AXE-MAKING AND AXE DISTRIBUTION FROM TWO QUARRIES IN EAST AUSTRALIA

VOLUME 2

VOLUME TWO

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Table 2.1 Output of the production trajectory classified by symmetry

State of symmetry	Attained	Lost and not attainable	Possible but not attained
Product use	Into exchange system	Into local distribution Hammerstone	Into local distribution Hammerstone Rejuvenation to symmetry and in the exchange system

Table 2.2 Output of the production trajectory classified by distribution

Distribution	**Into exchange system;**	**Into local distribution**	**Hammerstone**
	Rejuvenation to symmetry and in the exchange system		
State of symmetry	Attained	Lost and not attainable	Lost and not attainable
	Possible but not attained	Possible but not attained	Possible but not attained

Chapter 3

Table 3.1 Axes quarries in NSW

Quarry	Raw material type
Gulgong	actinolitic schist
Lowes Mount	amphibolised metabasalt
Cudgegong River, Tallawang	'basalt'
Arthurville	andesitic greywacke
Tumut	cambrian greenstone
Mount Oberon	metavolcanic
Warren: Mount Harris; Mount Foster; Little Mount	quartz feldspar porphyry
Tia	laminated amphibolite
Gragin Peak	metamorphosed bole
Tweed volcano	'volcanic material'
Moore Creek	andesitic greywacke
Salisbury Creek	siltstone
Aberfoyle	siltstone
Brewarrina	quartzite
Tibooburra	hornsfels

Table 3.2 Size of axe quarries in NSW

Quarry	Surface m2	Depth cm
Moore Creek	1500	<100
Gulgong	800	>50
Salisbury Court	300	0
Tia	800	<50
Brewarrina	1000	0
Arthurville	700	0
Lowes Mount	4000	<20
Little Mount	N/A	0

Table 3.3 Distribution of McBryde's grouping of axes in the Wilcannia area and Currabubula

McBryde group	Number of axes	Number in Wilcannia area	Number in Currabubula area
2A	25	2	5
2B Moore Creek	87	4	11
2C	7	1	0
3B	17	1	2
3C	11	0	1
5A	38	2	1
5B	16	0	2
5D	4	3	0
5E	11	0	1
8A	14	2	0
9	9	11	1
10 Gulgong	6	1	3
UG	63	10	2
Total	**308**	**37**	**29**
%	*100*	*12*	*9*

Table 3.4 Australian Museum axes from tribal areas around Gulgong and Warren

Tribal area around Gulgong quarry	Axe location	Number of axes
north part of Wiradjuri	Dunedoo	9
	Cobborah	1
	Talbragar River	5
	Macquarie River	10
	County Lincoln	4
	Dubbo	9
	Hill End	1
	Cudgegong River	1
	Oxley	1
	Mudgee/Cooyal	1
	Arthurville	1
	Geurie	1
	Molong	2
	Orange	1
	Blayney	1
south part of Kamilaroi	Uarbry	3
	Currabubula	43
	Breeza	6
	Quirindi	6
	Willow Tree	5
	Gunnedah	11
	Boggabri	6
	Mullaley	2
	Carrol Gap	1
	Curlewis	1
	Nemingha	1
Geawegal/ Wonnarua	Murrundi	4
	Merriwa	1
Gulgong area total		**138**
Tribal area around Warren		
north and east of Wongaibon	Narromine	6
	Nyngan	3

	Coolabah	1
	Tullamore	5
	Fifield	2
Ngemba	Bogan River	18
Weilwan	Lower Macquarie R	22
	Brewarrina	1
Kawambarai	Warren district	55
Warren area total		**113**
Total		**251**

Table 3.5 Stone axes from Warren district and Lower Macquarie River in the Australian Museum

Raw material	Warren stone(QFP)	Other hard rock	Total
edge ground	18	35	53
% edge ground	*53*	*81*	*69*
not ground	16	8	24
% not ground	*47*	*19*	*31*
Total	34	43	77
% of total	*44*	*56*	*100*

Chapter 4

4.1 Attributes on flakes

Feature	1	2	3	4	5	6	7	8	9	10	11	12
Flake size L	*	*	*	*			*					
Size classes					*	*			*	*	*	
LWT flakes	*	*	*	*			*		*	*	*	
PFA crushed	*	*					*				*	
PFA width		*					*				*	
Angular/Flat	*	*	*	*			*					
Hinge	*	*					*					
Step/Hinge								*				*
Ripples	*	*					*					
Flaws		*						*				*
Small stone	*	*		.			*				*	

Column	Data source
1	Gulgong Experimental Archaeology
2	Gulgong Flake Mound Excavation
3	Gulgong Extraction Face Excavation
4	Gulgong Anvil Excavation
5	Gulgong Surface Transects
6	Gulgong Random Squares
7	Gulgong Small Flake Surface Survey in10x5m Square
8	Gulgong Axe Preforms and Hammerstones
9	Warren Transects
10	Warren Random Squares
11	Warren Surface Flakes
12	Warren Axes and Hammerstones

Table 4.2 Surface surveys at Gulgong and Warren

Type of survey	Quarry	Survey
1 Random transects for site description	Gulgong and Warren	SGW1
2 Random squares for density	Gulgong and Warren	SGW2
3 Output of reduction sequence and in extraction area	Gulgong and Warren	SGW3
4 Raw material at rock outcrops	Gulgong and Warren	SGW4
5 in extraction area	Gulgong and Warren	SG5
6 and 7 Small flake study area	Gulgong and Warren	SGW6 SGW7

4.3 Gulgong: Transect stone count

Stone size L	>250mm	<250mm	<80mm	<40mm	Total
Station/square					
Ga50at12.3m	1	7	121	20	149
Ga50at15.3m	17	37	18	0	72
Ga50at31.3m	10	4	0	0	14
Ga50at35.6m	10	12	4	0	26
Ga60at12.2m	3	78	59	15	155
Ga60at15.5m	0	90	44	17	151
Ga50at19.3m	15	39	0	0	54
Ga30at28.8m	6	66	160	35	267
Ga70at17.1m	12	66	10	3	91
Ga60at20.8m	5	160	9	0	174
Ga60at29.9m	13	33	3	0	49
Ga60at36.8m	20	16	2	0	38
Ga70at12m	9	157	64	13	243
Ga70at19.5m	23	37	5	0	65
Ga70at24m	31	19	2	0	52
Ga10at20.3m	7	14	4	6	31
Ga10at26.3m	3	11	5	0	19
Ga10at28.8m	8	19	6	0	33
Ga30at10.1m	1	77	98	215	391
Ga30at17.3m	3	38	150	446	637
Ga30at22.4m	11	76	0	0	87
Total	208	1056	764	770	2798
Total %	7.4	37.8	27.3	27.5	100
n=21					
Stone size by length:					
>250mm	250mm or more than 250mm				
<250mm	less than 250mm	or 80mm or more			
<80mm	less than 80mm or more than 40mm				
<40mm	less than 40mm				

4.4 Gulgong: Transect #12 stone count

Flake Mound Summary Sheet for Transect #12						
Total Stone in each metre square						
MetreSquare	a	b	c	d	e	
TransectMetre						
73	9	10	14	17	20	
74	5	5	15	23	12	
75	6	9	6	17	21	
76	9	8	10	39	26	
77	10	13	22	21	0	
78	0	0	0	0	22	
79	20	9	6	39	32	
80	28	20	5	0	0	
81	16	14	2	0	0	
82	13	20	14	12	7	
83	18	17	22	18	19	
84	29	30	7	27	32	
85	12	7	15	40	27	
86	33	23	17	16	15	
87	38	35	100	32	18	
Total	246	220	255	301	251	1273

4.5 Gulgong: Stone density along transects

Transect #	#1	#2	#3	#4	#5	#6	#7/8	#9	#10	#11	#12	#13	#14	#15	#16	#17	#18/19	#20
TransectMetres																		
East 100													29					
95													39					
90									26				12					
85									26				3					
80									34				4					
75									33				15					
70									56				13					
65									56				10					
60									24				19	3				
55									23				9	6				
50									32				22	10	2	3		
45									36				23	8	10	7		
40									22		2		30	12	2	4		
35									23		1		37	14	7	10		
30									14	4	5		29	18	9	11		
25					3		3		29	6	7	2	35	20	3	9		
20					8	4	11		11	14	11	3	54	42	3	12		
15					12	4	16		20	7	28	8	24	18	10	9		
10	10		3	8	16	13	4		39	22	41	19	23	30	19	19		
5	10	4	10	4	32	28	31		57	26	108	12	61	35	23	17		
Transectbaseline																		
West 1	20	6	13	10	40	31	55		44	36	137	21	50	42	35	23	14	8
10	7	6	14	10	41	30	37		31	74	159	43	41	38	37	57	14	8
15	7	6	7	10	48	22	33		58	53	57	41	52	40	51	23	24	9
20	6	6	8	10	48	27	52		52	37	35	27	113	61	60	12	24	12
25	5	6	2	10	41	21	23		55	15	70	117	100	55	42	19	23	13
30	5	7	3	10	41	20	32		44	38	89	85	88	43	38	52	23	8
35	14	7	14	15	38	19	26		58	116	85	137	189	67	64	67	26	8
40	6	6	14	15	39	21	46		71	199	61	170	103	58	51	79	26	12
45	0	5	4	6	13	10	49		89	162	86	112	65	42	37	84	18	16
50	10	4	4	6	14	10	55		150	377	89	175	56	31	23	102	19	10
55	50	1	13	12	50	22	46		272	289	75	94	99	79	67	49	52	55
60	25	22	12	12	50	20	51		239	304	202	85	49	59	56	87	53	55
65	25	22	22	13	19	13	37		460	128	222	118	88	37	34	56	79	58
70	50	0	23	13	19	12	26		246	156	279	114	170	49	39	23	79	59
75	20	1	16	5	25	10	24		1120	220	298	109	406	212	108	30	96	37
80		1	16	5	25	6	18		1545	360	416	125	988	331	47	87	96	38
85		1	6	5	39	7	21		179	142	442	170	631	193	301	72	37	53
90		1	7	21	40	5	14		110	96	434	147	506	87	112	70	37	54
95		1	5	21	24	4	17	10	17	80	379	82	361	77	89	123	46	80
100		1	5	30	25	3	12	10	39	63	178	118	154	94	97	102	46	80
105					23	2	9	10	52	67		98	96	71	62	76	82	38
110					23	6	8	10	84	21		75	43	31	23	30	83	38
115					19	8	7	25	79	12		112	60	42	34	11	37	38
120					19	4	8	25	50	8		76	41	37	49	6	37	38
125					2	2	11	25	9	6		44	42	22	37	3	55	25
130					2	1	9	25	7	27		18	27	18	12	14	55	25
135					0	1	5	25	14	41		8	18	6	2	2	32	14
140					0	1	4	25	13	17		7	12	2	2	1	33	15
145					0		1	25	5	6		5	3	2	2	1	11	13
150					1		1	25	4	3		8	16	1			11	14
155									0	0		5	3				9	4
160									0	2		5	2				10	5
165									5			19	1				6	4
170									5			20					5	5
175									24			10					9	4
180									24								10	3
185									35								5	2
190									35								2	1
195									36									1
200									36									1
205									25									1
210									25									

4.6 Warren: Rock outcrops along transects

ROCK OUTCROPS									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect#									
#1			1						1
#2			2	2	3				7
#3		1	1	1	2				5
#4	2			3		1			6
#5	2	2	5	1	1	2	2	1	16
#6	1	1	3	1	3	1	2		12
#7	1	1	3	2	2	2	2	6	19
#8	2	1		2			2		7
#9	1	2	2	1	1	2		3	12
#10	2	3	2	4	2	3	3		19
#11		5	3	2	3	2	2	1	18
#12		1	1	1	1	1	1		6
#13	2	1	2	3	2	2	2	1	15
#14		3	3	2	3	2			13
#15			2	1	1	1			5
Total	13	21	30	26	24	19	16	12	161

4.7 Warren: Axe preforms along transects

PREFORMS									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect									
#1					2				2
#2			3	2	1				6
#3				5	3				8
#4	1		4	1	10	3			19
#5	4	5	1	1	8	1			20
#6	3	3	8	1	1	1	1		18
#7				2	2		1	1	6
#8	1	4	4	12	6	5	4	5	41
#9			1		2	1	1	3	8
#10					3	2	4	2	11
#11					1	5			6
#12		3	2	3	2	1	5	1	17
#13	3		5	5	1	2			16
#14			2	2					4
#15			1	2					3
Total	12	15	31	36	42	21	16	12	185

