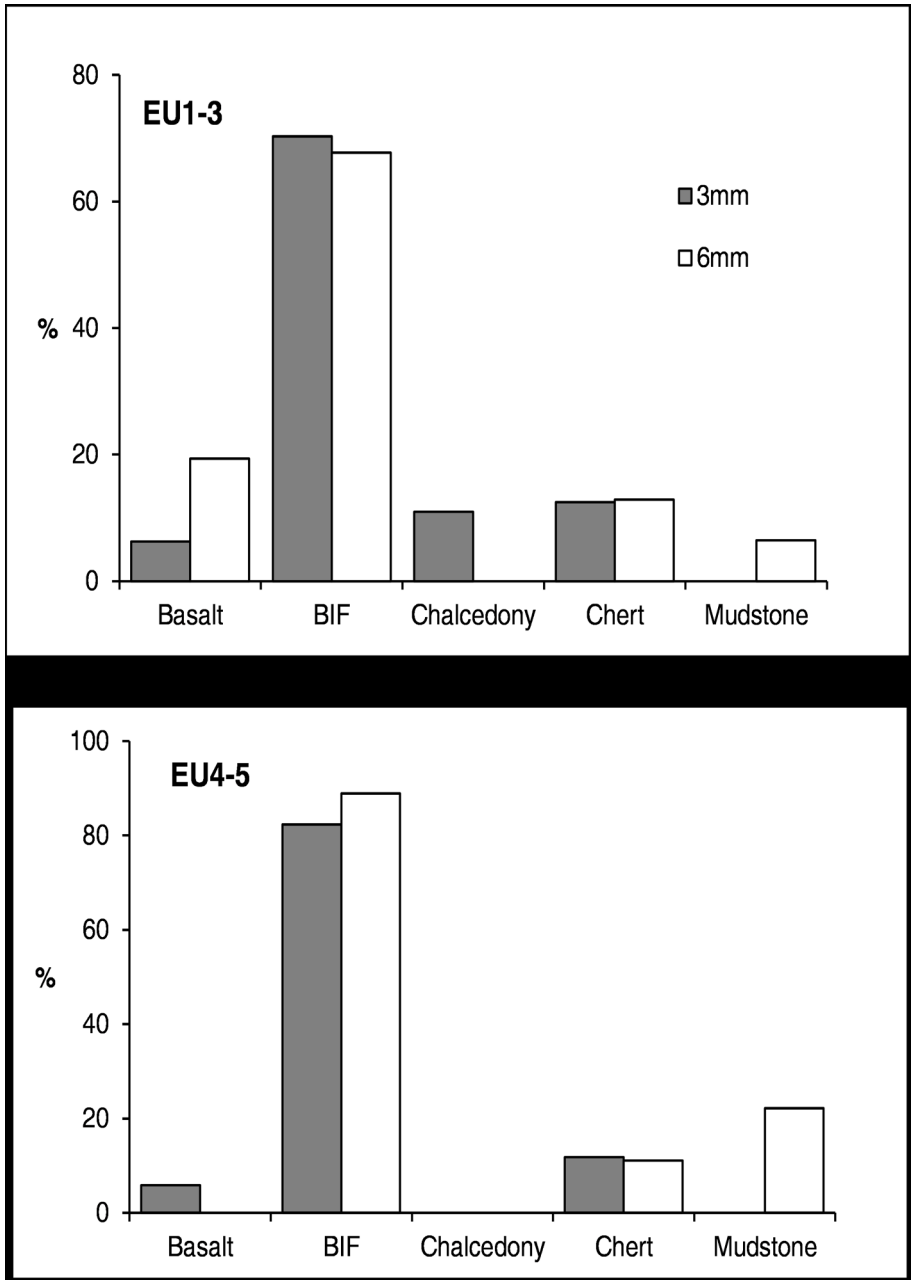

Figure A5.153: CB09-94: raw material composition by sieve fraction.

Table A5.62: CB09-94: assemblage composition.

	3 mm			6 mm			
	Debris	*Complete flake*	*Broken flake*	*Debris*	*Complete flake*	*Broken flake*	*Corefrag*
EU1–3							
Basalt	0	1	3	0	2	3	1
BIF	0	23	22	0	16	5	0
Chalcedony	0	6	1	0	0	0	0
Chert	1	5	2	0	3	1	0
Mudstone	0	0	0	0	1	1	0
EU1–3 total	1	35	28	0	22	10	1
EU4–5							
Basalt	0	1	0	0	0	0	0
BIF	0	9	5	0	5	3	0
Chert	0	2	0	1	0	0	0
Mudstone	0	0	0	0	0	2	0
EU4–5 total	0	12	5	1	5	5	0
Total	1	47	33	1	27	15	1

Table A5.63: CB09-94: platform type.

