CHAPTER SIX
THE ANALYSIS OF FIVE LATE HOLOCENE ARTEFACT ASSEMBLAGES

6.1 INTRODUCTION
In this chapter, the results of the technological analysis of the stone artefacts from the five assemblages dating from the Post Microblade period are tabled. The attributes recorded for each assemblage are discussed and combined in ways that suggest certain knapping behaviours by Aboriginal people over approximately the last thousand years.

6.2 THE RESULTS PROCEDURE
Results from the analysis of the artefact attributes from the five assemblages are first tabled and some conclusions reached. Likely scenarios of each site/section are then put forward using various combinations of attributes to suggest a particular site use or uses. Similarities and dissimilarities between the sites are discussed with reference to attributes that have some interpretations for human behaviour (see table 3.1). The results from each site are then summarised.

The initial and simplest type of analysis of the sites was to describe variability in the raw material frequencies. If the five sites had similarities between the raw material percentages then, it could be argued, the five sites should show similar degrees of rationing and reduction for each raw material group (for example Hiscock 1984:183). If this was the case, then the same factors might be causing the lack of variation between sites.

Causes of variation or lack of it, are most times attributed to variations in site function, technological constraints, group habits or logistics. In the absence of a reliable argument for lack of variation as to common logistics, function or technological constraints, we might be able to infer that the lack of variation was caused by a single group of people creating all the assemblages.

6.3 PREFERENCE FOR RAW MATERIAL
6.3.1 Raw material numbers and percentages
Results of raw material counts and percentages for the five sites were as follows (FG = fine grained, CG = coarse grained) :

RAW MATERIAL NUMBERS PER SITE

site	CMS	KACA	CP	UKBH	JHCC	total
quartz	145	71	235	55	486	989
FG	98	34	26	11	09	178
CG	10	05	68	09	20	112
total	253	110	329	75	520	1279

RAW MATERIAL PERCENTAGES/SITE

site	CMS%	KACA%	CP%	UKBH %	JHCC%
quartz	57	65	71	73	94
FG	39	31	08	15	02
CG	04	05	21	12	04

TABLE 6.1

These percentages become clearer if viewed as a graph (see following graph).

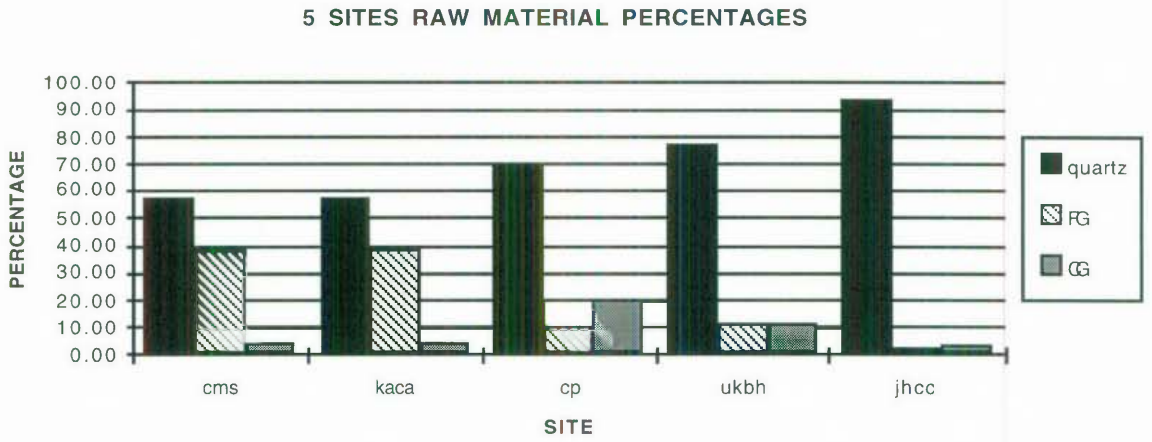


FIGURE 6.1

Quartz accounts for over 50% of the assemblages in all sites. The quartz percentage at Jack Halls Creek Camp site was at least 20% higher than at any other sites, but this percentage was well within the range of the quartz percentages of sites from the Warrumbungles (see Table 2.1). The high percentages of fine grained in the two shelters (the Crazyman Shelter 31% and the Kawambarai cave 39%) may be related to these sites having different functions to the open sites.

The graph also shows that the relatively high percentage of artefacts made from coarse grained at Camp Pincham (20.66%), is much higher than from the other four sites researched and it is also above that found in the other sites analysed in 1986 by Gaynor (see Table 2.1). The variation in raw mater between sites was reasonably large. In order to ascertain its statistically significance chi squared tests were carried out.

The Chi square tests show significant variation between the assemblages. In a comparison between all assemblages with each other on the frequencies of quartz and fine grained artefacts, all results showed a very highly significant difference ($p<0.0001$, X squared = 81.73, 11.76, 44.22) except the difference between the Kawambarai cave and the Ukerbarley Hayshed site which was only significant ($p<0.05$, X squared = 5.89), and there was no significant difference between Camp Pincham and the Ukerbarley Hayshed site ($p>0.05$, X squared = 44), or between the Crazyman Shelter and the Kawambarai cave ($p>0.05$, X squared = 0.10).

When the coarse grained artefacts were included in the analysis by comparing their frequencies with non-coarse grained frequencies, and by comparing quartz with non-quartz frequencies, there was no significant difference between the Ukerbarley Hayshed site and either Camp Pincham or the Kawambarai cave, nor between the Crazyman Shelter and the Kawambarai cave. When comparisons were made excluding quartz, the results were quite different in only three comparisons. These were the comparisons between Camp Pincham and the Ukerbarley Hayshed site (not significant became significant), Camp Pincham and Jack Halls Creek Camp site (very highly significant becomes not significant) and the Ukerbarley Hayshed site and Jack Halls Creek Camp site (very highly significant becomes not significant). So leaving out the quartz of the analysis would have been responsible for missing these statistically significant differences.

6.4 DEGREES OF REDUCTION

6.4.1 Artefact categories

The next step in the 5 sites analysis was to count the number of artefacts in each technological category for each material group and convert these to percentages, so that some comparisons could be made between sites with different overall sample sizes. The categories selected and the criteria for defining them were discussed in Chapter Three.

The breakup of artefacts into categories was the largest step in analysing these assemblages. It is from this data that attributes connected with each artefact category were combined (as in the last chapter) and combinations of artefact attributes sought that could point to factors that may have been responsible for the discard of artefacts in each site. The following table denotes the number of artefacts in each category for quartz.

NUMBER OF QUARTZ ARTEFACTS/CATEGORY

	CMS	KACA	CP	UKBH	JHCC
flakes	46	17	07	22	03
lamellates	0	11	02	01	07
fl. pieces	09	08	74	16	80
amor. bl.	0	12	02	01	03
cores	31	01	99	15	390
micro deb.	59	22	51	0	0
grindstone	0	0	0	0	0
hammerst/anvil	0	0	0	0	0
TOTAL	145	71	235	55	483

TABLE 6.2

The following graph displays the percentages of the four main artefact categories per site for quartz.

PERCENTAGE OF QUARTZ ARTEFACTS/CATEGORY

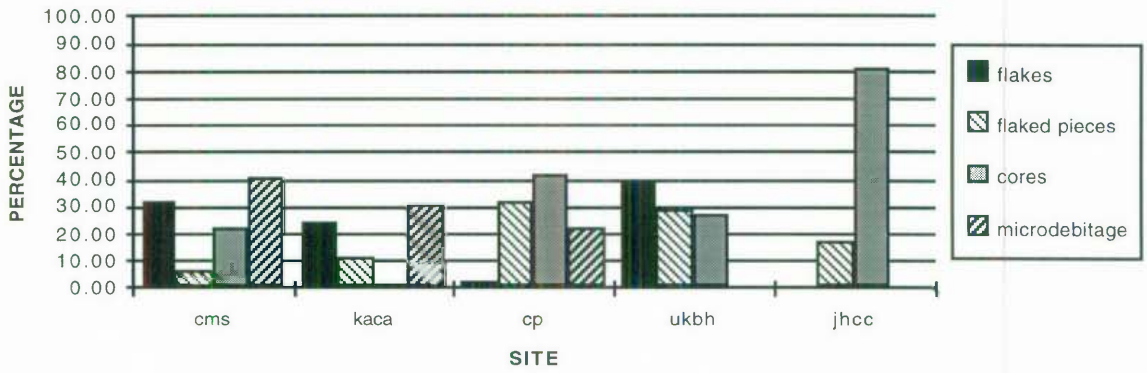


FIGURE 6.2

NUMBER OF FINE GRAINED ARTEFACTS/CATEGORY

	CMS	KACA	CP	UKBH	JHCC
flakes	39	13	07	6	03
lamellates	0	03	01	0	0
flaked pieces	11	08	12	0	0
amor bl.	01	01	0	0	0
cores	17	02	15	2	10
micro deb.	30	22	0	1	0
grindstone	0	0	0	0	0
hammerst/anvil	0	0	0	0	0
total	98	49	35	9	13