4.8 Warren: Flake scatters along transects

FLAKE SCATTERS									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect									
#1			1						1
#2			2	2	2				6
#3			2	1					3
#4	1					1	1		2
#5	1	1	3		1	1			7
#6			1	2			2		5
#7		2	2		1		1	1	7
#8			1	1					2
#9						1		2	3
#10	1	1	1		2		2		7
#11		2					2		4
#12	1	1					1		3
#13	1	1	1	2	1	2	2		10
#14		1	1	2	3				7
#15				2	1				3
Total	5	9	15	12	10	5	11	3	70

4.9 Warren: Hammerstones along transects

HAMMERSTONES									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect									
#1									
#2									
#3									
#4				1					1
#5						1			1
#6								1	1
#7		1	1						2
#8			1						1
#9					1			1	2
#10							1		1
#11			1	2		1			4
#12									
#13			1	2		1			4
#14				1					1
#15			1						1
Total	0	1	5	6	1	3	1	2	19

4.10 Warren: Grinding grooves along transects

GRINDING GROOVES									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect									
#1			1						1
#2									0
#3			1		1				2
#4			1	2	1				4
#5		1	1	1					3
#6		3	1	1			1		6
#7					2	1			3
#8			1	1	3		1		6
#9						2			2
#10				2	1		1		4
#11		3							3
#12			1						1
#13		1							1
#14									0
#15			1						1
Total	0	8	8	7	8	3	3		37

4.11 Warren: Cores along transects

CORES									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect									
#1									0
#2									0
#3									0
#4									0
#5					1				1
#6									0
#7		1							1
#8									0
#9									0
#10			1			1			2
#11									0
#12							1		1
#13									0
#14									0
#15						1			1
Total	0	1	1	0	1	2	1	0	6

4.12 Gulgong: Surface stone density per square metre

Transect	#1	#2	#3	#4	#5	#6	#7/8	#9	#10	#11	#12	#13	#14	#15	#16	#17	#18/19	#20
TransectMetres																		
East 100													1.2					
95													1.6					
90									1.1				0.5					
85									1.1				0.1					
80									1.3				0.2					
75									1.3				0.6					
70									2.2				0.5					
65									2.2				0.4					
60									1				0.8	0.1				
55									0.9				0.4	0.2				
50									1.3				0.9	0.4	0.1	0.1		
45									1.4				0.9	0.3	0.4	0.2		
40									0.9		0.1		1.2	0.4	0.1	0.2		
35									0.9		0		1.5	0.6	0.3	0.4		
30									0.6	0.2	0.2		1.2	0.7	0.4	0.4		
25					0.1		0.1		1.2	0.2	0.3	0.1	1.4	0.8	0.1	0.4		
20					0.3	0.2	0.4		0.4	0.6	0.4	0.1	2.2	1.7	0.1	0.5		
15					0.5	0.2	0.6		0.8	0.3	1.1	0.3	1	0.7	0.4	0.4		
10	0.4		0.1	0.4	0.6	0.5	1.7		1.6	0.9	1.6	0.8	1	1.2	0.8	0.8		
5	0.4	0.2	0.4	0.2	1.3	1.1	1.2		2.3	1	4.3	0.5	2.4	1.4	0.9	0.7		
Transectbaseline																		
West 1	0.8	0.2	0.5	0.4	1.6	1.2	2.2		1.5	1.4	5.5	0.8	2	1.7	1.4	0.9	0.6	0.3
10	0.3	0.2	0.5	0.4	1.6	1.2	1.5		1.2	3	6.4	1.7	1.6	1.5	1.5	2.3	0.6	0.3
15	0.3	0.2	0.3	0.4	1.9	0.9	1.3		2.3	2.1	2.3	1.7	2.1	1.6	2	0.9	1	0.3
20	0.2	0.2	0.3	0.4	1.9	1.1	2.1		2.1	1.5	1.4	1.1	4.5	2.4	2.4	0.5	1	0.5
25	0.2	0.2	0.1	0.4	1.6	0.8	0.9		2.2	0.6	2.8	4.7	4	2.2	1.7	0.8	0.9	0.5
30	0.2	0.3	0.1	0.4	1.6	0.8	1.3		1.8	1.5	3.6	3.4	3.5	1.7	1.6	2.1	0.9	0.3
35	0.6	0.3	0.5	0.6	1.5	0.8	1.1		2.3	4.6	3.4	5.5	7.6	2.7	2.6	2.7	1	0.3
40	0.2	0.2	0.5	0.6	1.5	0.8	1.8		2.8	8	2.4	6.8	4	2.3	2	3.2	1	0.5
45	0	0.2	0.2	0.2	0.5	0.4	0		3.6	6.5	3.4	4.5	2.6	1.7	1.5	3.4	0.7	0.6
50	0.4	0.2	0.2	0.2	0.5	0.4	2.2		6	15.1	3.6	7	2.2	1.2	0.9	4.1	0.8	0.4
55	2	0.1	0.5	0.5	2	0.9	1.8		10.9	11.2	3	3.8	4	3.2	2.6	2	2.1	2.2
60	1	0.9	0.5	0.5	2	0.8	2		9.6	12.2	8.1	3.4	2	2.4	2.2	3.5	2.1	2.2
65	1	0.9	0.9	0.5	0.8	0.5	1.5		18.4	5.1	8.9	4.7	3.5	1.5	1.4	2.2	3.2	2.3
70	2	0	0.9	0.5	0.8	0.5	1.1		9.8	6.2	11.2	4.6	6.8	2	1.6	0.9	3.2	2.3
75	0.8	0.1	0.6	0.2	1	0.4	1		44.8	9.8	11.9	4.4	16.2	8.5	4.2	1.2	3.8	1.5
80		0.1	0.6	0.2	1	0.2	0.7		61.8	14.4	16.6	5	39.5	13.2	1.9	0.5	3.8	1.5
85		0.1	0.2	0.2	1.6	0.2	0.8		7.2	5.7	17.7	6.8	25.2	7.7	12.1	0.9	1.5	2.1
90		0.1	0.2	0.8	1.6	0.2	0.6		4.4	3.8	17.4	5.9	20.2	3.5	4.5	0.8	1.5	2.1
95		0.1	0.2	0.8	1	0.2	0.7	0.4	0.7	3.0	15.2	3.3	14.4	3.1	3.6	4.9	1.8	3.2
100		0.1	0.2	1.2	1	0.1	0.5	0.4	1.6	2.5	7.1	4.7	6.2	3.8	3.9	4.1	1.8	3.2
105					1	0.1	0.4	0.4	2.1	2.7		3.9	3.8	2.9	2.5	3	3.3	1.5
110					1	0.2	0.4	0.4	3.4	0.8		3	1.7	1.2	0.9	1.2	3.3	1.5
115					0.8	0.3	0.3	1	3.2	0.5		4.5	2.4	1.7	1.4	2.4	1.5	1.5
120					0.8	0.2	0.4	1	2	0.3		3.1	1.6	1.5	2	0.2	1.5	1.5
125					0.1	0.1	0.4	1	0.4	0.2		1.8	1.7	0.9	1.6	0.1	2.2	1
130					0.1	0.1	0.4	1	0.3	1.1		0.7		0.7	0.5	0.6	2.2	1
135					0	0.1	0.2	1	0.6	1.6		0.3		0.2	0.1	0.1	1.3	0.6
140					0	0.1	0.2	1	0.5	0.7		0.3		0.1	0.1	0.1	1.3	0.6
145					0		0.1	1	0.2	0.2		0.2		0.1	0.1	0.1	0.4	0.6
150					0.1		0.1	1	0.2	0.1		0.3		0.1			0.4	0.6
155										0		0.2					0.4	0.2
160										0.1		0.2					0.4	0.2
165									0.2			0.8					0.2	0.2
170									0.2			0.8					0.2	0.2
175									1			0.4					0.4	0.2
180																	0.4	0.1
185									1.4								0.1	0.1
190									1.4								0.1	0.1
195									1.5									0.1
200									1.5									0.1
205									1									0.1
210									1									

4.13 Warren: Surface stone density per square metre

1	2	3	4	5	6	7	8	9	10
240	5	40	6	6	0		1		2
240	12	40	1	19	0				
240	16	10	4	9	0				1
240	31	30	2	18	0				2
240	36	0	6	19	0				
240	43	40	0	16	7				
240	55	30	1	7	2				
240	68	40	3	14	2				2
240	69	60	2	19	8				9
240	100	10	5	9	1				
240	126	20	0	19	0			1	1
240	133	0	0	27	3				
50	5	70	4	4	0				
50	12	50	5	3	2				
50	16	40	4	5	0			1	
50	31	10	4	6	0				
50	36	50	2	8	0				
50	43	20	2	17	0				
50	55	20	3	6	0				
50	68	80	3	9	2				1
50	69	40	1	23	1				
50	100	0	3	23	1			1	
50	126	40	2	7	3				
50	133	30	3	12	0				
50	151	0	4	7	0				
50	170	0	7	0	0				
50	186	0	1	16	0				
30	5	40	3	8	0				
30	12	40	4	8	0				
30	16	10	1	15	0				1
30	36	10	0	7	0				
30	31	20	2	4	0	1		1	
30	43	30	1	11	0				
30	55	40	2	5	0				
30	68	10	3	13	0				
30	69	30	6	20	0				
30	100	50	2	4	0				
30	126	20	5	7	0		1		
30	133	20	4	6	0				
30	151	0	1	15	0				
30	170	0	2	9	0				1
30	186	0	1	25	14				
30	199	0	6	17	0				
30	203	0	4	10	3				
30	217	70	1	12	2				
30	229	10	7	5	2			1	1
30	238	10	4	3	4	1			
320	5	20	1	4	0		2		
320	12	30	9	3	0				
320	16	30	7	6	1				
320	31	40	3	15	1				
320	36	20	4	8	0				
320	43	50	5	7	0				
320	55	0	5	14	0				
320	68	20	0	8	0				2
320	69	20	3	3	0				1
320	100	30	3	4	0				
320	120	30	2	1	0				
320	133	80	1	8	10				
320	151	40	3	6	0				
320	170	0	3	19	0				
320	186	10	3	8	4				1
320	199	60	3	6	0				
320	203	10	1	17	25				
320	217	0	5	15	1				2
320	229	0	2	14	2				
320	238	20	1	12	3				
10	5	30	3	10	0				
10	12	40	4	7	0				
10	16	0	6	12	0				
10	31	10	1	20	0				
10	36	20	3	9	1				
10	43	10	3	2	0				
10	55	10	1	7	0				
10	68	30	1	5	0				
10	69	40	0	6	3	1			
10	100	10	3	6	0				1

Column	
1	Transect degrees
2	Metre square distance along transect
3	Percent of bedrock in metre squares
4	Stone greater than 250mm in length
5	Stone less than 250mm in length
6	Stone less than 40mm in length
7	Worked stone -Preform
8	Worked stone -Block
9	Worked stone -Hammerstone
10	Worked stone -Flake