	Cortex	Plain	Crushed
Basalt	0	0	3
BIF	2	19	0
Chert	0	4	0
Mudstone	0	3	0
Total	2	26	3

Table A5.64: CB09-94: dimensions of complete flakes (6 mm sieve fraction, N>1).

		Length (mm)	Width (mm)	Thickness (mm)
Basalt (N=2)	Mean	15.0	13.5	5.5
	SD	5.7	0.7	0.7
BIF (N=16)	Mean	19.8	18.9	4.9
	SD	15.8	9.1	2.2
Chalcedony (N=3)	Mean	12.7	11.7	3.7
	SD	9.1	3.8	2.1

CB11-89

CB11-89 is a single-chambered, west-facing rockshelter on the slope of an east–west oriented series of hills that form part of the foothills of the eastern Chichester Range. The nearest potable water source is an ephemeral creek 200 m to the west. The talus slope is steep (35°) and long, ending at a third order creek 100 m to the west. Vegetation on the talus consists of scattered *Senna* spp. trees and an understorey of low to moderately dense *Triodia* spp. and scattered *Eragrostis* spp. along the drip line. The shelter interior is devoid of vegetation.

CB11-89 was first identified in 2011 and recorded in detail prior to excavation in 2014. The shelter measures 5 m long, 12 m wide and 5 m high at the drip line, with a ground surface area of 57 m². The floor is flat in the southern half with bedrock at the drip line which steeply drops away over a 2.5 m sheer section of rock onto the talus below. The northern half of the shelter floor slopes down to the north and gradually merges into the talus. The shelter walls are exfoliating BIF and the deposit consists of fine sediment, bedrock, roof fall pieces and macropod scats. This shelter is very high and open, offering plenty of room to move around in and protection from the elements to the east (Figure A5.154, Figure A5.155).

The surface assemblage consists of seven artefacts. A banded iron millstone (with pecking and flake scars) lay near the drip line in the south of the shelter (Figure 5.5). A chert reduction area was in the centre of the shelter. This comprised three debris fragments, a flake, a proximal flake fragment and a core fragment of distinctive green-grey chert. The chert resembled seams of chert in the shelter walls, but there was no evidence that any of these had been quarried. It seems likely that this represents the opportunistic reduction of exfoliated material.

A series of depth probes gave results ranging from 12 cm to 40 cm. Two 1 × 1 m test pits (Squares A and B) were placed 0.45 m apart and 2 m inside the drip line in the flat southern portion of the shelter floor. This area had the greatest depth of sediment that had collected between the exposed bedrock at the drip line and at the rear of the shelter. It was also clear of large roof fall and outcropping bedrock.

FIGURE A5.154: CB11-89: general view of shelter.