TABLE 6.3

PERCENTAGE OF FG ARTEFACTS/CATEGORY

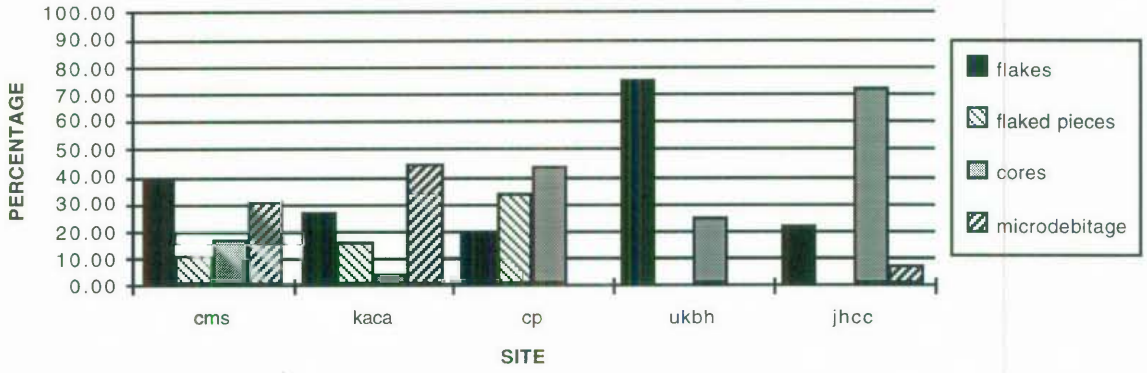


FIGURE 6.3

NUMBER OF CG ARTEFACTS/CATEGORY

	CMS	KACA	CP	UKBH	JHCC
flakes	2	1	09	6	01
lamellates	0	0	0	0	0
flaked pieces	0	1	22	0	0
bl.fractures	0	0	0	0	0
cores	7	3	37	2	18
micro deb	1	0	0	0	0
grindstone	0	0	0	0	0
hammerst/anvil	0	0	0	0	01
total	10	5	68	8	20

TABLE 6.4

PERCENTAGE OF CG ARTEFACTS/CATEGORY

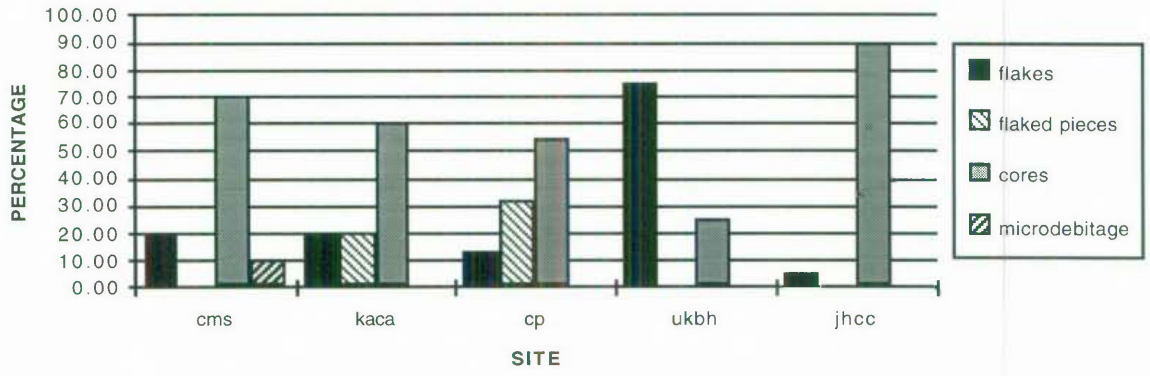


FIGURE 6.4

These tables and graphs show that :

1. If only the fine grained artefacts had been analysed then it would have been assumed that

flakes accounted for at least 20% of artefacts in all five assemblages. This was clearly not the case for the other two raw materials as quartz flakes accounted for only 3.42% at Camp Pincham and only 0.62 % at Jack Halls Creek Camp site. Clearly leaving out the quartz portion of the assemblages, would have created a false impression of flake frequency for these two sites. Generally the average percentage of quartz flakes/assemblage (range .062% - 31.71 %) was lower than of the fine grained material (range 19.23 - 39.8%). The percentage of coarse grained flakes was uniformly low and less than 20 % at Camp Pincham (13.24%) and at Jack Halls Creek Camp site (5.00%).

2. Microdebitage occurred mostly in quartz or fine grained with the range 30 to 44 % in the shelters but only 0 to 21.7% in the open sites. The microdebitage percentage dominate the quartz assemblages at the Crazyman Shelter and the Kawambarai cave (30 to 40 %).

3. In Jack Halls Creek Camp site and Camp Pincham, quartz cores were dominant, and coarse grained cores were dominant in all sites except the Ukerbarley Hayshed site. Fine grained cores, however, were only dominate in one site (Jack Halls Creek Camp site). This suggests that different strategies may have been employed in the reduction of the fine grained material in some sites. A higher percentage of fine grained flakes/assemblage in most sites compared to the percentages of either quartz and coarse grained flakes/assemblage in each site, supports this proposition (see [1] above).

4. The percentages of cores/assemblage were higher in the quartz assemblages than in the other two raw materials. Quartz cores percentage ranged from 1% at the Kawambarai cave to 86% at Jack Halls Creek Camp site. The percentage of fine grained cores in the 5 sites was from 4 % at the Kawambarai cave to 71% at Jack Halls Creek Camp site. There was, however, little overall difference between the percentages of flaked pieces of fine grained and quartz (quartz ranged from 6% to 31% and fine grained from 0% to 34.28%). Coarse grained flaked pieces were absent altogether at the Crazyman Shelter, the Ukerbarley Hayshed site and Jack Halls Creek Camp site, suggesting that the coarse grained was not being reduced to any great extent at these sites.

The preceding graphs clearly show that if the quartz portion of the assemblages was ignored then important differences in the core, flake and microdebitage categories between the quartz and fine grained assemblages would have been missed. Important inferences of human behaviour that could have been connected with these artefact categories would then have been missed. Just how important these inferences may have been, will be discussed in Chapter Seven.

6.4.2 Core classes

As cores are the base from which all flaked artefacts originally come , they should hold clues about the techniques used to reduce the raw material. Cores are important in any

technological analysis because of the amount of data that can be extracted from them. These data then can be used to infer human behaviour. Hiscock (1984:179) used the morphology of cores to explain rationing of raw material in assemblages. Cores were divided into the four classes based on the presence of cortex (C) and rotation (R), as was described in Chapter 3. These four classes were least reduced (C & NR), medium reduction (C & R, NC & NR), to most reduced (NC & R).

The following table denotes the cores in their raw material groups and in their respective position in the reduction sequence.

QUARTZ NUMBERS

site	C&NR	C&R	NC&NR	NC&R	total
CMS	04	10	01	14	29
KACA	01	0	0	0	01
CP	29	18	09	42	98
UKBH	02	05	02	06	15
JHCC	225	110	11	47	393
total	**261**	**143**	**23**	**109**	

(C=CORTEX, R=ROTATED, NR=NOT ROTATED, NC= NO CORTEX)

FINE GRAINED G NUMBERS

site	C&NR	C&R	NC&NR	NC&R	total
CMS	1	0	0	16	17
KACA	1	0	1	0	02
CP	4	3	1	08	16
UKBH	0	2	0	0	02
JHCC	1	3	0	06	10
total	**7**	**8**	**2**	**30**	

COARSE GRAINED NUMBERS

site	C&NR	C&R	NC&NR	NC&R	total
CMS	1	04	0	02	07
KACA	2	0	0	01	03
CP	8	16	2	11	37
UKBH	0	01	0	01	02
JHCC	4	12	0	02	18
total	**15**	**33**	**2**	**17**	

TABLE 6.5

Converting these numbers to percentages and viewing them as graphs outlines the differences between the sites more clearly.

FIGURE 6.5

These numbers in each class were combined for the 5 sites and converted to percentages to view overall reduction across the region. The results were as follows :

	PERCENTAGES OF CORE CLASSES			
	C&NR	C&R	NC&NR	NC&R
quartz	42.79	22.33	5.75	28.62
FG	18.18	29.75	11.25	40.82
CG	24.96	43.41	1.08	30.55

TABLE 6.6

Table 6.6 shows that, on average, fine grained cores were more highly reduced than either the quartz or coarse grained cores. Fine grained averaged 40.82% in the most reduced class (no cortex and rotated). This is more than 10% above either of the other two raw material groups. Quartz has the highest average percentage of cores in least reduced class (cortex and non rotated). This signifies that overall, quartz cores were the least reduced. The high average percentage of coarse grained cores in the "cortex and rotated" class, may relate to the fact that quartzite pebbles in the Coonabarabran Region are very hard and from personal experience make excellent hammerstones. Many of these quartzite cores may have started off as hammerstones and eventually broke from use and may then have been reduced further as cores, leaving a high percentage in the "cortex and rotated" class.