10	126	70	0	3	0				
10	133	70	1	3	0				
10	151	70	0	7	0				
10	170	40	0	9	2				
10	186	70	0	4	0				
10	199	40	1	8	0				
10	203	70	5	2	0				
10	217	10	0	11	5				
10	229	60	0	3	0				
10	238	10	4	16	0				2
270	5	30	7	8	0				1
270	12	40	5	6	1				
270	16	20	4	14	5	1			
270	31	30	3	6	0				
270	36	10	4	8	0		2		
270	43	10	4	7	0				
270	55	0	5	9	0			1	
270	68	0	5	16	0			1	1
270	69	0	4	18	0				
270	100	40	4	6	0				
270	126	0	5	10	3				2
270	133	30	1	14	2			2	
180	5	10	3	7	2				
180	12	20	5	6	2				
180	16	60	3	3	3				
180	31	20	1	8	2				
180	36	10	5	10	2				
180	43	10	1	16	2			1	
180	55	10	0	1	0				
180	68	0	0	0	0				
180	69	0	0	1	0	1			
180	100	30	0	3	0		1		
180	126	0	1	6	1			1	
180	133	90	0	1	1				
180	151	50	1	4	6				
180	170	30	3	7	0	1			
180	186	50	0	15	16				1
180	199	10	0	6	0				
180	203	0	0	17	0				
180	217	20	1	6	1				
180	229	0	5	12	0		1		2
180	238	10	2	19	2				
110	5	20	5	3	0				
110	12	10	3	12	1				
110	16	50	4	6	2				
110	31	10	3	16	0				
110	36	100	1	15	7				16
110	43	100	0	0	0				
110	55	40	4	9	0				
110	68	30	1	7	1				
110	69	50	1	3	1	1			
110	100	10	2	13	0				
110	126	10	0	4	2				
330	5	30	2	9	0				
330	12	20	4	8	0				
330	16	50	4	1	0	1			
330	31	30	1	7	0				
330	36	70	4	6	0				
330	43	10	4	8	6	1			1
330	55	50	0	7	0				
330	68	10	1	4	0				
330	69	10	1	4	0			1	
330	100	0	0	7	1				
330	126	30	2	10	0				
330	133	20	3	14	3				
330	151	0	4	9	0			1	
330	170	30	1	4	2				
330	186	10	4	9	0	1			1
330	199	10	0	9	2			1	
330	203	100	4	6	0			1	
330	217	0	2	8	1				
330	229	70	2	7	0				
330	238	0	4	7	1				2
220	5	0	3	10	1				
220	12	0	8	6	0		1		
220	16	50	1	11	0		1		
220	31	60	0	8	0				
220	36	0	0	23	0				
220	43	40	0	0	3				

220	55	10	1	4	0				
220	68	40	0	5	0				
220	69	40	1	3	0			1	
220	100	10	7	8	3				
220	126	50	1	8	0				1
220	151	100	1	9	7				4
220	170	40	0	12	4				
350	5	30	3	1	0			1	
350	12	30	1	4	0				
350	16	60	1	5	0				
350	31	0	4	10	0				
350	36	80	2	12	0				
350	43	20	2	5	0				
350	55	40	2	5	0				
350	68	0	2	4	0				
350	69	0	2	4	0				
350	100	0	3	9	0				
350	126	10	0	2	0			1	
350	133	0	0	0	0				
350	151	20	0	8	1				
350	170	20	3	11	1			1	
350	186	30	1	23	2				
350	199	0	3	4	2				
350	203	20	0	12	2			1	1
350	217	30	0	3	0				
350	229	30	0	4	0				
350	238	0	2	3	1			1	
70	5	20	5	6	0				
70	12	10	4	9	0				
70	16	30	1	7	0				
70	31	40	3	9	0				
70	36	0	4	3	0				
70	43	50	0	13	18		1		12
70	55	30	1	7	0		1		
70	68	20	4	8	0				3
70	69	80	4	4	2				
70	100	0	5	22	4				
70	126	80	3	6	0				
70	133	0	4	7	0				
70	151	0	0	16	0				
160	5	30	6	4	4				
160	12	50	7	8	1				1
160	16	10	2	5	0				
160	31	80	1	7	0				
160	36	20	2	6	0				
160	43	10	0	8	0			1	
160	55	0	1	0	0				
160	68	80	0	3	0				
160	69	70	0	6	3				
160	100	0	3	5	2				
160	126	0	4	5	0				
160	133	0	1	7	0			2	
160	151	0	4	12	0			1	
160	170	0	0	2	0				
160	186	10	1	4	0			1	
160	199	40	1	7	0				
160	203	10	3	4	0				
160	217	0	4	5	0			1	
160	224	50	2	7	0			1	
160	238	10	3	5	1				1
			527	1825	258	10	12	28	80

Table 4.14 Excavations at Gulgong and Warren

Type of excavation	Quarry	Excavation
1 Test pits for site depth	Warren	EW1
2 Test pits for site extent	Gulgong	EG1
3 Test pits for stone extraction	Gulgong	EG2
4 Anvil debris	Gulgong	EG3
5 Extraction face	Gulgong	EG4
6 Flake mound debris	Gulgong	EG4

4.15 Gulgong: Stone from excavation at rock outcrops 22 and 25

RO22							
Square	*Worked stone*			*Not Worked*			*Total of worked/*
	>30mmL	*<30mmL*	*Total*	*>30mmL*	*<30mmL*	*Total*	*Not worked*
North1	23	36	59	23	420	443	502
North2	10	22	32	60	556	716	748
North3	9	12	21	63	723	786	807
South1	7	7	14	14	41	55	69
South2	34	124	158	10	108	118	276
South3	14	34	48	0	13	13	61
Total	97	235	332	170	1861	2131	2463
%of total			*13.5*			*86.5*	*100*
RO25							
North1	9	11	20	30	189	219	239
North2	3	3	6	0	0	0	6
North3	1	2	3	8	49	57	60
South1	2	0	2	8	43	51	53
South2	0	0	0	0	29	29	29
South3	0	0	0	0	18	18	18
Total	15	16	31	46	328	374	405
%oftotal			*7.6*			*92.4*	*100*

Table 4.16 Gulgong: archaeological features recorded on stone in GFM1

	Feature	Attributes
1	Total stone	either worked; or not worked
2	Stone size	maximum length
3	Flake size	length, width and thickness measure (LWT)
4	Shape	flat; thin; block; or angular
5	PFA of flakes	measured from flakes with LWT measures; recorded as crushed where it is damaged; or as found where the flake is broken
6	Stone flaked on two sides	both ventral and dorsal sides; any dorsal ridge lines were also recorded
7	Termination type	on flakes; particularly hinge fractures
8	Flaws	in the raw material
9	Cortex	cover on flakes
10	Weathering	of stone

4.17 Gulgong: Stone attributes recorded from excavation in GFM1

GFM1	Total stone	Not worked	Worked	Flake size (average)	Flat	Thin	Block	Angular	PFA measured	PFA crushed	PFA found	Flaked 2 sides	Dorsal Ridge	Hinge	Flaw	Cortex	Weathered
1C 1	124	22	102	40.09677	79	61	44	54	4	8	8	19	1	2	1	4	4
1C 2	329	97	232	41	226	203	99	120	7	20	17	32	1	2	0	13	4
1C 3	388	64	324	41.9	262	210	124	176	7	17	19	61	1	2	0	10	23
1C 4	524	96	428	38.9	378	325	144	198	22	20	24	58	4	7	2	14	19
1C 5	431	69	362	39.8	308	267	123	164	8	17	13	54	2	3	1	12	20
1C 6	270	53	217	48.3	193	164	78	106	7	4	19	36	1	1	0	0	11
Total1C	2066	401	1665		1446	1230	612	818	55	86	100	260	10	17	4	53	81
2C 1	32	2	30	51.5	24	2	8	30	10	5	4	14	0	4	0	13	0
2C 2	707	185	522	55.2	443	133	263	574	88	95	62	266	4	10	0	0	81
2C 3	246	98	148	56.2	170	43	76	203	19	22	31	55	5	10	0	0	14
2C 4	355	117	238	66.2	206	122	149	232	28	17	21	83	1	9	3	19	54
2C 5	206	93	113	75.5	113	86	89	118	13	8	32	0	0	4	0	0	31
2C 6	163	104	59	78.9	92	59	71	104	10	8	17	2	1	1	1	1	26
2C 7	56	41	15	75.4	22	17	32	37	5	1	5	0	0	0	0	0	19
2C 8	83	60	23	77.4	35	30	48	52	5	3	5	0	0	0	0	0	24
2C 9	26	22	4	80	9	9	16	16	2	0	2	0	0	0	0	0	5
2C 10	17	13	4	62.5	1	0	16	17	0	0	0	2	0	0	0	2	3
Total2C	1891	735	1156		1115	501	768	1383	180	159	179	422	11	38	4	35	257
3C 1	783	154	630	35.5	523	448	259	334	28	18	49	74	1	5	2	39	24
3C 2	240	46	194	41.2	161	124	79	115	19	6	18	25	3	2	0	11	13
3C 3	517	172	345	52.5	309	234	206	282	16	18	30	41	2	1	1	27	83
3C 4	377	257	120	56.2	133	88	245	289	12	5	21	19	0	1	0	25	112
Total3C	1918	629	1289		1126	894	789	1020	75	47	118	159	6	9	3	102	232
4C S1	492	113	379	46.6	306	128	63	139	123	0	0	122	67	0	0	292	58
4C 2	3501	1760	1741	54	1751	728	829	959	329	5	18	564	183	0	0	533	1140
4C 3	524	196	328	36.1	379	306	37	105	72	0	0	103	15	0	0	49	82
4C 4	261	205	56	46.5	139	100	62	48	4	0	0	5	3	0	0	8	81
Total4C	4778	2274	2504		268	0	0	882	1361	0	0	0	0	0	0	0	0
Total GFM1	10653	4039	6614		6262	3887	3160	4472	838	297	415	1635	295	64	11	1072	1931

Table 4.18 Gulgong: GFM1 stone greater than 20mm length from 4 squares as worked or not worked
Summary from Table 4.17

Square	Not Worked	Worked	Total
1C	401	1665	2066
% of square	*19*	*81*	*100*
2c	735	1156	1891
% of square	*39*	*61*	*100*
3C	629	1289	1918
% of square	*33*	*67*	*100*
4C	2274	2504	4778
% of square	*48*	*52*	*100*
Total of GFM1	4039	6614	10653
% of total	*38*	*62*	*100*

4.19 Gulgong: GFM1 flake LWT measures

Square	Worked stone	% of Wkd stone	LWT#	Long Flake	Squat Flake	Small Squat Flake	Thick Squat Flake	Massive Flake	Massive Thick Flake
1C 1	102	*3.9*	4	0	4	4	0	0	0
1C 2	232	*3*	7	1	6	4	3	1	0
1C 3	324	*2.2*	7	4	3	3	1	0	0
1C 4	428	*5.1*	22	7	15	14	4	1	0
1C 5	362	*2.2*	8	2	6	6	2	0	0
1C 6	63	*11.1*	7	3	4	2	2	1	1
1C 7	217	*3.2*	7	3	4	2	2	1	1
Total	**1728**		**62**	**20**	**42**	**35**	**14**	**4**	**2**
%oftotal			*3.6*	*1.2*	*2.4*				
2C 1	30	*33.3*	10	4	6	6	3	0	0
2C 2	522	*16.9*	88	15	73	70	15	4	2
2C 3	148	*12.8*	19	1	18	18	2	1	0
2C 4	238	*12.2*	29	1	28	28	4	3	0
2C 5	113	*11.5*	13	2	11	11	0	1	0
2C 6	59	*16.9*	10	1	9	9	0	2	0
2C 7	15	*33.3*	5	0	5	4	2	0	0
2C 8	23	*21.7*	5	1	4	4	1	0	0
2C 9	4	*50*	2	1	1	1	0	0	0
Total	**1156**		**181**	**26**	**155**	**151**	**27**	**11**	**2**
%oftotal			*15.7*	*2.3*	*13.4*				
3C 1	630	*4.6*	29	6	23	23	6	0	0
3C 2	194	*9.8*	19	6	13	10	6	1	1
3C 3	345	*4.6*	16	4	12	10	6	3	3
3C 4	120	*10*	12	5	7	7	3	0	0
Total	**1289**		**76**	**21**	**55**	**50**	**21**	**4**	**4**
%oftotal			*5.9*	*1.6*	*4.3*				
4C S1	480	*33.5*	161	35	126	120	18	9	1
4C 2	1639	*17.8*	292	82	210	197	45	17	4
4C 3	328	*22*	72	19	53	51	5	3	1
4C 4	56	*7.1*	4	0	4	4	0	0	0
Total	**2503**		**529**	**136**	**393**	**372**	**68**	**29**	**6**
%oftotal			*21.1*	*5.4*	*15.7*				

4.20 Gulgong: summary of GFM1 flake LWT measures

Summary									
Square GFM1	*Worked stone*	*% of Wkd stone*	*LWT#*	*Long Flake*	*Squat Flake*	*Small Squat Flake*	*Thick Squat Flake*	*Massive Flake*	*Massive Thick Flake*
1C	1728	*3.6*	62	20	42	35	14	4	2
2C	1156	*15.7*	181	26	155	151	27	11	2
3C	1289	*5.9*	76	21	55	50	21	6	4
4C	2503	*21.2*	529	136	393	372	68	29	6
Total	6676	*12.7*	848	213	645	608	130	50	14
%oftotal	*100*		*12.7*	*3.2*	*9.65*				
%of total flake			*100*	*24*	*76*				
% of total SF					*100*	*94*	*15*	*6*	*2*