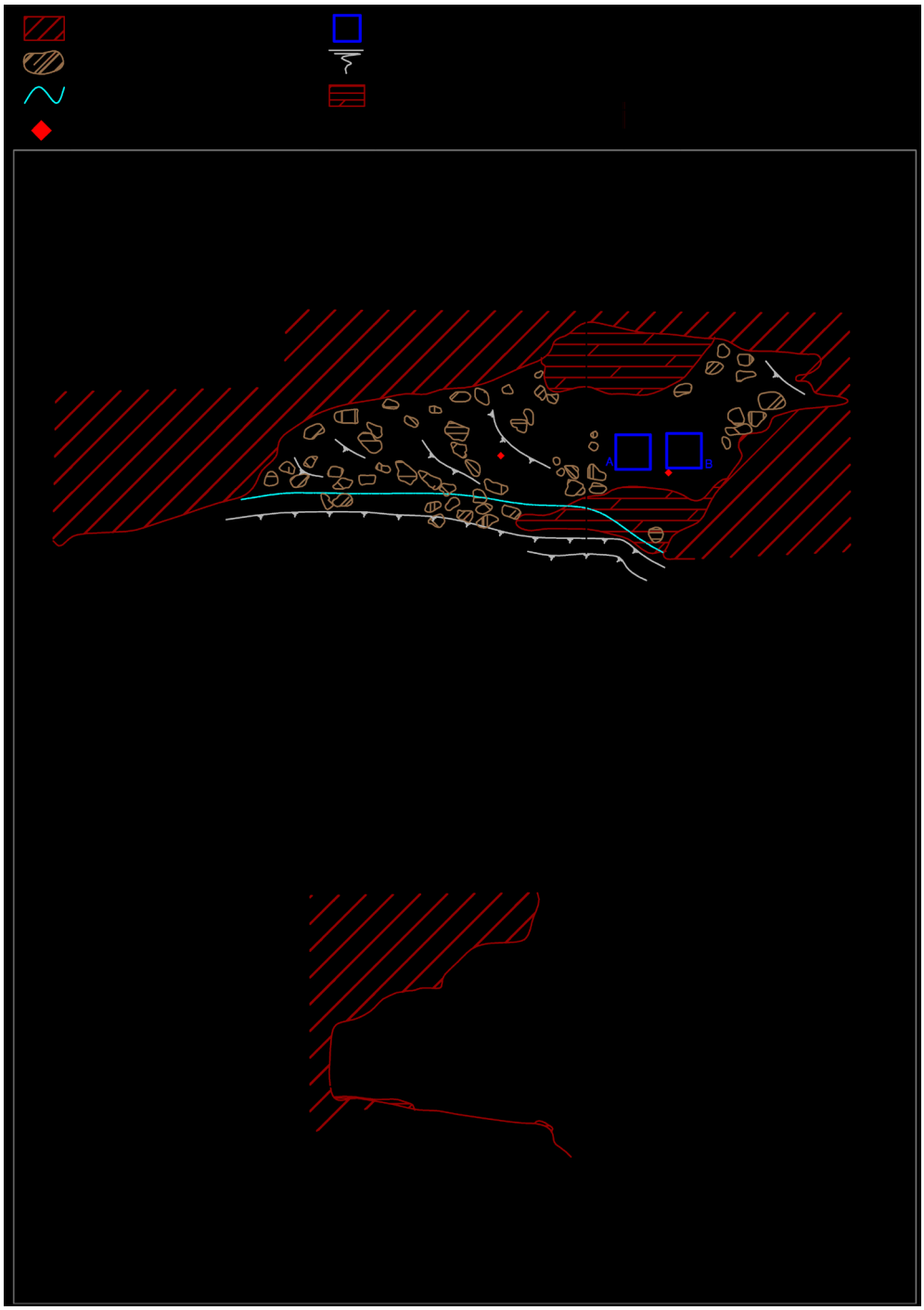

FIGURE A5.155: CB11-89: site plan and profile. (Drawn by M. Jimenez-Lozano).

Excavation results

Square A was excavated in seven excavation units. Bedrock was reached at 24 cm below the ground surface. Square B was excavated in five EUs, finishing on bedrock 33 cm below the surface (Figure A5.156).

The surface of the shelter was mostly covered with gravel-sized pieces of exfoliated roof fall, with some animal scats and medium-sized rocks. Below this, the deposit was a mixture of fine, brown sediment with very fine charcoal pieces and gravel (SU1). From EU2, the fine sediment continued but was intermixed with chalky calcified rock which became increasingly shaly with depth (SU2). Bedrock first appeared in EU3 and it is likely that SU2 comprised decomposing bedrock (Figure A5.157). The deposits were mostly neutral (Square A pH 6.5–7.5, Square B pH 7–7.5).

Three charcoal samples were sent for radiocarbon dating (Figure A5.158). These returned median calibrated ages of 98 cal BP in EU1 and 528 cal BP in EU2 of Square A, and 606 cal BP in EU2 of Square B, suggesting a single episode of occupation in the last 600 years.

Only small amounts of organic material (such as plant debris, scats and scattered insect casings) were recovered from the excavations, mostly from the top 15 cm. Most charcoal and artefacts came from EU1–2 (Figure A5.159). Only three artefacts were recovered below EU2 (one from Square A and two from Square B) and all were recovered from the 3 mm sieve fraction. Very little charcoal was found and it was all fine and scattered. There were no hearth features. It is possible that the charcoal is not associated with cultural activities and could have been blown in from the surrounding area after natural fire events.