Cores were not weighed in this analysis because although the variation in the sizes of the quartz and coarse grained pebbles available was known, the sources and range of sizes of pebbles or nodules of fine grained were not known, leaving little to be gained by making comparison between the raw materials. The use of the four classes of reduction of cores seemed to be a better attribute to quantify the amount of reduction taking place regardless of the initial size of the raw material.

6.4.3 Brief summary of the analysis of cores per site

The analysis of cores for each site is now summarised as there was a high degree of variability in core reduction between sites.

1.The Crazyman Shelter - Cores appeared to have been more reduced at the Crazyman Shelter than at any other site as it has the highest percentage of all sites in the "no cortex and rotated" class for both fine grained (94%) and quartz (48%) cores. The fine grained percentage (94%) was also the highest percentage recorded for any of the four core classes in any of the three raw material groups in the five sites. I would argue that this high percentage of fine grained was the result of fine grained being much harder to obtain at the Crazyman Shelter than the other two raw material groups and that the fine grained material was usually preferred because of its more predictable knapping qualities when compared to the quartz and coarse grained.

2. Kawambarai cave - The small numbe· of cores in all three raw material groups at the Kawambarai cave (just five cores from ar assemblage of 110 artefacts) suggests to me that cores were being very heavily reduced, so that only flaked pieces and/or debitage were being left at the site.

3. Camp Pincham - This site has the highest percentage of cores in the most reduced class "no cortex and rotated" for fine grained a id quartz, suggesting there was a very heavy demand on these raw materials. This may have been related to the site's location at the base of the walking trails though the mountainous regions of the Warrumbungle National Park. As these trails are used by bushwalkers today to gain access to the mountains, then in all possibility, this spot was the base for Aboriginal groups in the past to tap the resources of the mountains. This site could then be one of the big camps in the Post Microblade phase of Witter's model, from which small groups dispersed to meet again later in the year at an another big camp (Witter 1986b:3-7. Witter, when recording the site, stated that this site was large by Warrumbungle National Park standards (Witter 1987 as cited by Geering 1988:1).

4. The Ukerbarley Hayshed site - Quartz cores in the most reduced class "no cortex and rotated" accounted for the highest percentage in this site (40%). The number of cores in the fine grained and coarse grained material was, however, low (only 2 in each).

5. Jack Halls Creek Camp site - Cores in the least reduced class "cortex and non rotated" accounted for 57.25% of quartz cores. Conversely this class had the lowest percentage in the fine grained (10%) suggesting that fine grained cores were being more heavily reduced than the quartz. The coarse grained cores in this site follow the trend seen in most of the other sites for coarse grained, that is, the highest percentage of cores were in the "cortex and rotated" class. This suggests that more than the preliminary reduction was taking place. Alternatively the coarse grained may have been used for some other purpose (such as for hammerstones) which resulted in more rotation of the pebble. Evidence for the use of coarse grained hammerstones would probably be lost if cortex was removed when used as cores.

Overall the percentages of cores in the classes at Jack Halls Creek Camp site was very different to the other sites across the three raw material groups. These differences were :

1. Jack Halls Creek Camp site had the highest percentage of quartz cores in the least reduced class "cortex and not rotated". This indicated that many cores were being abandoned in the primary stage of reduction and this strongly suggests that the material was plentiful on or near the site.

2. Although the overall number of coarse grained cores at Jack Halls Creek Camp site was much smaller than the number of quartz cores, the highest percentage of coarse grained cores found at Jack Halls Creek Camp site was in the second stage of reduction ("cortex and

rotated" class).

3. The fine grained cores found in Jack Halls Creek Camp site were the result of heavy reduction of the raw material as the highest percentage of cores was in the "no cortex and rotated" class. This strongly suggests that the material was not as plentiful as the quartz and the coarse grained in the area.

6.4.4 Overall view of core reduction across the five sites

It appears that the fine grained material was being extensively manipulated to get the most out of each core. This proposition is strengthened when the table depicting lengths, widths and thicknesses across the five sites is viewed (see following table 6.7).

CORE NUMBERS AND RANGES OF CORE SIZES

quartz length	**CMS**	**KACA**	**CP**	**UKBH**	**JHCC**
Range	31	0	40	29	73
Minimum	05	06	07	07	07
Maximum	36	06	47	36	80
Count	31	01	98	15	393
width					
Range	22	0	30	26	53
Minimum	04	05	05	04	05
Maximum	26	05	35	30	58
Count	31	01	15	15	393
thickness					
Range	18	0	21	21	37
Minimum	02	03	02	03	03
Maximum	20	03	23	24	40
Count	31	01	98	15	393
FG length					
Range	30	11	18	27	49
Minimum	06	11	08	27	10
Maximum	36	22	26	54	59
Count	17	02	14	02	10
width					
Range	17	13	14	02	24
Minimum	04	05	05	16	08
Maximum	21	18	19	18	32
Count	17	02	14	02	10
thickness					
Range	09	0	11	01	21
Minimum	03	05	03	08	02
Maximum	12	05	14	09	23
Count	17	02	14	02	10

CG	length				
Range	25	17	60	09	73
Minimum	10	15	8	22	17
Maximum	35	32	68	31	90
Count	07	03	37	02	18
	width				
Range	22	19	43	19	59
Minimum	03	08	06	08	12
Maximum	25	27	49	27	71
Count	07	03	37	02	18
	thickness				
Range	6	07	31	05	36
Minimum	2	04	03	06	05
Maximum	8	11	34	11	41
Count	7	03	37	02	18

TABLE 6.7

These tables show that there is hardly any difference between the maximum and minimum lengths of quartz, fine grained and coarse grained cores at the Crazyman Shelter (quartz 5-36 mm, fine grained 6-36 mm, coarse grained 10-35 mm). The maximum and minimum widths are also reasonably close (quartz 4-26 mm, fine grained 4-21 mm, coarse grained 3-25 mm) but the thickness are not so similar (quartz 2-20 mm, fine grained 3-12 mm, coarse grained 2-8 mm). The size of cores therefore, is quite similar in all raw materials. None of the other sites have such close similarities between dimensions of the cores. Jack Halls Creek Camp site has the largest range of lengths in all three raw material groups (quartz 7-80 mm, fine grained 10-59 mm, coarse grained 17-90 mm) suggesting that minimum reduction was taking place, and possibly a preference for long flakes. Some raw material groups have very low numbers of cores in one or more of the groups reducing any meaningful comparisons.

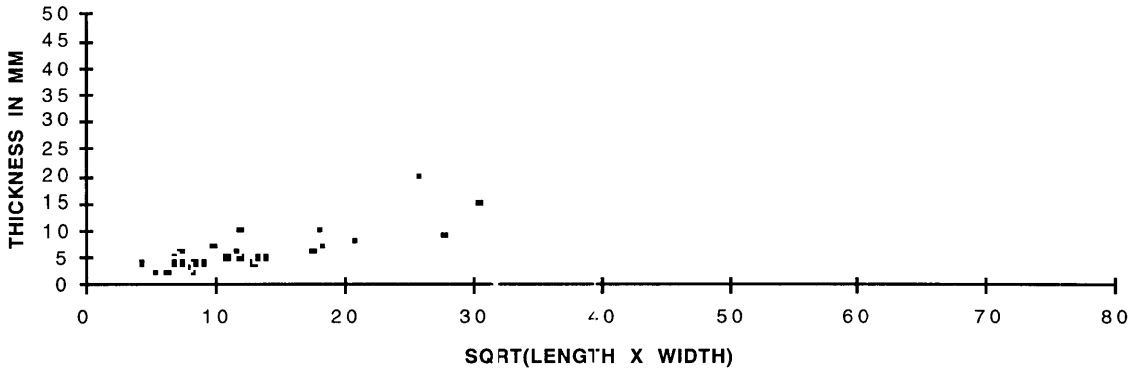
From the table it is clear that the length, width and thickness of cores for the fine grained group at the Crazyman Shelter were smaller than in any of the other four sites. The length, width and thickness of the fine grained cores were also smaller than the quartz and coarse grained at the Crazyman Shelter. Generally the relative length, width, and thickness trends are identical for each raw material group at each site.