Table 4.21 Gulgong: GFM1 stone greater than 20mm length from 4 squares in size classes: Summary of Table 4.22 GFM1 Flake size

	Stone classes: length in mm			
Square	**20<60mm**	**60<100mm**	**100>100mm**	**Total**
1C	1839	242	68	2149
% of square	*86*	*11*	*3*	*100*
2C	1130	575	188	1893
% of square	*60*	*30*	*10*	*100*
3C	1591	219	108	1918
% of square	*83*	*11*	*6*	*100*
4C	3544	950	305	4799
% of square	*74*	*20*	*6*	*100*
Total of GFM1	8104	1986	670	10759
% of GFM1	*75*	*19*	*6*	*100*

4.22 Gulgong: GFM1 flake size in 3 categories

GFM1	>20 to 60	>60 to 100	>100mm	Total
1C 1	109	14	1	124
1C 2	289	30	10	329
1C 3	332	42	13	387
1C 4	475	41	8	524
1C 5	386	38	6	430
1C 6	248	77	30	355
Total	**1839**	**242**	**68**	**2149**
% of total	85.6	11.3	3.1	100
2C 1	23	8	1	32
2C 2	503	166	38	707
2C 3	171	59	16	246
2C 4	203	114	38	355
2C 5	88	87	32	207
2C 6	66	67	31	164
2C 7	20	27	9	56
2C 8	38	29	16	83
2C 9	7	14	5	26
2C 10	11	4	2	17
Total	**1130**	**575**	**188**	**1893**
% of total	59.7	30.4	9.9	100
3C 1	729	48	7	784
3C 2	204	32	4	240
3C 3	384	83	50	517
3C 4	274	56	47	377
Total	**1591**	**219**	**108**	**1918**
% of total	83	11.4	5.6	100
4C S1	413	59	24	496
4C 2	2429	830	253	3512
4C 3	489	30	11	530
4C 4	213	31	17	261
Total	**3544**	**950**	**305**	**4799**
% of total	73.8	19.8	6.4	100
Total	**8104**	**1986**	**669**	**10759**
% of total	75.3	18.5	6.2	100

Table 4.23 Gulgong: GFM1 squares density of stone in cubic metres

GFM1 square	total stone >20mm	density per cubic cm
1C	2066	0.02174
2C	1891	0.01847
3C	1917	0.02289
4C	4778	0.04155
Total	**10652**	**0.02559**

Table 4.24 Gulgong: GFM1 square 4C stone by weight in kilos. Greater than 20mm length compared with less than 20mm length

Square	4C S1	4C 2	4C 3	4C 4	Total
>20mm *% of total*	9.033 *100*	81.177 *99*	39.464 *96*	5.087 *86*	134.76 *98*
<20mm *% of total*	0 *0*	0.478 *1*	1.597 *4*	0.803 *14*	2.878 *2*
Total *% of total*	9.033 *100*	81.655 *100*	41.061 *100*	5.89 *100*	137.64 *100*

Chapter 5

Table 5.1 Axes from the Gulgong and Warren areas at the Australian Museum

Axes	symmetry	approach symmetry	symmetry not attained	Total
Warren	2	4	75	81
%	*2*	*5*	*93*	*100*
Gulgong	50	19	65	134
%	*37*	*14*	*49*	*100*
Total	52	23	140	215
%	*24*	*11*	*65*	*100*

Chi-square test	symmetry and symmetry approached	symmetry not attained	total
Warren	6	75	81
Gulgong	69	65	134

Chi-square = 41.27

Probability = < 0.000

Table 5.2 Summary of preforms recorded where maximum measures are greater than axial measures at Gulgong and Warren

	Maximum>Axial	Total
Gulgong		
Width count	78	315
% of total	*25*	*100*
Thickness count	101	314
% of total	*32*	*100*
Warren		
Width count	12	205
% of total	*6*	*100*
Thickness count	21	204
% of total	*10*	*100*

Table 5.2

Chi-square test	width	thickness
Warren	12	21
Gulgong	78	101

Chi-square = 0.335

Probability = 0.56

Table 5.3 Symmetry in preforms from all transects (A, B, C) at Gulgong by the stages of reduction

	Symmetry			
Stage of reduction	**Yes**	**Lost**	**Not attained**	**Total**
Advanced thinning	18	9	5	**32**
Shaping	26	42	22	**90**
Blocking out	15	23	55	**93**
Total	**59**	**74**	**82**	**215**
%	28	34	38	100

Table 5.3 and 5.4

Chi-square test	symmetry attained and lost	symmetry not attained	total
Warren	26	48	74
Gulgong	133	82	212

Chi-square = 14.83

Probability = 0.000

Table 5.4 Symmetry in preforms on transects at Warren by the stages of reduction

	Symmetry			
	Yes	Lost	Not attained	Total
Stage of reduction				
Advanced thinning	4	3	2	**9**
Shaping	2	13	8	**23**
Blocking out	2	2	38	**42**
Total	**8**	**18**	**48**	**74**
%	11	24	65	100

Table 5.5 Symmetry in all preforms from Gulgong by the stages of reduction

	Symmetry							
	Attained		Lost		Not attained			
Stage of reduction	N	%	N	%	N	%	Total	%
Advanced thinning	25	*49*	16	*31*	10	*20*	51	*100*
Shaping	35	*25*	62	*44*	43	*31*	140	*100*
Blocking out	18	*15*	25	*21*	74	*64*	117	*100*
Total	78	*25*	103	*34*	127	*41*	308	*100*

Table 5.5 and 5.6

Chi-square test	symmetry attained and lost	symmetry not attained	total
Warren	42	83	125
Gulgong	181	127	308

Chi-square = 21.55
Probability = 0.000

Table 5.6 Symmetry in all preforms from Warren by the stages of reduction

	Symmetry							
	Attained		Lost		Not attained			
Stage of reduction	N	%	N	%	N	%	Total	%
Advanced thinning	6	*43*	5	*36*	3	*21*	**14**	***100***
Shaping	1	*2*	26	*59*	17	*39*	**44**	***100***
Blocking out	1	*1*	3	*5*	63	*94*	**67**	***100***
Total	**8**	***6***	**34**	***27***	**83**	***67***	**125**	***100***

Table 5.7 Edge damage and mass removal at Gulgong in symmetry and stages of reduction

Symmetry	Stage of reduction	Edge Damage	Mass Removal	Total
Attained	Advanced	9	5	14
	Shaped	11	3	14
	Blocking out	6	3	9
Lost	Advanced	6	1	7
	Shaped	35	6	41
	Blocking out	13	5	18
Not attained	Advanced	2	2	4
	Shaped	14	7	21
	Blocking out s	19	20	39
Total		115	52	167

Table 5.7

Chi-square test	edge damage	mass removal	total
symmetry attained and lost	80	23	113
symmetry not attained	35	31	66
total	115	54	179

Chi-square = 10.127
Probability = 0.001

Table 5.8 Edge damage and mass removal at Warren in symmetry and stages of reduction

Symmetry	Stage of reduction	Edge Damage	Mass Removal	Total
Attained	Advanced	1	4	5
	Shaped	2	1	3
	Blocking out	1	1	2
Lost	Advanced	3	0	3
	Shaped	10	2	12
	Blocking out	2	0	2
Not attained	Advanced	0	1	1
	Shaped	6	2	8
	Blocking out	12	11	23
Total		37	22	59

Chapter 6

Table 6.1 Tests used in rock mechanics research suitable for evaluating the selection of stone for axes

Test	Performance measure	Reference
Brazil disc test	Tensile strength	Lama and Vutukuri (1978) Bradley et al. (1992)
Unconfined compressive strength test	Tensile strength	Hayden (1987)
Los Angeles test	Hardness	Dickson (1981) Minty (1961)
Vickers indentation	Hardness	Cotterell and Kamminga (1990)
Moh's scratch test	Hardness	Dickson (1981) Semenov (1964)
Paige impact test	Elasticity and resiliancy	Goodman (1944) McBryde (1978)

Table 6.2 Measures of rock mechanics on raw material for axe making

Rock Type	Source	Density	Elasticity	Tensile Strength
Source: (Lama and Vutukuri 1978)				
Grey wacke	USA Taiwan India	2.77 2.5 2.67	68.43 4.14 21.89	5.52 2.0 4.83
Greenstone	USA	3.1	74.6	26.89
Actinolite Schist	India	3.5	77.9	N/A
Tremolite Schist	India	3.01	89.6	N/A
Amphibole	India	3.15	117.	41.7
Andesite	USA Japan	2.37 2.56	37.02 33.2	7.24 10.2
Basalt	USA	N/A	N/A	15.3
Source: (Bradley *et al.* 1992)				
	Great Langdale England (range)	N/A	N/A	34.2 42.0 (7.8)
	Graig Lywd Wales	N/A	N/A	33.8
	Tieve-bulliagh, N. Ireland	N/A	N/A	22.2
	Killin Scotland (range)	N/A	N/A	31.4 44.1 (12.7)

Table 6.3 Raw material type found at axe quarries in east Australia

Quarry	Raw material type	McBryde axe group
Moore Creek	Andesitic greywacke	2B
Salisbury Court	Siltstone	3D
Tia, Wilson's Creek	Laminated amphibolite	8C
Gragin Peak	Metamorphosed bole	6
Aberfoyle	Siltstone	3A
Tweed volcano	N/A	7D
Gulgong	Actinolitic schist	10
Tumut	Cambrian greenstones	N/A
Mt. Foster Mt. Harris Little Mount	Quartz feldspar porphry	N/A
Lowes Mount	Amphibolitised metabasalt	N/A
Cudgegong River	Basalt	N/A
Arthurville	Andesitic greywacke	N/A
Mount Oberon	Amphibole hornsfelses-sheared andesite	N/A
Mission Lane, Brewarrina	Quartzite	N/A
Mount Bowen	N/A	N/A
Mounts William and Camel	Andesitic hornsfels	N/A

Table 6.4 Ranking of rock outcrops at Gulgong by stoneworkers in prehistory

Rank	No. of outcrops	Percent of total	Characteristics
High	5	*10*	Fine grained; solid block; no fracture
Medium	15	*31*	Loose blocks of fine-grained material
Low	29	*59*	Coarse-grained material; fine-grained fractured and weathered material
Total	**49**	***100***	

Table 6.5 Rock outcrop survey of Gulgong Areas A, B, C, D

No.	Size in m2	Material (Fine/coarse)	Fracture (Y/N)	Rock	Score (3-6)	Rank	Archaeological material (Y/N)	Extraction face (Y/N)
1	1300	Fine	No	Solid	6	High	Yes	Yes
2	350	Fine	No	Solid	6	High	Yes	No
3	300	Fine	Yes	Loose	4	Med	Yes	No
4	140	Fine	No	Solid	6	High	No	Yes
5	220	Fine	Yes	Loose	4	Med	No	No
6	210	Coarse	Yes	Loose	3	Low	No	No
7	220	Fine	Yes	Loose	4	Med	No	No
8	380	Coarse	Yes	Loose	3	Low	No	No
9	190	Coarse	Yes	Loose	3	Low	No	No
10	900	Coarse	Yes	Loose	3	Low	No	No
11	580	Coarse	Yes	Loose	3	Low	No	No
12	590	Coarse	Yes	Loose	3	Low	No	No
13	10	Fine	Yes	Loose	4	Med	No	No
14	10	Coarse	Yes	Loose	3	Low	No	No
15	640	Coarse	Yes	Loose	4	Med	No	No
16	490	Fine	Yes	Loose	4	Med	Yes	No
17	680	Fine	Yes	Loose	4	Med	No	No
18	760	Fine	No	Solid	6	High	No	Yes
19	730	Coarse	Yes	Loose	3	Low	No	No
20	570	Coarse	Yes	Loose	3	Low	Yes	No
21	350	Fine	Yes	Loose	4	Med	Yes	No
22	930	Fine	Yes	Loose	3	Low	Yes	No
23	270	Coarse	Yes	Loose	3	Low	No	No
24	180	Coarse	Yes	Loose	3	Low	No	No
25	670	Coarse	Yes	Loose	3	Low	No	No
26	240	Coarse	Yes	Loose	3	Low	No	No
27	490	Fine	Yes	Loose	4	Med	No	No
28	400	Fine	Yes	Loose	4	Med	No	No
29	390	Coarse	Yes	Loose	3	Low	Yes	No
30	1240	Fine	Yes	Loose	4	Med	No	No
31	800	Fine	Yes	Loose	4	Med	No	No
32	220	Fine	Yes	Loose	4	Med	Yes	No
33	360	Coarse	Yes	Loose	3	Low	No	No
34	250	Fine	Yes	Loose	3	Low	No	No
35	410	Coarse	Yes	Loose	3	Low	No	No
36	440	Fine	Yes	Loose	3	Low	No	No
37	1050	Coarse	Yes	Loose	3	Low	No	No
38	1200	Fine	Yes	Loose	4	Med	No	No
39	420	Coarse	Yes	Loose	3	Low	No	No
40	300	Fine	Yes	Loose	3	Low	No	No
41	20	Coarse	Yes	Loose	3	Low	No	No
42	240	Fine	Yes	Loose	3	Low	No	No
43	900	Fine	Yes	Loose	3	Low	No	No
44	700	Coarse	Yes	Loose	3	Low	No	No
45	400	Coarse	No	Solid	5	Med	Yes	No
46	270	Coarse	Yes	Loose	3	Low	No	No
47	360	Fine	Yes	Loose	3	Med	Yes	No
48	300	Coarse	Yes	Solid	3	Med	No	No
49	800	Fine	Yes	Solid	6	High	Yes	Yes