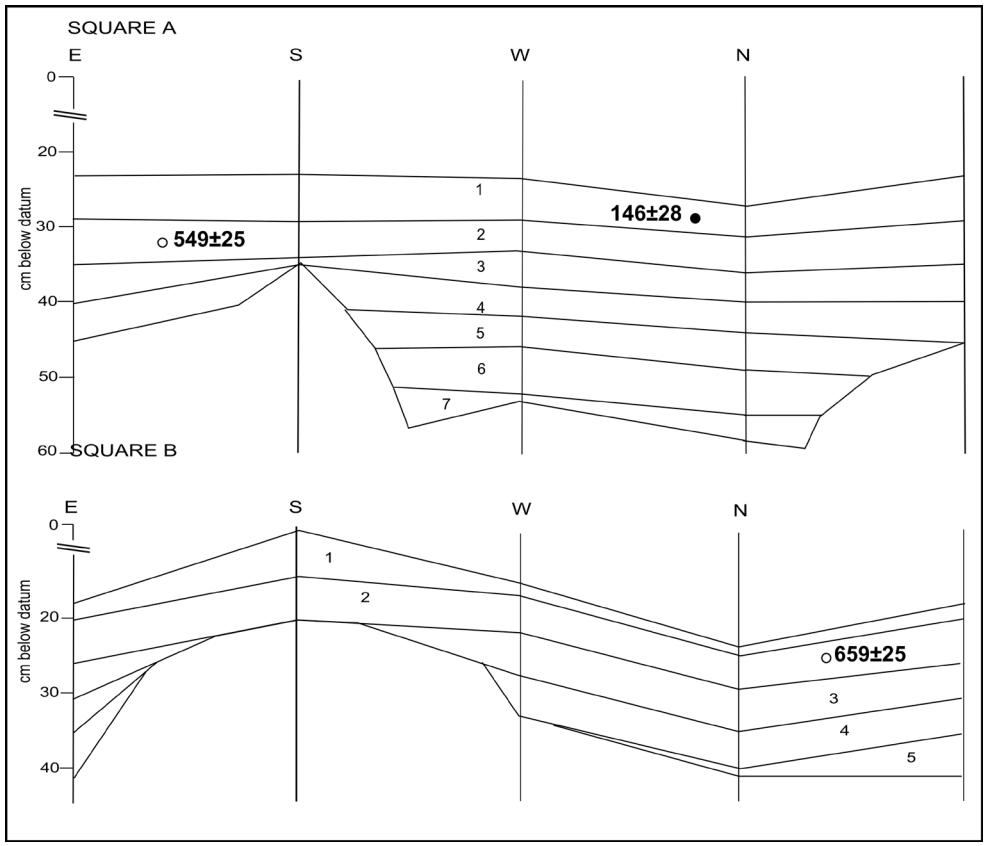

Figure A5.156: CB11-89: excavation units and position of radiocarbon samples.

FIGURE A5.157: Photos of CB11-89 during excavation (a) and showing south-west wall (b).

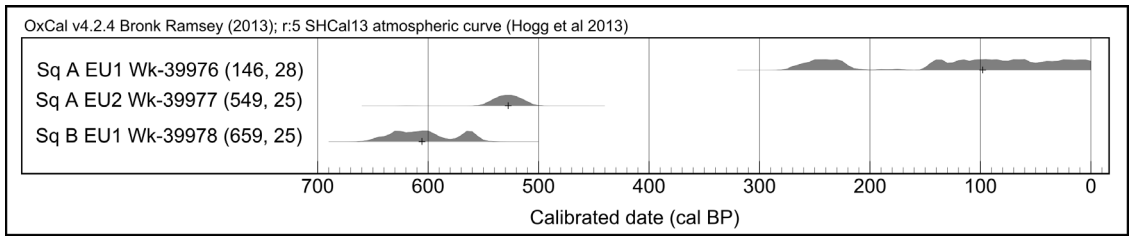

Figure A5.158: CB11-89: radiocarbon determinations probability plot.