6.4.5 Reduction charts

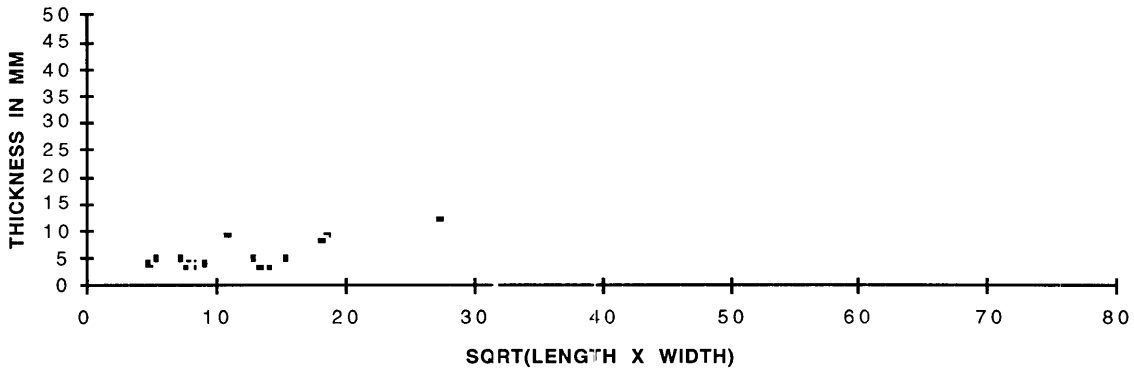
The sizes of cores found in each raw material group is important in revealing (as Hiscock 1984, and Wall 1993, have found) whether the raw material was subject to rationing or not. Reduction charts were constructed for cores using the dimensions of the cores in each raw material group for each site. As described in 2.3, the square root of length multiplied by

width is plotted against the thickness in a scattergram. This enables a visual representation of the sizes of the discarded cores. All charts were constructed using the same axis dimensions, so comparisons could be made between all phases in the Crazyman Shelter and the 5 surface assemblages. The Reduction charts in the following pages are grouped per site.