Table 6.6. Extraction and archaeological material at Gulgong rock outcrops

Rock outcrop number (n=14)	Rank	Archaeological material	Extraction	Archaeological material and extraction
1	High	Yes	Yes	Yes
2	High	Yes	No	No
3	Medium	Yes	No	No
4	High	No	Yes	No
16	Medium	Yes	No	No
18	High	No	Yes	No
20	Low	Yes	No	No
21	Medium	Yes	No	No
22	Low	Yes	No	No
29	Low	Yes	No	No
32	Medium	Yes	No	No
45	Medium	Yes	No	No
47	Medium	Yes	No	No
49	High	Yes	Yes	Yes

Table 6.7 Fine-grained rock outcrops in the flake mound Area B.X at Gulgong: Summary of Table 6.8

Characteristics	Number
Fine grained rock outcrops	30
Rocks in situ to the bedrock	29
Outcrops with loose blocks	1
Extraction and flaking present	20
Raw material flaws	1
Total	30

Table 6.8 Rock outcrops in flake mound Area B.X at Gulgong

Number	Location	Height in centimetres	Diameter N-S	Diameter E-W	Count InSitu	Count Loose	Extraction (Y/N)	Raw material Flaw (Y/N)	Flakes (Y/N)
1	Ga120 5.1m	100	80	100	1		Yes	No	Yes
2	Ga115 21.7m	70	60	100	6		No	No	No
2a	Ga115 23.7m	90	300	120	1		No	No	No
2b	10m S of 2	120	70	180	1		Yes	No	No
3	Ga 90 21.9m	100	520	430	6	3	Yes	No	Yes
4	Ga80 25.1m	120	490	320	4	8	No	No	No
5	Ga80 15.7m	80	160	100	2		Yes	No	Yes
6	Ga75 37m	70	400	170	1		No	No	Yes
7	Ga70 39.2m	95	300	265	11	5	No	No	Yes
7a	5mNW of 7	35	80	45	0	1	Yes	No	No
8	Ga65 10.4m	100	50	60	1		Yes	No	No
9	Ga92 6.3m	60	100	80	1		Yes	Yes	Yes
10	Ga92 8.8m	40	60	60	1		Yes	No	Yes
11	Ga45 8.3m	50	60	70	1		Yes	No	Yes
12	Ga45 11.3m	50	30	50	1		Yes	No	No
13	Ga40 13.9m	70	290	110	3	1	Yes	No	Yes
14	Ga30 8.7m	40	120	50	1		Yes	No	No
15	Ga45 32.2m	100	220	120	4		Yes	No	Yes
16	Ga35 23.5m	70	470	120	3	3	No	No	Yes
17	Ga42 41.6m	80	50	60	1		Yes	No	Yes
18	Ga10 26.3m	90	410	250	1		Yes	No	Yes
19	Ga340 14.1m	20	90	70	1		Yes	No	No
20	Ga340 24.m	80	110	120	2		No	No	Yes
21	Ga340 29.1m	100	350	190	1	8	No	No	No
22	Ga345 32.8m	90	90	60	1		No	No	No
23	Ga330 29.4m	120	240	350	1	8	Yes	No	Yes
24	Ga305 33.m	125	350	400	1	5	Yes	No	Yes
25	Ga305 35.6m	90	295	265	1		Yes	No	Yes
26	Ga310 34.8m	145	940	570	6	16	Yes	No	Yes
27	Ga310 40.8m	80	430	210	1	9	No	No	No

Table 6.9 Rock outcrops along transects at Warren

ROCK OUTCROPS									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect#									
#1			1						1
#2			2	2	3				7
#3		1	1	1	2				5
#4	2			3		1			6
#5	2	2	5	1	1	2	2	1	16
#6	1	1	3	1	3	1	2		12
#7	1	1	3	2	2	2	2	6	19
#8	2	1		2			2		7
#9	1	2	2	1	1	2		3	12
#10	2	3	2	4	2	3	3		19
#11		5	3	2	3	2	2	1	18
#12		1	1	1	1	1	1		6
#13	2	1	2	3	2	2	2	1	15
#14		3	3	2	3	2			13
#15			2	1	1	1			5
Total	13	21	30	26	24	19	16	12	161

Table 6.10 Flake scatters along transects at Warren

FLAKE SCATTERS									
TransectMetres	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	Total
Transect									
#1			1						1
#2			2	2	2				6
#3			2	1					3
#4	1					1	1		2
#5	1	1	3		1	1			7
#6			1	2			2		5
#7		2	2		1		1	1	7
#8			1	1					2
#9						1		2	3
#10	1	1	1		2		2		7
#11		2					2		4
#12	1	1					1		3
#13	1	1	1	2	1	2	2		10
#14		1	1	2	3				7
#15				2	1				3
Total	5	9	15	12	10	5	11	3	70

Table 6.11 Flake scatters along four transects at Warren

Transect	Square metres	Flake scatters	Flake count	Flakes per square metre
T500/6	900	24	513	0.57
T500/8	1550	8	94	0.06
T500/12	1800	14	202	0.11
T500/16	1750	16	176	0.1
Total	**6000**	**62**	**985**	**0.16**

Table 6.12 Random metre square survey of surface stone density at Warren: Summary of Table 6.13

	Number	Percent
Loose stone >250mm	172	*80*
Worked stone	69	*32*
Bedrock in square	165	*76*
Bedrock within 5m. around square	180	*83*
Total number of squares surveyed	216	*100*

Table 6.13 Random metre square stone density at Warren

1	2	3	4	5	6	7	8	9	10
240	5	40	6	6	0		1		2
240	12	40	1	19	0				
240	16	10	4	9	0				1
240	31	30	2	18	0				2
240	36	0	6	19	0				
240	43	40	0	16	7				
240	55	30	1	7	2				
240	68	40	3	14	2				2
240	69	60	2	19	8				9
240	100	10	5	9	1				
240	126	20	0	19	0			1	1
240	133	0	0	27	3				
50	5	70	4	4	0				
50	12	50	5	3	2				
50	16	40	4	5	0			1	
50	31	10	4	6	0				
50	36	50	2	8	0				
50	43	20	2	17	0				
50	55	20	3	6	0				
50	68	80	3	9	2				1
50	69	40	1	23	1				
50	100	0	3	23	1			1	
50	126	40	2	7	3				
50	133	30	3	12	0				
50	151	0	4	7	0				
50	170	0	7	0	0				
50	186	0	1	16	0				
30	5	40	3	8	0				
30	12	40	4	8	0				
30	16	10	1	15	0				1
30	36	10	0	7	0				
30	31	20	2	4	0	1		1	
30	43	30	1	11	0				
30	55	40	2	5	0				
30	68	10	3	13	0				
30	69	30	6	20	0				
30	100	50	2	4	0				
30	126	20	5	7	0		1		
30	133	20	4	6	0				
30	151	0	1	15	0				
30	170	0	2	9	0				1
30	186	0	1	25	14				
30	199	0	6	17	0				
30	203	0	4	10	3				
30	217	70	1	12	2				
30	229	10	7	5	2			1	1
30	238	10	4	3	4	1			
320	5	20	1	4	0		2		
320	12	30	9	3	0				
320	16	30	7	6	1				
320	31	40	3	15	1				
320	36	20	4	8	0				
320	43	50	5	7	0				
320	55	0	5	14	0				
320	68	20	0	8	0				2
320	69	20	3	3	0				1
320	100	30	3	4	0				
320	120	30	2	1	0				
320	133	80	1	8	10				
320	151	40	3	6	0				
320	170	0	3	19	0				
320	186	10	3	8	4				1
320	199	60	3	6	0				
320	203	10	1	17	25				
320	217	0	5	15	1				2
320	229	0	2	14	2				
320	238	20	1	12	3				
10	5	30	3	10	0				
10	12	40	4	7	0				
10	16	0	6	12	0				
10	31	10	1	20	0				

Column	
1	Transect degrees
2	Metre square distance along transect
3	Percent of bedrock in metre squares
4	Stone greater than 250mm in length
5	Stone less than 250mm in length
6	Stone less than 40mm in length
7	Worked stone -Preform
8	Worked stone -Block
9	Worked stone -Hammerstone
10	Worked stone -Flake

Table 6.13/2

10	36	20	3	9	1				
10	43	10	3	2	0				
10	55	10	1	7	0				
10	68	30	1	5	0				
10	69	40	0	6	3	1			
10	100	10	3	6	0				1
10	126	70	0	3	0				
10	133	70	1	3	0				
10	151	70	0	7	0				
10	170	40	0	9	2				
10	186	70	0	4	0				
10	199	40	1	8	0				
10	203	70	5	2	0				
10	217	10	0	11	5				
10	229	60	0	3	0				
10	238	10	4	16	0				2
270	5	30	7	8	0				1
270	12	40	5	6	1				
270	16	20	4	14	5	1			
270	31	30	3	6	0				
270	36	10	4	8	0		2		
270	43	10	4	7	0				
270	55	0	5	9	0			1	
270	68	0	5	16	0			1	1
270	69	0	4	18	0				
270	100	40	4	6	0				
270	126	0	5	10	3				2
270	133	30	1	14	2			2	
180	5	10	3	7	2				
180	12	20	5	6	2				
180	16	60	3	3	3				
180	31	20	1	8	2				
180	36	10	5	10	2				
180	43	10	1	16	2			1	
180	55	10	0	1	0				
180	68	0	0	0	0				
180	69	0	0	1	0	1			
180	100	30	0	3	0		1		
180	126	0	1	6	1			1	
180	133	90	0	1	1				
180	151	50	1	4	6				
180	170	30	3	7	0	1			
180	186	50	0	15	16				1
180	199	10	0	6	0				
180	203	0	0	17	0				
180	217	20	1	6	1				
180	229	0	5	12	0		1		2
180	238	10	2	19	2				
110	5	20	5	3	0				
110	12	10	3	12	1				
110	16	50	4	6	2				
110	31	10	3	16	0				
110	36	100	1	15	7				16
110	43	100	0	0	0				
110	55	40	4	9	0				
110	68	30	1	7	1				
110	69	50	1	3	1	1			
110	100	10	2	13	0				
110	126	10	0	4	2				
330	5	30	2	9	0				
330	12	20	4	8	0				
330	16	50	4	1	0	1			
330	31	30	1	7	0				
330	36	70	4	6	0				
330	43	10	4	8	6	1			1
330	55	50	0	7	0				
330	68	10	1	4	0				
330	69	10	1	4	0			1	
330	100	0	0	7	1				
330	126	30	2	10	0				
330	133	20	3	14	3				
330	151	0	4	9	0			1	
330	170	30	1	4	2				