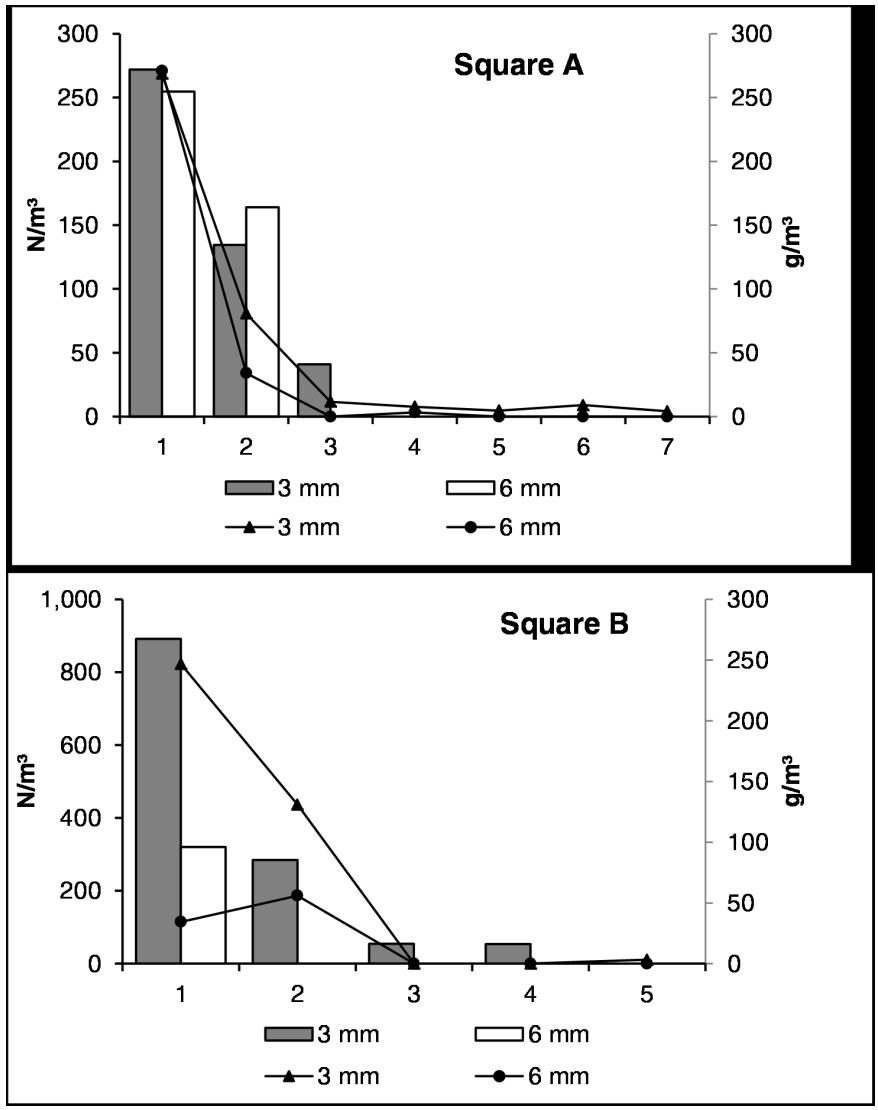

Figure A5.159: CB11-89: distribution of artefacts and charcoal.

Stone artefacts

A total of 86 flaked stone artefacts was recovered from the excavation. Thirty came from the 6 mm sieve fraction, including 22 from Square A and eight from Square B. The remainder came from the sampled 3 mm sieve fraction, 20 from Square A and 36 from Square B. When corrected for sampling the estimated total from the 3 mm sieve fraction was 23 for Square A, and 42 for Square B.

Most of the flaked stone is complete or broken flakes of BIF with small quantities of basalt, mudstone and quartzite in Square A; and basalt, chert, chalcedony and mudstone in Square B (Table A5.65). In both squares, raw material composition is similar in the 3 mm and 6 mm sieve fractions (Figure A5.160). The 6 mm sieve fraction is almost exclusively BIF in both squares with other raw materials occurring in small quantities in the 3 mm sieve fraction. Chi-square is not significant for the total assemblage (chi-square=4.7164; df=5; p=0.446; Fisher's Exact p=0.63471). Two single platform cores and a core fragment were also found. This is unusual as cores are rare in the excavated assemblages from the Christmas Creek survey area. Both cores are large (485 g and 567 g), with 90% cortex, and were probably left in the shelter for future use. No formal tools or artefacts with secondary retouch were found.

Cortex only occurs on BIF with nine, or about 31% of the 6 mm BIF assemblage, retaining cortex. This includes both single platform cores and the core fragment. Platforms are plain or focal (Table A5.66), but there was no evidence of overhang reduction. Table A5.67 summarises the dimensions of complete BIF flakes.

Discussion

CB11-89 shows sparse evidence of use over the last few hundred years. The surface millstone is an indicator of possible intention to return. The rest of the surface assemblage probably results from a single chert reduction event. This probably represents opportunistic use of exfoliated chert, since there is no evidence of quarrying of the chert seams in the shelter wall. The excavated assemblage is sparse and BIF dominated. The presence of two BIF single platform cores is unusual and probably indicates provisioning the shelter with raw material.