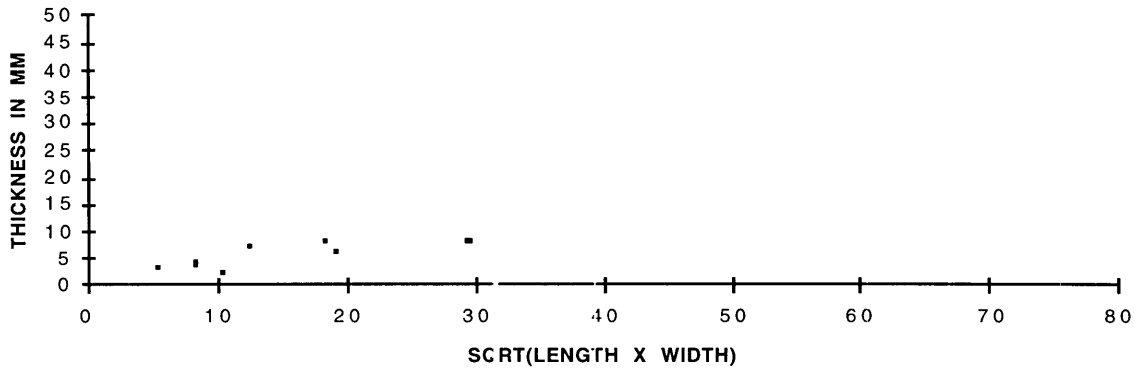
CMS PHASE 1 QUARTZ CORES REDUCTION CHART



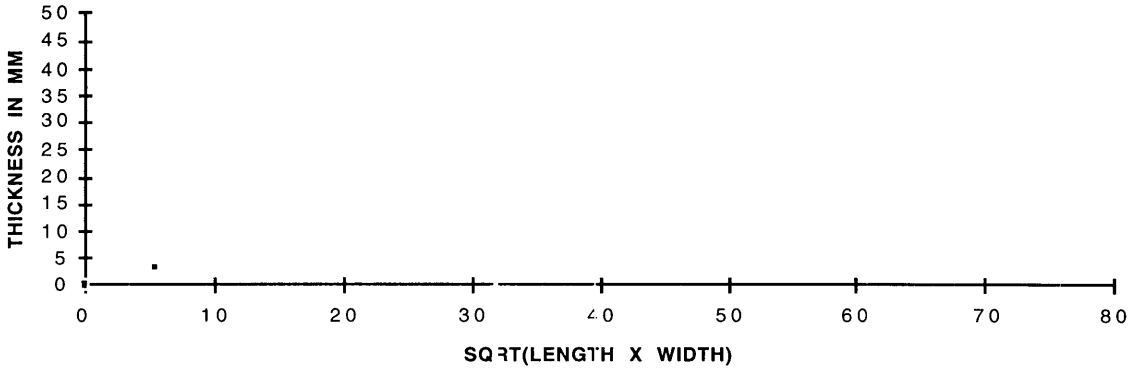
CMS PHASE 1 FINE GRAINED CORES REDUCTION CHART



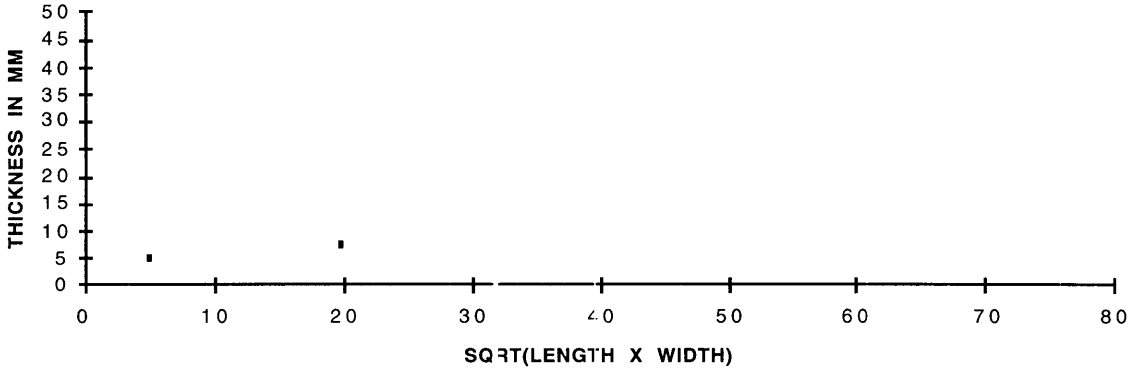
CMS PHASE 1 COARSE GRAINED CORES REDUCTION CHART



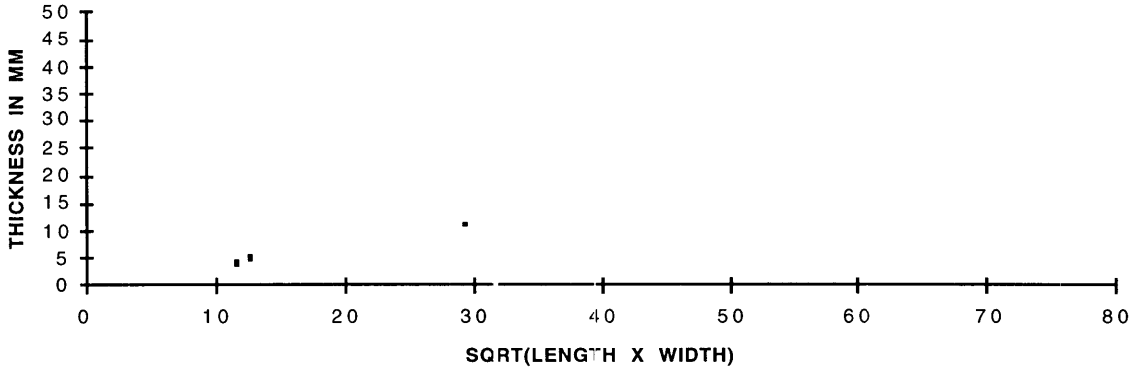
KAWAMBARAI CAVE QUARTZ CORES REDUCTION CHART



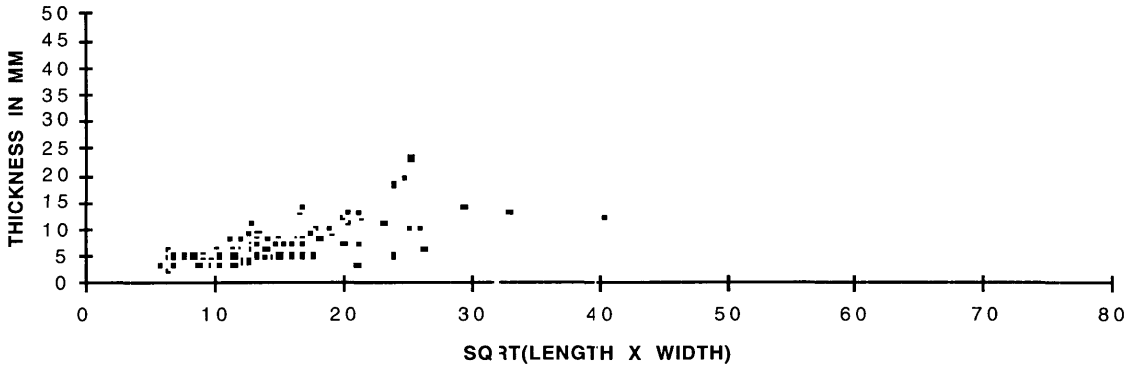
KAWAMBARAI CAVE FINE GRAINED CORES REDUCTION CHART



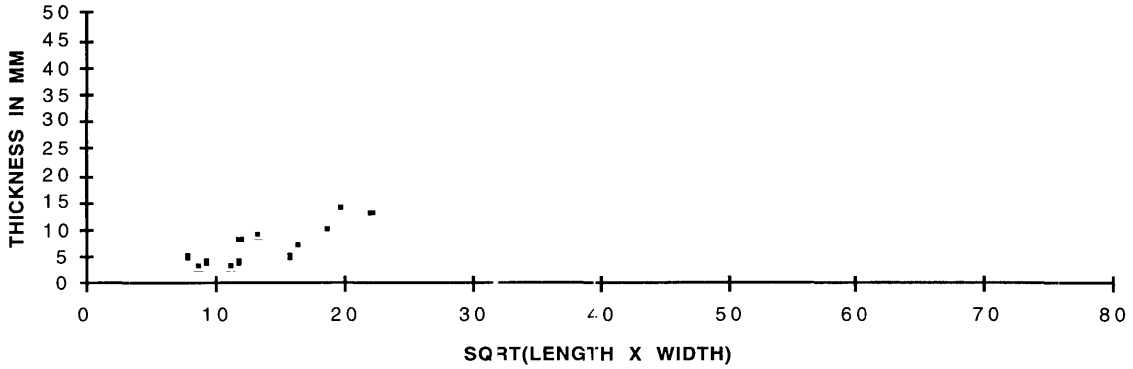
KAWAMBARAI CAVE COARSE GRAINED CORES REDUCTION CHART



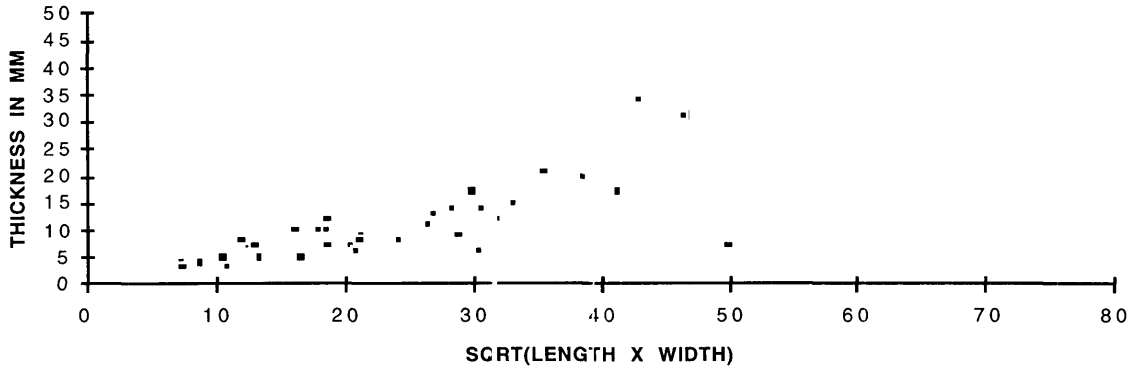
CAMP PINCHAM QUARTZ CORES REDUCTION CHART



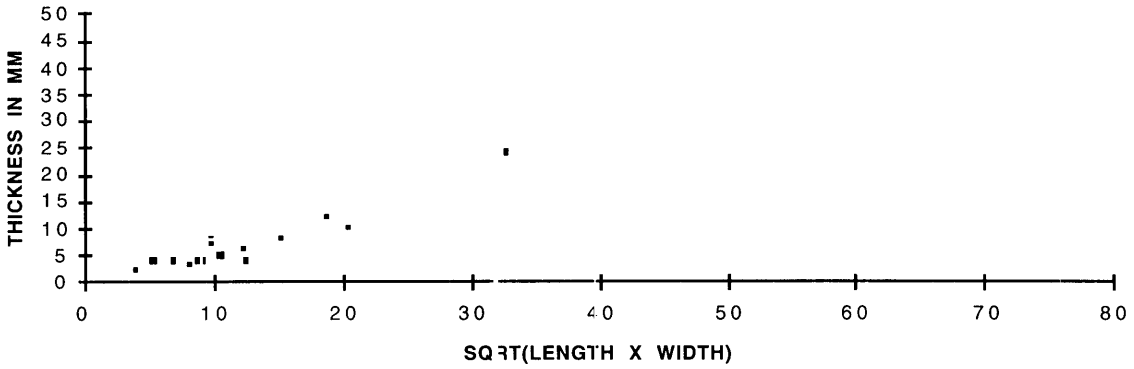
CAMP PINCHAM FINE GRAINED CORES REDUCTION CHART



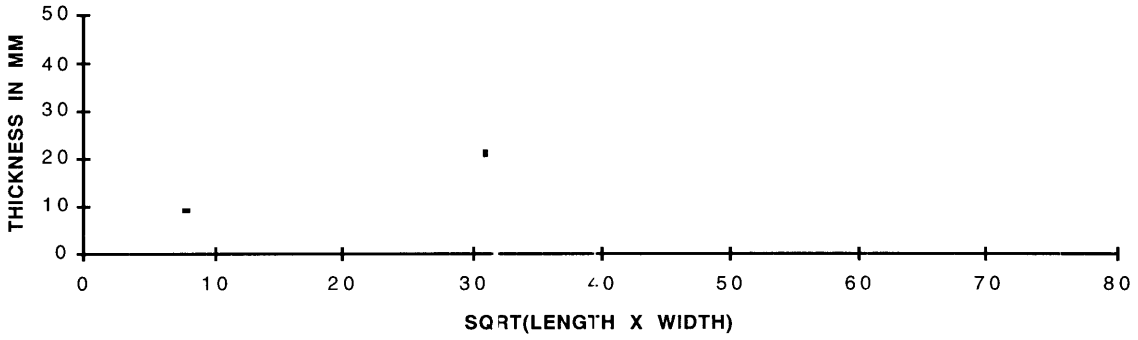
CAMP PINCHAM COARSE GRAINED CORES REDUCTION CHART



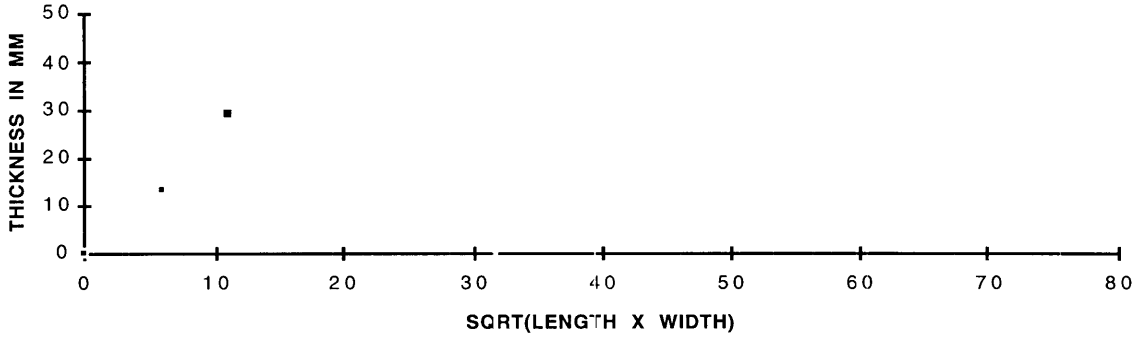
UKERBARLEY HAYSHED SITE QUARTZ CORES REDUCTION CHART



UKERBARLEY HAYSHED SITE FINE GRAINED CORES REDUCTION CHART



UKERBARLEY HAYSHED SITE COARSE GRAINED CORES REDUCTION CHART



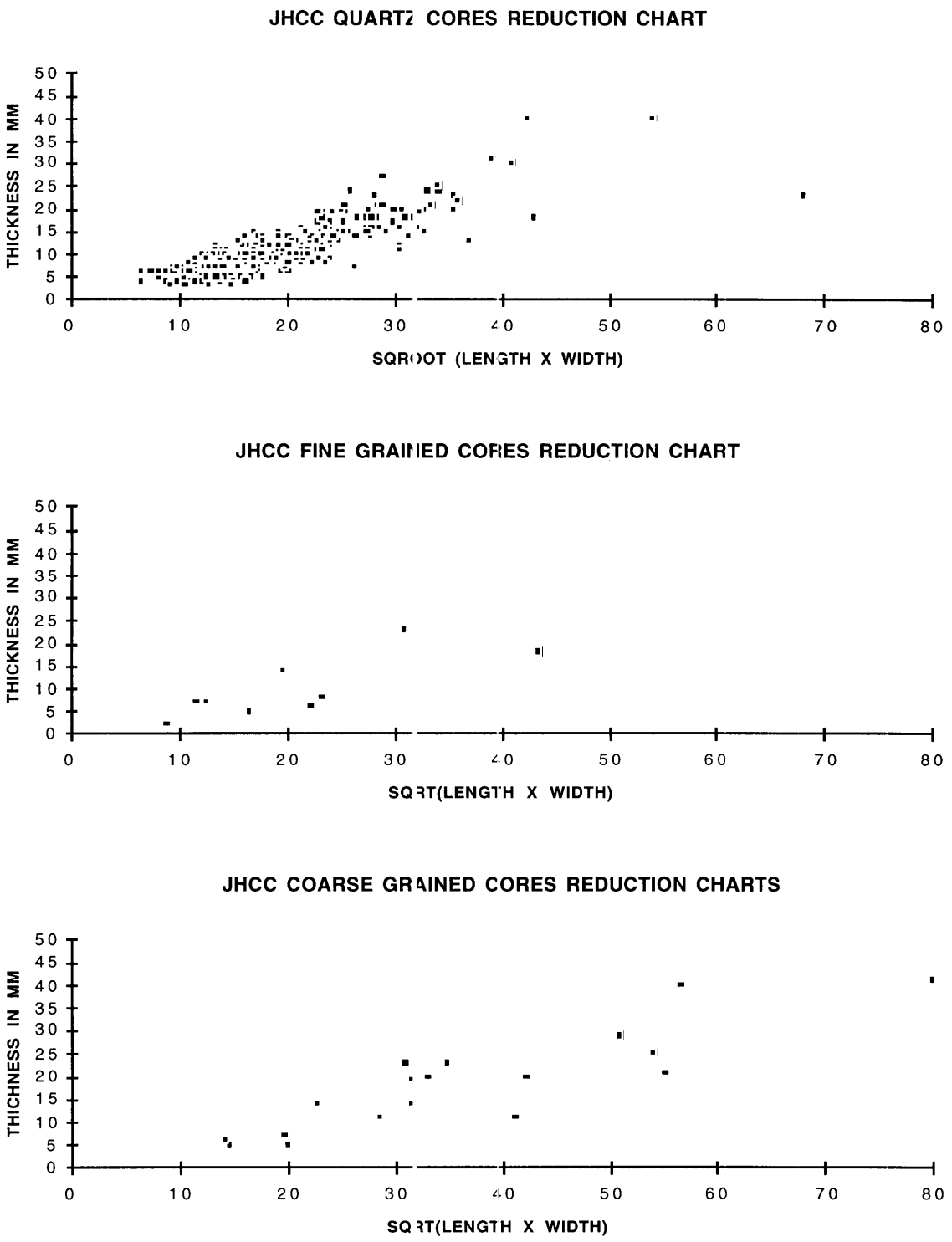


FIGURE 6.6

These charts show that the largest spread of core sizes in the three raw material groups is at Jack Halls Creek Camp site (one large coarse grained core was on the 80 on the X axis and 45 on the Y axis and these had to be taken as the bases for the X and Y axes for all the charts).

The Crazyman Shelter is the only site which appears to have approximately the same spread of core sizes in the three raw material groups. This could imply that much more uniform knapping was occurring at the Crazyman Shelter than at the other sites. The low numbers of cores at the Kawambarai cave makes comparisons very difficult. All that can be said is that they all fall within the range of sizes at the Crazyman Shelter. The reduction chart shows that the size of cores in coarse grained at Camp Pincham begins on the X axis at 5, which is the lowest recorded for artefacts as anything smaller was classed as microdebitage. This is the lowest in any of the open sites, but is the same as at the Crazyman Shelter. This would imply that coarse grained cores were being reduced more at these sites than at the others. This could be related to rationing of the raw material, which could be related to population pressures on stone resources. The number of quartz cores at the Ukerbarley Hayshed site far out-numbers the sample in fine grained and coarse grained. The low number of fine grained cores at this site compared to other open sites seems to imply that this site is not a residential type camp site. Overall the reduction charts show that quartz cores are discarded on site more than the other two raw material cores. Analysing only the fine grained portion of these assemblages would have failed to uncover this important characteristic of quartz cores.

6.4.6 Bipolar cores

The following table depicts the number of bipolar cores/total cores in each raw material category per site.

	BIPOLAR CORES/ASSEMBLAGE				
group	**CMS**	**KACA**	**CP**	**UKBH**	**JHCC**
quartz	1/30	0/1	17/98	0/15	263/394
FG	0/17	0/2	4/16	0/2	0/10
CG	0/7	0/3	2/37	0/2	0/18

TABLE 6.8

The table shows that Jack Halls Creek Camp site has a much higher percentage of cores that have been reduced by the bipolar method in quartz, than at other sites, even though the range of quartz pebbles available throughout the Pilliga Sandstone Formation around the five sites is roughly about the same (personal observations). Evidence of bipolar knapping is present mainly in quartz with the exception being at Camp Pincham, where it has been used in all three raw material groups. In this instance if only the fine grained material was analysed in the sites then there would be little evidence of bipolar knapping. Bipolar knapping highlights the importance of quartz as an indicator of human behaviour which would not have been found if only the fine grained was analysed at Jack Halls Creek Camp site.

6.4.7 Summary of the analysis of cores from the five sites

By combining the results from the tables on raw material percentages, artefact categories, core cortex and rotation, plus using the means of length, width and thicknesses of all cores, the following observations can be made about the five sites.