Table 6.13/3

330	186	10	4	9	0	1			1
330	199	10	0	9	2			1	
330	203	100	4	6	0			1	
330	217	0	2	8	1				
330	229	70	2	7	0				
330	238	0	4	7	1				2
220	5	0	3	10	1				
220	12	0	8	6	0		1		
220	16	50	1	11	0		1		
220	31	60	0	8	0				
220	36	0	0	23	0				
220	43	40	0	0	3				
220	55	10	1	4	0				
220	68	40	0	5	0				
220	69	40	1	3	0			1	
220	100	10	7	8	3				
220	126	50	1	8	0				1
220	151	100	1	9	7				4
220	170	40	0	12	4				
350	5	30	3	1	0			1	
350	12	30	1	4	0				
350	16	60	1	5	0				
350	31	0	4	10	0				
350	36	80	2	12	0				
350	43	20	2	5	0				
350	55	40	2	5	0				
350	68	0	2	4	0				
350	69	0	2	4	0				
350	100	0	3	9	0				
350	126	10	0	2	0			1	
350	133	0	0	0	0				
350	151	20	0	8	1				
350	170	20	3	11	1			1	
350	186	30	1	23	2				
350	199	0	3	4	2				
350	203	20	0	12	2			1	1
350	217	30	0	3	0				
350	229	30	0	4	0				
350	238	0	2	3	1			1	
70	5	20	5	6	0				
70	12	10	4	9	0				
70	16	30	1	7	0				
70	31	40	3	9	0				
70	36	0	4	3	0				
70	43	50	0	13	18		1		12
70	55	30	1	7	0		1		
70	68	20	4	8	0				3
70	69	80	4	4	2				
70	100	0	5	22	4				
70	126	80	3	6	0				
70	133	0	4	7	0				
70	151	0	0	16	0				
160	5	30	6	4	4				
160	12	50	7	8	1				1
160	16	10	2	5	0				
160	31	80	1	7	0				
160	36	20	2	6	0				
160	43	10	0	8	0			1	
160	55	0	1	0	0				
160	68	80	0	3	0				
160	69	70	0	6	3				
160	100	0	3	5	2				
160	126	0	4	5	0				
160	133	0	1	7	0			2	
160	151	0	4	12	0			1	
160	170	0	0	2	0				
160	186	10	1	4	0			1	
160	199	40	1	7	0				
160	203	10	3	4	0				
160	217	0	4	5	0			1	
160	224	50	2	7	0			1	
160	238	10	3	5	1				1
			527	1825	258	10	12	28	80

Chapter 7

Table 7.1. Characteristic flakes found in axe reduction stages

Reduction Stage	From Newcomer, Burton and Edmonds	Stages at Gulgong & Warren	Quarry products	Flake debitage
3	Initial trimming of block	Blocking out	Block	Massive flakes; thick in section; elongated and invasive LWT=100x 100x50 small angular platform chips with large platforms
4	Mass reduction	Shaping	Blank	Broad squat flakes; thick in section LWT= 50x100x20
5	Final shaping & thinning	Advanced shaping and thinning	Preform	Thinning flakes; small thin platform chips LWT=
				100x50x5

Table 7.2 Features recorded on preforms from Gulgong and Warren

Feature of preform	Description
Made on a flake, **or** block	Either flake or block
Bifacial flaking	Yes/no important for flake
Measures	Axial in mm
LWT	Length Width Thickness
Measures	Maximum in mm
Length Width Thickness	-see text for description
Axial Length to width	
Weight in gms	
Reduction Stage	3 stages: Blocking Shaping Thinning
Symmetry	3 states: 1) attained 2) not attained 3) symmetry lost
Reason for abandonment	4 reasons: 1) Transverse snap 2) Edge damage 3) Mass removal 4) Raw material flaw
Flake count	
Hinged flake count	
Step flake count	
Cortex %	

Table 7.3 The attributes recorded for archaeological material from the excavation

Flake Feature	Description
Not Worked	No flaking features
Worked	Carries flaking features
Flake Size	Maximum length measure
Length	From platform or PFA
Width	At mid-point to length
Thickness	At mid point to length
PFA Found	Impact point can be identified
PFA Crushed	No platform intact
PFA Width	Platform intact
Cortex	Percentage of cover on dorsal side
Flaked on 2 sides	Dorsal and ventral flake marks
Dorsal ridges	Presence or absence on flake
Hinged flake	Presence of hinge termination
Ripple marks	Presence of ripples on ventral side
Flaw in material	Crack or gap in the material
Flat shape	
Thin shape	
Block shape	
Angular shape	

Table 7.4 Experimental stone reduction at Gulgong

Input Details	Comments
Two people; stone knapper and the recorder	Usually same knapper through each experiment; some knappers change in the course of the experiment
Raw material sample selected	Forty numbered pieces of Gulgong stone were available
Weight and metric (LWT) size of the sample selected	The size of the input raw material varied between sample input pieces
General morphology of the selected stone as either rounded, or angular	Used as a guide to the starting condition of the workpiece
The surface can be cortex covered, or clean	The working properties and flakes produced are affected by the presence or absence of cortex
The raw material may be flawed, or clear	The flaws may be visible fractures, and may appear during knapping
The workpiece can be anvil-rested, or held freehand	Working details of holding the workpiece will change in some experiments
The percussion tool can be a stone hammer, or a steel hammer	In a few sections of the experiments a steel hammer was used
The type of blow delivered by the knapper can be a series of short blows, or a full arm swing	Short blows are usual, but with an anvil block then an arm swing may be used
The hand hold for the percussor may be single hand or double hand	Most of the hammerstones selected were only suitable for single hand use

Table 7.5 Attributes recorded in the experimental stone reduction of Gulgong material at UNE

Attribute	Explanation
Experiment number	
Raw Material sample #	
Knapper	
Strike count	
Stone start shape:	Round Angular
Stone quality:	Flawed Not flawed
Surface of stone:	With cortex No cortex
Reduction technique:	Anvil rested Freehand
Hammer:	Stone Steel
Knapping by:	Short blows Arm swing
Knapping grip:	Singlehand Doublehand
Weight at start in kg	
Measure in mm	Length Width Thickness
Weight at end in kg	

Table 7.6 Experimental trials on Gulgong material at UNE

Exp No.	Raw material sample No.	Knapper	Event No.	Strike count	Stone start shape	Stone quality	Stone surface	Reduction technique	Hammer	Knapping tchnique	Grip	Start wgt (kg)	Length (mm)	Width (mm)	Thickness (mm)	End wgt (kg)
1	35	PG	1-4	145	Round	Flawed	Cortex	Anvil	Stone	Short blows	1 hand	19.1	480	290	180	6.7
2	36	PG	1-7	420	Angular	Not flawed	No cortex	Anvil	Stone	Short blows	1 hand	4.6	300	150	100	1
3	4	GK	1-4	175	Angular	Flawed	No cortex	Anvil	Stone	Short blows	1 hand	8.9	550	150	150	1.8
4	fromExp3	WP/GK	1-6	92	Angular	Not flawed	No cortex	Anvil	Stone & steel	Short blows	1 hand & 2 hand	12.2	410	145	140	5.8
5	16	WP/GK	1-9	419	Angular	Not flawed	No cortex	Anvil & freehand	Stone	Short blows	1 hand	4.7	270	160	80	1
6	1	GK/WP	1-3	124	Angular	Not flawed	No cortex	Anvil	Stone & steel	Short blows	1 hand	5.2	390	190	130	2.2
7	38/2A	PG	1+2	189	Angular	Not flawed	No cortex	Anvil	Stone	Short blows & arm swing	1 hand	2.8	260	90	75	1
8	38/2B	PG	1	48	Angular	Not flawed	No cortex	Anvil	Stone	Arm swing	1 hand	4.5	290	110	90	4.4
9	2	WP/GK	1-3	157	Angular	Flawed	No cortex	Anvil & freehand	Stone	Short blows	1 hand	4.8	295	165	80	1.4
10	5	PG	1+2	62	Angular	Flawed	No cortex	Anvil	Stone	Short blows & arm swing	1 hand	7.2	410	180	100	4.2
11	6	WP	1-3	330	Round	Not flawed	No cortex	Anvil	Stone & steel	Short blows	1 hand	7	275	230	100	1

Table 7.6/2

12	23	GK	1+2	158	Angular	Not flawed	No cortex	Anvil & freehand	Stone	Short blows	1 hand	3.1	265	135	90	0.9
13	WRO1	PG/RSC	1-4	N/A	Angular	Not flawed	No cortex	Anvil	Stone	Short blows & arm swing	1 hand & 2 hand	20	460	200	180	N/A
14	RO21	PG/RSC	1	N/A	Round	Flawed	Cortex	Anvil	Stone	Short blows & arm swing	1 hand & 2 hand	20	490	220	180	N/A

Table 7.7 Events recorded in experimental trials

Events are:

1 Change of sides, faces, or edges on the workpiece: so there must be a break in the physical location of the flake removal, something which happens less in early stages than late

2 Removal of large slab: changes mass of block on one face and everything has to be reconsidered

3 Return to a previously worked edge or face: to reincorporate the earlier events on that part of the preform back into the process

4 Change position of the workpiece: for example, by wedging mass against an anvil to increase mass for better detachments

5 Move from sides or edges to centre mass and back

6 Change of hammerstone

7 Change in size of the flakes removed: for example where work moves from an edge into the inner mass then flakes get smaller as this is reduced

8 Excessive force and repeated blows with a hammerstone to remove stone from the block

Table 7.8 Experimental trials for extraction of raw material at Gulgong

Weight (grams)	Flake Size	Flat/ thin	Angular block	Irregular shape	Flawed
620	230		1		
2235	295		1		
1585	240		1		
1836	255		1	1	1
3170	385		1	1	
TOTAL			**5**	**2**	**1**

Table 7.9 Experimental extraction of raw material at Warren commercial quarry

Trial #	Type of hammer	Length	Width	Thick	Shape	Regular shape (Y/N)
1	Stone	335	120	110	angular block	Y
2	Stone	270	165	120	angular block	N
3	Steel	275	195	110	angular block	N
4	Steel	190	210	78	flat flake	Y

Table 7.10. Experimental trials on raw material at Gulgong of stone detached above 80mm in length

Experiment#	Wgt (gms)	Flake Size	Flat/Thin	Angular/block
Exp G1	287	100		1
	157	80		1
	581	155		1
	419	180		1
	132	110		1
	35	85	1	
	44	92		1
	15	80	1	
	41	80		1
	2650	265		1
	1030	200		1
	632	155		1
	318	170		1
	185	150	1	
	165	115		1
	115	95		1
	69	90		1
	57	86		1
	41	81		1
	36	100	1	
	51	82		1
	70	90	1	
	172	102		1
	111	85	1	
	65	80	1	
	12	93		1
	360	115		1
	98	90		1
	167	120		1
	133	105		1
	127	90		1
	54	92		1
	64	82		1
	75	108	1	
	68	85		1
Total			8	27
Exp G2	517	165		1
	302	165		1
	289	148		1
	123	120		1
	48	92		1
	17	80	1	
	13	82	1	
	472	190		1
	177	135		1
	200	130		1
	108	135		1
	39	85		1
	44	80		1
	52	87		1
Total			2	12

Table 7.11. The Shape of flakes in the experimental axe shaping on Gulgong material

Experiment number	Event number	Flake count	Flat Thin	Angular Block
1	1	6	1	5
	2	17	10	7
	3	33	17	16
	4	106	39	67
Total		**162**	**67**	**95**
2	1	10	8	2
	2/3	16	7	9
	4	22	11	11
	5	5	2	3
	6	23	13	10
	7	44	28	16
Total		**120**	**69**	**51**
3	1/2	9	5	4
	3	12	0	12
	4	12	6	6
Total		**33**	**11**	**22**
4	1-4	17	10	7
	5/6	41	15	26
Total		**58**	**25**	**33**
5	1	1	1	
	2	5	4	1
	3	8	4	4
	4	9	6	3
	5	4	1	3
	6/7	6	5	1
	8	10	6	4
	9	7	2	5
Total		**50**	**29**	**21**
6	1	4	2	2
	2	5	2	3
	3	20	16	4
Total		**29**	**20**	**9**
7	1	8	7	1
	2	9	5	4
Total		**17**	**12**	**5**
8	1	4	3	1
Total		**4**	**3**	**1**
9	1	6	4	2
	2	45	27	18
	3	15	11	4
Total		**66**	**42**	**24**
10	1	23	14	9
	2	25	12	13
Total		**48**	**26**	**22**
11	1/2	7	7	0
	3	49	27	22
Total		**56**	**34**	**22**