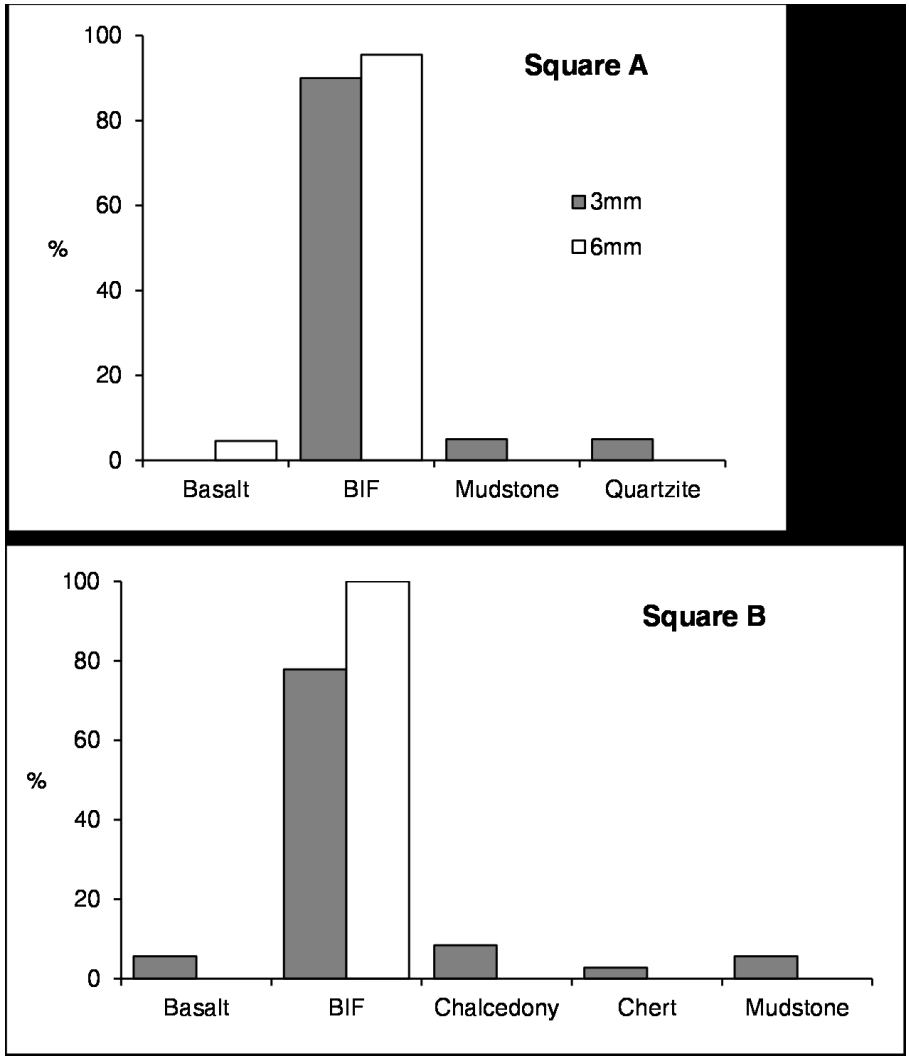

Figure A5.160: CB11-89: raw material composition by sieve fraction.

Table A5.65: CB11-89: assemblage composition.

	3 mm			6 mm				
	Debris	*Complete flake*	*Flake fragment*	*Debris*	*Complete flake*	*Flake fragment*	*Single platform core*	*Core fragment*
Square A								
Basalt	0	0	0	0	1	0	0	0
BIF	0	11	7	2	6	11	2	0
Mudstone	1	0	0	0	0	0	0	0
Quartzite	0	1	0	0	0	0	0	0
Square A Total	1	12	7	2	7	11	2	0
Square B								
Basalt	1	1	0	0	0	0	0	0
BIF	2	13	13	1	5	1	0	1
Chalcedony	2	1	0	0	0	0	0	0
Chert	0	0	1	0	0	0	0	0
Mudstone	1	1	0	0	0	0	0	0
Square B Total	6	16	14	1	5	1	0	1
Total	7	28	21	3	12	12	2	1

Table A5.66: CB11-89: platform type.

	Cortex	Plain	Crushed	Focal
Basalt	0	1	0	0
BIF	1	5	1	4
Total	1	6	1	4

Table A5.67: CB11-89: summary dimensions (mm) of complete BIF flakes.

N	Length	SD	Width	SD	Thickness	SD
11	17.5	7.4	17.6	8.2	4.7	2.5