1.(a) Quartz, although the most knapped material in all sites, was not reduced as much as the fine grained material (this statement is supported by the fact that fine grained has a smaller percentage of cores per assemblage). Fine grained has smaller average dimensions and so, on the average, fine grained cores were smaller than the quartz and coarse grained cores when abandoned.

(b) Fine grained had a higher percentage of rotated cores and a smaller percentage of cores with cortex. Finally there is a larger percentage of flakes per fine grained assemblage than in either of the quartz and coarse grained assemblages in all sites.

(c) The coarse grained material had generally higher percentages of cores per raw material assemblages than the quartz and fine grained material. According to the table on means, coarse grained was not being reduced as much as the other two materials in all sites (the means of the dimensions of coarse grained cores were considerably larger than in the other two raw materials except at the Ukerbarley Hayshed site where the means of the fine grained material was the largest (this site has the smallest sample of fine grained cores - only two). This indicates that fine grained cores may have been personal gear at the Ukerbarley Hayshed site and were being carried in and out of the site. This small sample of cores and an absence of microdebitage (see artefact category earlier in this chapter) suggests that only very limited reduction of fine grained material was occurring on site at the Ukerbarley Hayshed site.

2. (a) From the table on core cortex and rotation, the percentage of quartz in the least reduced class "cortex and not rotated" at Jack Halls Creek Camp site (80.86%) was much higher than at any other site. If we combine this high percentage with the highest average dimensions of quartz cores from Jack Halls Creek Camp site, with the largest range of sizes of quartz cores used in any site (7 to 80 mm), it is clear that this site was very different to other sites.

(b) The means of the coarse grained cores were larger in size at Jack Halls Creek Camp site than at any other site, but the coarse grained cores have been reduced more than at other sites, as the largest percentage of cores is in the rotated with cortex class indicating at least one rotation of the core.

The analysis of the cores then has shown that there are considerable differences in reduction

of cores between the three raw material groups with the quartz having the lowest percentages of reduction of raw material, followed by coarse grained. The fine grained is the most reduced overall, suggesting it is of more value as a knapping medium than the other two raw materials. It has not, however, been reduced by the bipolar method in any site except Camp Pincham. So if only the fine grained was analysed, then aspects of reduction that were peculiar to the quartz would have been missed.

6.4.8 Flakes

Flakes displaying signs of backing were not found in any of the five sites. This was not unexpected, according to Witter's and the predictive model. Flakes were separated into complete flakes and broken flakes as was the case for the four phases in the Crazyman Shelter. The broken flakes were further divided into four classes according to the type of break. These classes were discussed in Section 3.3.

6.4.9 Complete flakes

The following table depicts numbers of complete flakes per raw material group in each site.

COMPLETE FLAKES PER RAW MATERIAL GROUP

quartz					
site	**CMS**	**KACA**	**CP**	**UKBH**	**JHCC**
total flakes	46	17	08	22	03
complete flakes	10	03	02	05	01
percentage complete	21.74	17.65	25.00	22.73	33.33
FG					
site	**CMS**	**KACA**	**CP**	**UKBH**	**JHCC**
total flakes	39	13	05	06	03
complete flakes	04	05	03	02	01
percentage complete	10.26	38.46	60.00	33.33	33.33
CG					
site	**CMS**	**KACA**	**CP**	**UKBH**	**JHCC**
total flakes	02	01	09	05	01
complete flakes	0	01	07	0	01
percentage complete	0.00	100.00	77.78	0.00	100.00

TABLE 6.9

Percentages of complete flakes vary more across the fine grained than across the quartz assemblages (quartz 17.65 - 33.33%, fine grained 10.26 - 60%), while coarse grained complete flakes were non existent at some sites. It is of value to examine the type of breaks that have occurred in each raw material because these attributes can suggest trampling or knapping skills.

6.4.10 Flake breaks

The following table presents the number of breaks in flakes per raw material group in each site.