Table 7.11/2

12	1	13	11	2
	2	14	13	1
Total		**27**	**24**	**3**
13	1	30	8	22
	2	38	16	22
	3	70	15	55
	4	2	2	0
Total		**140**	**41**	**99**
14	1	46	34	12
Total		**46**	**34**	**12**
All Exps Total		**856**	**437**	**419**

Table 7.12 Experimental stone flakes classified by shape for the total of events in each experiment Summary of Table 7.11

Experiment number	Event number	Flat/ Thin	Angular Block	Total Count
1	1-4	67	95	162
2	1-7	69	51	120
3	1-4	11	22	33
4	1-6	25	33	58
5	1-9	29	21	50
6	1-3	20	9	29
7	1-2	12	5	17
8	1	3	1	4
9	1-3	42	24	66
10	1-2	26	22	48
11	1-3	34	22	56
12	1-2	24	3	27
13	1-4	41	99	140
14	1	34	12	46
Total		**437**	**419**	**856**
%of total		**51**	**49**	**100**

Table 7.13 Large flakes and blocks (>180mm in length) from experimental trials with material from Gulgong

Flake #	Experiment#	Event#	Weight (grams)	Size length (mm)
	1	1	1211	195
	1	2	908	210
	1	4	759	250
	3	1/2	1443	220
	4	1-4	715	195
	4	5/6	585	200
			1606	230
	5	2	866	190
	5	4	823	180
	1	2	1062	185
	1	1	815	180
	1	2	2650	265
			1030	200
	14	1	517	180
			500	190
Mean			**1031**	**196**
Range (max)			**2650**	**265**
(min)			**500**	**180**

Table 7.14 Experimental stone flakes from extraction to the blocking out stage of reduction

Experiment Number	Event number	No. of flat & thin flakes	No. of angular block flakes	Total count	Angular block flakes as % of total
1	1-4	67	95	162	*58.6*
3	1-2	4	5	9	*55.6*
4	1-4	10	7	17	*41.2*
13	1-4	41	99	140	*70.7*
14	1	34	12	46	*26.1*
Total		**156**	**218**	**374**	*58.3*
% of total		*42*	*58*	*100*	

Table 7.15 Experimental stone flakes from the blocking out stage of reduction

Experiment Number	Event number	No. of flat & thin flakes	No. of angular block flakes	Total count	Angular block flakes as % of total
2	1-6	41	35	76	46.0
3	3	0	12	12	100
4	5-6	15	26	41	63.4
5	1-2	5	1	6	16.7
6	1	2	2	4	50.0
7	1-2	12	5	17	29.4
8	1	3	1	4	25.0
9	1	4	2	6	33.3
10	1-2	26	22	48	45.8
11	1-2	7	0	7	100
12	1-2	24	3	27	11.1
Total		**139**	**109**	**248**	**44.0**
%of total		**56**	**44**	**100**	

Table 7.16 Experimental stone flakes from the shaping stage of reduction

Experiment Number	Event number	No. of flat & thin flakes	No. of angular block flakes	Total count	Angular block flakes as % of total
2	7	28	16	44	*36.4*
3	4	6	6	12	*50.0*
5	3-7	16	11	27	*40.1*
6	2-3	18	7	25	*28.0*
9	2-3	38	22	60	*3*
11	3	27	22	49	*44.9*
Total		**133**	**84**	**217**	*38.7*
% of total		***61***	***39***	***100***	

Table 7.17 Experimental stone flakes from the thinning stage of reduction

Experiment Number	Event number	No. of flat & thin flakes	No. of angular block flakes	Total count	Angular block flakes as % of total
5	8-9	8	9	17	*36.4*
Total		**8**	**9**	**17**	***36.4***
% of total		***47***	***53***	***100***	

Table 7.18 Experimental flaking of Gulgong stone: Squat and thick flakes

Experiment No.	Event No.	Stage of Reduction	Length to width = <0.67 (Squat)	Length to width = <0.67 - 1.0 (Squat)	Length to width = 1.0 - 2.0 (Long)	Length to width = >2.0 (Long)	TOTAL length to width	Length to thickness = <4.0 (Thick)	Length to thickness = >4.0 (Thin)	TOTAL length to thickness
1	4	Extraction	4	0	0	0	**4**	2	2	**4**
2	1-6 7	Blocking out Shaping	22 17	9 6	12 3	3 0	**46** **26**	25 19	21 7	**46** **26**
3	3	Blocking out	1	0	2	0	**3**	1	2	**3**
4	1-4 5-6	Extraction Blocking out	1 9	0 2	4 2	0 0	**5** **13**	2 7	3 6	**5** **13**
5	1-2 4-7 8-9	Blocking out Shaping Thinning	0 0 6	0 6 0	9 3 5	3 2 0	**12** **11** **11**	3 3 7	9 8 4	**12** **11** **11**
6	2-3	Shaping	8	5	0	0	**13**	9	4	**13**
7	1-2	Blocking out	3	1	0	0	**4**	3	1	**4**
8	1	Blocking out	2	0	0	0	**2**	2	0	**2**
9	2	Shaping	1	2	1	0	**4**	3	1	**4**
10	1-2	Blocking out	2	0	0	0	**2**	2	0	**2**
11	3	Shaping	10	3	0	0	**13**	9	4	**13**
12	2	Blocking out	3	1	0	0	**4**	3	1	**4**
Total			**89**	**35**	**41**	**8**	**173**	**100**	**73**	**173**
%Total			***51.4***	***20.2***	***23.7***	***4.6***	***100***	***57.8***	***42.2***	***100***

Table 7.19 Experimental flaking of Gulgong stone: Squat and thick flakes in the extraction stage

Experiment No.	Event No.	Length to width = <0.67 (Squat)	Length to width = <0.67 - 1.0 (Squat)	Length to width = 1.0 - 2.0 (Long)	Length to width = >2.0 (Long)	TOTAL length to width	Length to thickness = <4.0 (Thick)	Length to thickness = >4.0 (Thin)	TOTAL length to thickness
1	4	4	0	0	0	**4**	2	2	**4**
4	1-4	1	0	4	0	**5**	2	3	**5**
Total		**5**	**0**	**4**	**0**	**9**	**4**	**5**	**9**
%Total		*56*	*0*	*44*	*0*	*100*	*44*	*56*	*100*

Table 7.20 Experimental stone from Gulgong: squat and thick flakes from the blocking out stage of reduction

Experiment No.	Event No.	Length to width = <0.67 (Squat)	Length to width = <0.67 - 1.0 (Squat)	Length to width = 1.0 - 2.0 (Long)	Length to width = >2.0 (Long)	TOTAL length to width	Length to thickness = <4.0 (Thick)	Length to thickness = >4.0 (Thin)	TOTAL length to thickness
2	1-6	22	0	12	3	**46**	25	21	**46**
3	3	1	0	2	0	**3**	1	2	**3**
4	5-6	9	2	2	0	**13**	7	6	**13**
5	1-2	0	0	9	3	**12**	3	9	**12**
7	1-2	3	1	0	0	**4**	3	1	**4**
8	1	2	0	0	0	**2**	2	0	**2**
10	1-2	2	0	0	0	**2**	2	0	**2**
12	2	3	1	0	0	**4**	3	1	**4**
Total		**42**	**13**	**25**	**6**	**86**	**46**	**40**	**86**
%Total		*49*	*15*	*29*	*7*	*100*	*54*	*46*	*100*

Table 7.21 Experimental flaking of Gulgong stone: Squat and thick flakes in the shaping stage of reduction

Experiment No.	Event No.	Length to width = <0.67 (Squat)	Length to width = <0.67 - 1.0 (Squat)	Length to width = 1.0 - 2.0 (Long)	Length to width = >2.0 (Long)	TOTAL length to width	Length to thickness = <4.0 (Thick)	Length to thickness = >4.0 (Thin)	TOTAL length to thickness
2	7	17	6	3	0	**26**	19	7	**26**
5	4-7	0	6	3	2	**11**	3	8	**11**
6	2-3	8	5	0	0	**13**	9	4	**13**
9	2	1	2	1	0	**4**	3	1	**4**
11	3	10	3	0	0	**13**	9	4	**13**
Total		**36**	**22**	**7**	**2**	**67**	**43**	**24**	**67**
Percent		*54*	*33*	*10*	*3*	*100*	*64*	*36*	*100*

Table 7.22 Hinge fractures by reduction stage in experimental trials on material from Gulgong

Reduction stage	Experiment#	Event#	Flakes	Hinges	*Hinge %*
Extraction (2)	3	1, 2	9	1	
	4	1 to 4	17		
Total (2)			**26**	**1**	***3.9***
Blocking out (3)	3	3	12		
	4	5, 6	41	3	
	5	1	2	1	
	5	2	7		
Total (3)			**62**	**4**	***6.5***
Shaping (4)	3	4	12		
	5	3	11	2	
	5	4	11	2	
	5	5	5	1	
	5	6, 7	9		
Total (4)			**48**	**5**	***10.4***
Thinning (5)	5	8	13		
	5	9	9		
Total (5)			**22**	**0**	***0***
TOTAL			**158**	**10**	***6.3***

Table 7.23 Hinged flake measures from experimental trials with Gulgong raw material

Experiment#	Event #	Length (mm)	Width (mm)	Thick (mm)
3	1, 2	45	35	7
4	5, 6	75	75	20
	5, 6	30	57	6
	5, 6	24	43	4
5	1	44	32	10
	3	41	35	8
	3	55	30	15
	4	43	28	7
	4	42	24	5
	5	41	28	15

Table 7.24 The Reason for abandonment of preforms at Gulgong and Warren

		Transverse snap	Edge damage	Mass removal	Raw material flaw	TOTAL
Gulgong	N	35	165	66	27	**293**
	%	*12*	*56*	*23*	*9*	***100***
Warren	N	82	80	37	0	**199**
	%	*41*	*40*	*19*	*0*	***100***

Table 7.25 Reason for abandonment of axe preforms by stages of reduction, along transects in Areas A, B and C at Gulgong

Stage of reduction	Transverse snap	Edge damage	Mass removal	Raw material flaw	TOTAL	PERCENT
3. Blocking out stage	6	41	26	14	87	*40*
2. Shaping stage	15	56	17	3	91	*42*
1. Advanced thinning stage	8	20	9	2	39	*18*
TOTAL	29	117	52	19	217	*100*
PERCENT	*14*	*53*	*24*	*9*	*100*	

Table 7.26 Reason for abandonment of axe preforms by stages of reduction along transects at Warren, Little Mount.

Stage of reduction	Transverse snap	Edge damage	Mass removal	Raw material flaw	TOTAL	PERCENT
3. Blocking out stage	20	24	12	0	56	*40*
2. Shaping stage	29	19	7	0	55	*42*
1. Advanced thinning stage	2	6	6	0	14	*18*
TOTAL	51	49	25	0	125	*100*
PERCENT	*41*	*39*	*20*	*0*	*100*	

Table 7.27 Summary of stepped and hinge fractures on preforms from Gulgong and Warren.