TYPE OF FLAKE BREAKS PER RAW MATERIAL GROUP (in numbers)

quartz					
site	CMS	KACA	CP	UKBH	JHCC
transverse	12	07	03	15	02
longitudinal	14	03	04	01	0
t & l	08	04	01	01	0
unknown	02	0	01	0	0
total flakes	46	17	08	22	03

FG					
site	CMS	KACA	CP	UKBH	JHCC
transverse	14	05	0	0	02
longitudinal	12	02	01	01	0
t & l	09	01	01	01	0
unknown	0	0	0	0	0
total flakes	39	13	05	06	03

CG					
site	CMS	KACA	CP	UKBH	JHCC
transverse	01	0	0	04	0
longitudinal	01	0	0	01	0
t & l	0	0	0	0	0
unknown	0	0	0	0	0
total flakes	02	0	0	0	01

TABLE 6.10

The table below displays the percentages of flake break types. Flakes with both types of breaks (t & l) have been included in both the transverse and longitudinal percentages.

TYPE OF FLAKE BREAK PER RAW MATERIAL GROUP (in percentages)

quartz					
site	CMS	KACA	CP	UKBH	JHCC
transverse	47.83	41.18	37.50	68.18	66.67
longitudinal	30.43	17.65	12.50	04.55	0.00
unknown	04.53	0.00	12.50	0.00	0.00

FG					
site	CMS	KACA	CP	UKBH	JHCC
transverse	35.90	38.40	0.00	33.33	0.00
longitudinal	30.77	15.38	20.00	16.67	0.00
unknown	0.00	0.00	0.00	0.00	0.00

CG site	CMS	KACA	CP	UKBH	JHCC
transverse	50.00	0.00	0.00	80.00	0.00
longitudinal	50.00	0.00	0.00	20.00	0.00
unknown	0.00	0.00	0.00	0.00	0.00

TABLE 6.11

The previous table on quartz shows that the percentage in each break category does vary from site to site. What is surprising is that the largest percentages of transverse breaks in all groups is not, as one would expect in the cave at the Kawambarai cave, which has a restricted floor space due to the confines of the walls, but at the Ukerbarley Hayshed site which is an open site. This suggests a lot of trampling occurred after the artefacts were discarded (this could help to substantiate the oral history about the site being a meeting place for large groups of Aborigines in the last century. Alternatively domestic stock may have been responsible for some of the breakage near the surface. Also the ground surface is harder at the Ukerbarley Hayshed site than in the sandy floor of the Kawambarai cave.

The highest percentage of longitudinal breaks occurred in all raw material groups at the Crazyman Shelter (the coarse grained sample of only two flakes can be disregarded as being too small a sample to obtain a meaningful trend if one existed), but in comparison, the quartz and fine grained samples were quite large (46 and 29). This high percentage of longitudinal breaks would suggest that the knappers were generally using too much force in knapping these raw materials. This has occurred at the Kawambarai cave and Camp Pincham to a lesser extent.

6.4.11 Flakes Statistics

The complete flakes were further analysed to obtain the mean, range, maximums and minimums of the lengths, widths and thicknesses in each raw material group. This was carried out to ascertain if there were any differences in dimensions between quartz flakes and the the flakes in the other other raw material groups. If analysing the fine grained flakes gave a similar result to analysing the quartz then if could be deemed of little importance as far as flake variability was concerned. The coarse grained material was always included (although there was only 18 finds in the total sample) to enable an analysis of the whole assemblage to take place (see following graphs).

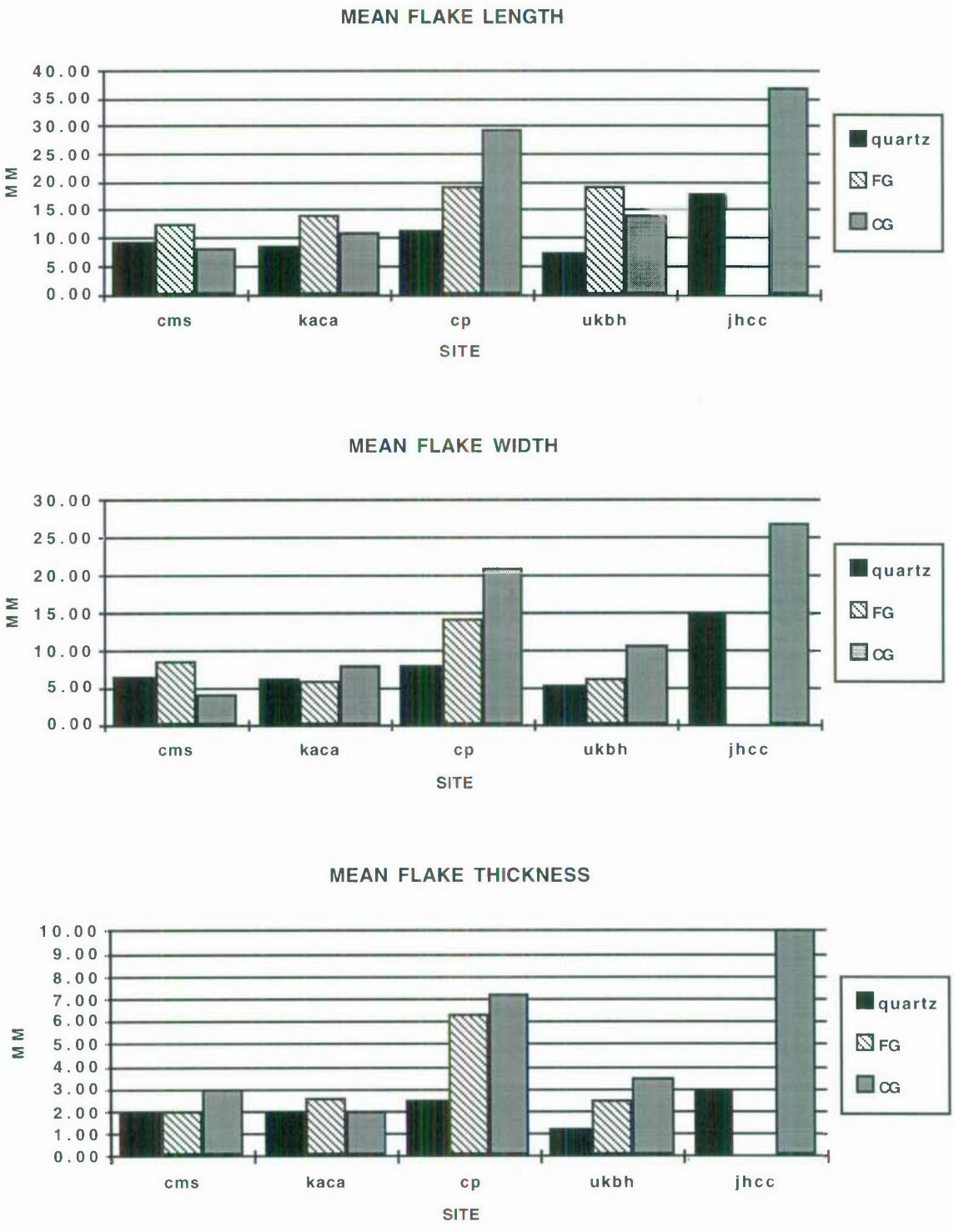


FIGURE 6.7

These graphs show that the extent of mean lengths, widths and thicknesses in the two shelters (the Crazyman Shelter and the Kawambarai cave) was much more uniform across the three raw material groups than in the open sites. These graphs also show that the mean lengths, widths and thicknesses of all three raw material groups at Camp Pincham were much higher

than those at the Crazyman Shelter, the Kawambarai cave and the Ukerbarley Hayshed site. Jack Halls Creek Camp site has only three complete flakes and these are the largest in their respective groups. The small sample sizes of complete flakes at Jack Halls Creek Camp site, excludes one from making any worthwhile statement about complete flakes in this site. This is also the case for coarse grained at the Crazyman Shelter and the Kawambarai cave, which were only represented by one complete flake.

The means of the lengths, widths, and thicknesses of the fine grained in the Crazyman Shelter, the Kawambarai cave, Camp Pincham and the Ukerbarley Hayshed site were well above those for the quartz flakes in the same sites. If the fine grained material was regarded as flaked more often than the quartz, then one would expect that, on the average, only flakes with small means of lengths, widths, and thicknesses would be found. The large mean flake size of the fine grained would suggest that this material was not being reduced to its fullest extent, or that it simply flaked better, making it easier to produce larger flakes.

6.4.12 Flaked pieces
6.4.13 Flaked pieces percentages

Tables 6.12, 6.13 and 6.14 show flaked pieces represented a large percentage of all quartz artefacts in the five Coonabarabran assemblages analysed, but they were also present in the fine grained and coarse grained in certain sites (see following table).

FLAKED PIECES PERCENTAGES

	CMS	KACA	CP	UKBH	JHCC
quartz	6.21	11.27	30.21	29.09	16.56
FG	11.22	16.33	34.28	0.00	0.00
CG	0.00	20.00	32.35	0.00	0.00

TABLE 6.12

6.6.14 Flaked pieces statistics

To gain a further understanding of the importance of quartz flaked pieces, the means of the dimensions of flaked pieces were obtained. These are as follows:

FLAKED PIECES LENGTH, WIDTH, THICKNESS STATISTICS

quartz	CMS	KACA	CP	UKBH	JHCC
Length	7.89	8.63	9.57	8.31	14.64
Width	4.56	5.00	7.05	5.94	10.40
Thickness	2.78	2.75	3.50	3.13	05.58

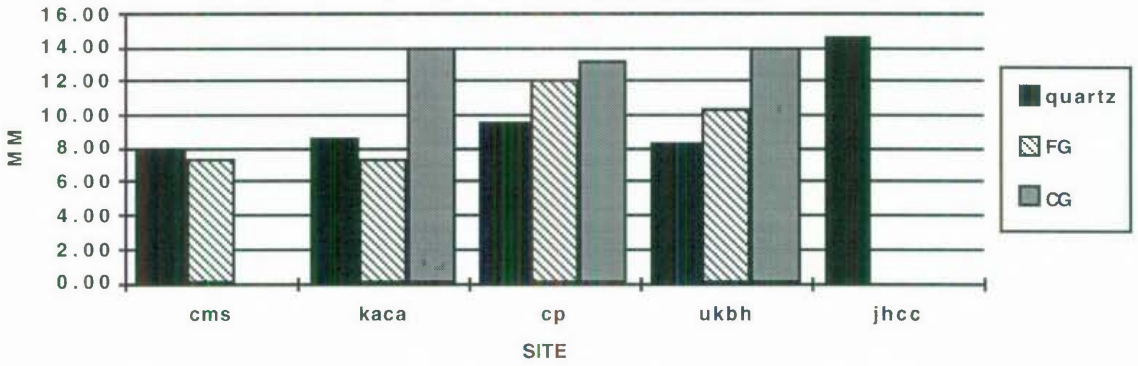
FG	CMS	KACA	CP	UKBH	JHCC
Length	7.36	7.38	12.00	10.33	no sample
Width	4.45	4.25	9.14	7.67	
Thickness	2.82	2.50	3.00	2.67	

CG	CMS	KACA	CP	UKBH	JHCC
Length	no sample	14.00	13.14	14.00	no sample
Width		08.00	08.82	10.50	
Thickness		05.00	03.91	03.50	

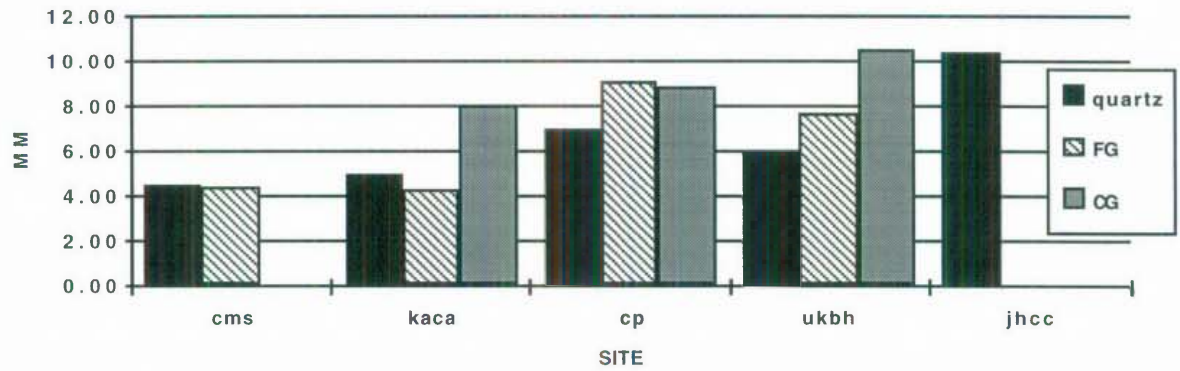
TABLE 6.13

Comparisons between the raw material groups and each site become clearer when viewed as graphs.

FLAKED PIECES MEAN LENGTH



FLAKED PIECES MEAN WIDTH



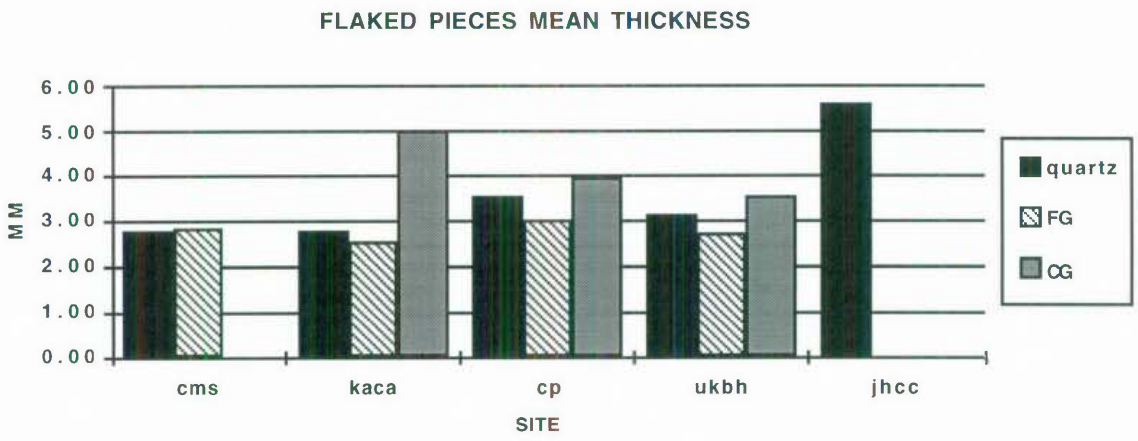


FIGURE 6.8

Another statistic that seemed to be of value in this analysis of flaked pieces was the range of sizes in the three raw material groups from the five sites. These were as follows:

FLAKED PIECES RANGE STATISTICS

QUARTZ ***length***

	CMS	KACA	CP	UKBH	JHCC
Range	10	13	12	12	22
Minimum	05	05	06	05	06
Maximum	15	18	18	17	28
number	09	08	74	16	80
width					
Range	07	06	13	14	18
Minimum	02	02	03	02	03
Maximum	09	08	16	16	21
Thickness					
Range	05	06	07	05	03
Minimum	01	01	02	02	02
Maximum	06	07	09	06	12

FG ***length***

	CMS	KACA	CP	UKBH	JHCC
Range	08	05	07	13	no sample
Minimum	05	05	09	05	
Maximum	13	10	16	18	
number	11	08	07	03	0
width					
Range	04	08	06	10	
Minimum	04	05	05	16	
Maximum	07	09	13	14	
thickness					
Range	02	07	02	13	
Minimum	02	01	02	02	
Maximum	04	08	04	04	

CG *length*	CMS	KAWA	CP	UKBH	JHCC
Range	no sample	0	3 9	0	no sample
Minimum		1 4	0 7	1 4	
Maximum		1 4	4 6	1 4	
number	0	0 1	2 2	0 2	0
width					
Range		0	1 6	0 3	
Minimum		0 8	0 6	0 9	
Maximum		0 8	2 2	1 2	
thickness					
Range		0	0 5	0 1	
Minimum		0 5	0 2	0 3	
Maximum		0 5	0 7	0 4	

TABLE 6.14

The preceding tables and graphs show that at the Crazyman Shelter there was very little difference between the mean dimensions of quartz and fine grained (length - quartz 7.89, fine grained 7.36, width - quartz 4.56, fine grained 4.45, thickness - quartz 2.78, fine grained 2.82). There were no coarse grained flaked pieces recorded at this site. The ranges (see Table 6.14) varied, however, between the two raw materials with quartz having the greater range. The ranges in the lengths were between 5-15 mm in quartz and 5-13 mm in fine grained (not a great deal of difference). Range of widths in quartz was between 2-9 mm and between 4-7 mm in fine grained. Range of thickness was 1-6 mm in quartz and 2-4 mm in fine grained. Altogether there seemed to little overall difference in all the range of dimensions in quartz and fine grained at the Crazyman Shelter.

At the Ukerbarley Hayshed site and Camp Pincham, the fine grained mean length and width were greater than that of the quartz (this was not the case in the 2 shelters). As there were no fine grained or coarse grained flaked pieces at Jack Halls Creek Camp site, analysing the quartz produced the only worthwhile result.

In Table 6.14 although the sample number was small in both the Crazyman Shelter and the Kawambarai cave, the means of the length, widths and thicknesses were reasonably close (lengths - 7.89, 8.63, widths - 4.56, 5.00, thicknesses 2.78, 2.75) suggesting that there may have been a common reduction strategy for quartz at the two sites.

At Jack Halls Creek Camp site, the means of the lengths, widths and thicknesses were much larger than at any of the other four sites. The means were much smaller at Camp Pincham than at Jack Halls Creek Camp site. This could not have been caused by variations in the raw