SITE	Number of preforms	Percent with Hinge Fractures	Percent with Step Fractures
Gulgong	341	*87.3%*	*89.6%*
Warren	124	*6.6%*	*72%*

Table 7.28 Number of Hinge fractures on preforms from all recording at Gulgong and Warren

	Number of hinge fractures																					
	0		1		2		3		4		5		6		7		8		>8		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Gulgong	42	12	55	16	70	21	77	23	46	14	30	9	8	2	4	1	4	1	5	1	**341**	**100**
Warren	117	94	6	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**124**	**100**

Table 7.29 Hinged flake count by the stage of reduction recorded from transects at Gulgong (Areas A, B, C) and at Warren

	Number of hinge fractures										
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**>8**	**TOTAL**
Gulgong											
Blocking out stage	14	14	17	16	6	1	2	0	0	0	
Shaping stage	16	20	24	20	6	12	2	0	2	1	
Advanced thinning stage	2	5	11	8	5	1	1	0	0	2	
TOTAL	**32**	**44**	**54**	**44**	**17**	**14**	**5**	**0**	**2**	**3**	**213**
Percent	***15***	***21***	***25***	***21***	***8***	***7***	***2***	***0***	***<1***	***1***	***100***
Warren											
Blocking out stage	47	4	1								
Shaping stage	49	2									
Advanced thinning stage	21										
TOTAL	**117**	**6**	**1**								**124**
Percent	***94***	***5***	***1***								***100***

Table 7.30 Percentage of hinge flakes grouped by stages of reduction from transects at Gulgong on Areas A, B, C and at Little Mount, Warren

	No. of hinge flakes			
	0	1 - 4	>4	%
Gulgong (n=213)				
Stage 3: Blocking out	19%	77%	4%	100
Stage 2: Shaping	16%	67%	17%	100
Stage 1: Advanced thinning	6%	83%	11%	100
TOTAL %	15%	75%	10%	100
Warren (n=124)				
Stage 3: Blocking out	90%	10%		100
Stage 2: Shaping	96%	4%		100
Stage 1: Advanced thinning	100%	0%		100
TOTAL %	94%	6%		100

Table 7.31 Flaking Control features from GFM1

GFM1 Excavation square	PFA total	Worked stone	Hinge flake fracture	Ventral ripple	PFA crushed	PFA found	PFA width measure
GFM1 1C 1	21	102	2	0	8	8	5
1C 2	40	232	2	0	20	17	3
1C 3	42	324	2	0	17	19	6
1C 4	51	428	7	0	20	24	7
1C 5	34	362	3	0	17	13	4
1C 6	17	63	1	0	4	13	0
1C 7	0	154	0	0	0	0	0
Total1C	**205**	**1665**	**17**	**0**	**86**	**94**	**25**
GFM1 2C 1	13	30	4	0	5	4	4
2C 2	157	522	10	0	95	62	0
2C 3	53	148	10	0	22	31	0
2C4	45	238	9	0	17	21	7
2C5	40	113	4	0	8	32	0
2C6	26	59	1	0	8	17	1
2C7	9	15	0	0	1	5	3
2C8	10	23	0	0	3	5	2
2C9	4	8	0	0	0	2	2
Total 2C	**357**	**1156**	**38**	**0**	**159**	**179**	**19**
GFM1 3C 1	74	630	5	0	18	49	7
3C 2	30	194	2	0	6	18	6
3C 3	46	345	1	0	18	30	8
3C 4	29	120	1	0	5	21	3
Total 3C	**179**	**1289**	**9**	**0**	**47**	**118**	**24**
GFM1 4C S	0	760	14	9	0	0	0
4C L1	23	3511	84	43	5	18	0
4C L2	0	660	11	9	0	0	0
4C L3	0	113	0	0	0	0	0
Total 4C	**23**	**5044**	**109**	**61**	**5**	**18**	**0**
Total	**774**	**9154**	**173**	**61**	**297**	**409**	**68**
Percent	*8.4*	*100*	*1.9*	*0.7*	*38.4*	*52.8*	*8.8*

Table 7.32 Comparison of GFM1 2C with total of 4 GFM1

Excavation square	PFA total	Worked stone	PFA crushed	PFA found	PFA width measure
GFM1 (total)	774	9154	297	409	68
Percent	*8.4*	*100*	*38.4*	*52.8*	*8.8*
GFM1 2C	357	1156	159	1948	<1
Percent	*30.9*	*100*	*13.8*	*17.1*	*<1*

Table 7.33 Hinged flakes from the 10x5 metre surface area at Gulgong

	Hinged flakes	Total worked stone
Count of all worked stone	65	892
Percent	*7.3*	*100*
Count of LWT	34	139
Percent	*24.5*	*100*

Chapter 8

Table 8.1 Tool kits in relation to the production trajectory and use-life for stone axes

Stage of reduction	*Predicted*	*Gulgong*	*Warren*
Extraction	Lever poles Fire Wedges Heavy h/stone	Heavy h/stone Actinolitic schist Local stone not for axes	None required
Blocking out	Anvil Large h/stones	Anvil Large h/stone Actinolitic schist	Large h/stone Actinolitic schist
Shaping	Medium h/stone	Medium h/stone Actinolitic schist Exotic stone	Medium h/stone Actinolitic schist
Thinning	Small h/stone	Small h/stone Actinolotic schist Exotic stone	Small h/stone Actinolitic schist
Grinding	Grinding slab	Fixed grindstone	Fixed grindstone
Use and Maintenance	Small h/stone Whetstone Portable grindstone	None	**-at campsites** Small h/stone Exotic stone Portable grindstone Whetstone

Table 8.2 Hammerstones from Gulgong in total

Location	*Length*	*Width*	*Thickness*	*Weight*	*Raw material type**	*No. of battered points*	*Trajectory***
GWRO1	155	90	45	1002	2	1	1
GWRO2	195	90	55	1302	2	1	1
GWRO1	135	60	42	518	2	1	1
GFM T11E	110	60	36	294	3	1	4
GHS1T4C	120	65	55	517	1	2	1
GHST4C	165	98	50	1307	1	2	1
GHS3T4C	75	50	40	223	2	1	1
G T12/3	80	60	50	343	1	1	1
GHS1T1C	90	60	40	243	1	1	1
G T4C	84	48	18	98	2	1	1
G T7CM25	95	70	45	342	1	1	1
GHS#49	95	75	25	228	3	1	4
GHS#50	87	73	48	560	3	1	4
GT12M78	90	75	40	253	3	1	4
GHS1	100	90	28	295	3	1	4
GHS2	75	45	32	151	3	1	4
GE/H134	73	60	50	315	3	1	4
GFM14CL1	85	65	45	425	3	1	5
GFM12Cspit7	64	42	40	155	3	1	5
GFM	85	62	49	330	3	2	4
GFM	103	83	23	275	3	1	4
Ga50at19.3m	130	62	55	460	1	1	1
Ga60at12.2m	89	54	42	275	1	1	1
GExtrFace	295	120	90	4750	2	1	1
E1 ExtrFace	122	48	35	285	1	2	1
97 RO1 T2	139	105	63	1028	2	1	1
49 T19 M183	190	85	72	1427	1	2	1
45 T19 M165	195	87	64	1219	1	1	1
51 T19 M183	155	98	61	868	1	1	1
86 T3 M70	137	68	34	351	1	1	3
70 T3-T4	280	145	120	6156	1	2	3
54 T18-20	270	113	78	2372	1	1	3
T7c/10	236	122	63	2493	1	1	3
T11 M60	130	70	54	655	1	1	3
T11 M24	215	114	100	2831	1	1	1
T8c/2	205	90	67	1447	1	1	1
T14 M80	180	65	55	1068	1	2	3
T11/31	265	112	80	3320	1	1	2
T12 M35	158	85	65	1086	1	1	1
T11/13	161	80	57	962	1	1	3
T11/15	116	74	43	503	1	1	1
T11/6	185	132	80	2570	1	1	2
FM1 2Cspit9	260	140	105	2100	1	1	2
10x5sq	100	65	27	215	1	3	1
Ga 60N 36.8m	145	110	43	1165	1	1	2
Ga60 12.2m	154	87	64	945	1	1	1
Ga60 15.5m	108	88	32	425	1	3	3
Ga30N 22.4m	135	57	44	430	1	1	3
Ga30N 22.4m	155	81	58	890	1	1	1
Ga60N 12.3m	110	48	42	270	1	1	3
Ga30N 22.4m	247	74	72	2050	1	1	3
#P2	210	120	55	1875	1	1	3
Ga45 32.3m	115	58	52	450	1	3	3

*** (raw material type):**
1=fine grained actinolitic schist
2=coarse grained actinolitic schist
3=exotic/off site stone

****(Trajectory):**
1=hammerstone
2=block to hammerstone
3=preform to hammerstone
4=exotic hammerstone
5=exotic muller to hammerstone

Table 8.3 Hammerstones from transects at Gulgong

Location	Length	Width	Thickness	Weight	Raw material type*	No. of battered points	Trajectory**
T4C	120	65	55	517	1	2	1
T4C	165	98	50	1307	1	2	1
T4C	75	50	40	223	2	1	1
T12/3	80	60	50	343	1	1	1
T1C	90	60	40	243	1	1	1
T4C	84	48	18	98	2	1	1
T7CM25	95	70	45	342	1	1	1
T12M78	90	75	40	253	3	1	4
T2 97 RO1	139	105	63	1028	1	1	1
T19 M183	190	85	72	1427	1	2	1
T19 M165	195	87	64	1219	1	1	1
T19 M183	155	98	61	868	1	1	1
T3 M70	137	68	34	351	1	1	3
T3-T4	280	145	120	6156	1	2	3
T18-20	270	113	78	2372	1	1	3
T7C/10	236	122	63	2493	1	1	3
T11 M60	130	70	54	655	1	1	3
T11 M24	215	114	100	2831	1	1	1
T8C/2	205	90	67	1447	1	1	1
T14 M80	180	65	55	1068	1	2	3
T11/31	265	112	80	3320	1	1	2
T12 M35	158	85	65	1086	1	1	1
T11/13	161	80	57	962	1	1	3
T11/15	116	74	43	503	1	1	1
T11/6	185	132	80	2570	1	1	2

*** (Raw material type):**
1=fine grained actinolitic schist
2=coase grained actinolitic schist
3=exotic/off site stone

****(Trajectory):**
1=hammerstone
2=block to hammerstone
3=preform to hammerstone
4=exotic hammerstone
5=exotic muller to hammerstone

Table 8.4 Hammerstones from Warren in total

Location	*Length*	*Width*	*Thickness*	*Weight*	*No. of battered points*	*Trajectory**
T150/4	80	70	45	310	1	1
Isolated find	155	135	75	1950	1	1
T500/14	126	60	48	570	2	3
Isolated find	105	88	67	650	1	1
Isolated find	115	75	47	575	1	3
Isolated find	147	90	45	860	1	3
Isolated find	186	85	52	950	2	1
Isolated find	120	108	47	830	1	1
Isolated find	105	105	48	645	1	3
Isolated find	125	85	65	1075	1	1
Isolated find	103	83	42	480	2	3
T500/16/7	90	65	45	340	1	1
Isolated find	90	105	40	570	1	3
Isolated find	152	95	55	1180	2	2
T500/14	122	100	32	587	1	3
T500/14	120	90	64	779	1	2
Isolated find	118	80	45	603	1	3
T500/14	107	100	45	540	2	3
Isolated find	125	72	36	517	1	1
Isolated find	140	100	47	805	1	3
Isolated find	128	85	52	730	1	3
Isolated find	140	125	62	1770	2	1
T150/4	115	90	43	600	1	3
T500/8	115	70	60	650	1	1
T500/12	110	85	38	420	2	3
ISOLATED	98	90	42	434	1	3
T500/10	100	96	45	520	2	3
T500/10	87	110	47	660	1	3
T500/10	100	120	47	835	1	3
T500/10	102	96	40	765	1	3
T500/13	135	118	50	1215	1	5
T500/13	135	68	60	840	2	3
T500/13	145	77	53	765		3
T500/18	110	70	38	650		1
T150/6	125	96	65	990	2	1
T500/10	83	60	38	250	2	3
T500/10	95	82	50	450	1	1
T500/10	70	45	35	120	1	2
T500/15	115	62	58	530	1	1
ExtractionFace	135	105	64	1275	2	1
Study Area	112	92	44	705	1	4
Study Area	85	85	75	780	1	5
Study Area	105	75	63	675	3	1
Isolated find	98	103	46	710	1	4
Isolated find	123	55	45	475	2	1
Isolated find	105	88	67	650	1	1
Isolated find	115	75	47	575	1	3
Isolated find	147	90	45	860	1	3
Isolated find	186	85	52	950	2	3
Isolated find	120	108	47	830	1	2
Isolated find	105	105	48	645	1	1
Isolated find	125	85	65	1075	1	1
Isolated find	103	83	42	480	2	3

*** (Trajectory):**
1=hammerstone
2=block to hammerstone
3=preform to hammerstone
4=transverse snap preform to hammerstone
5=core to hammerstone

Table 8.5 Hammerstones from transects at Warren

Location	*Length*	*Width*	*Thickness*	*Weight*	*No. of battered points*	*Trajectory**
T150/4	80	70	45	310	1	1
T500/14	126	60	48	570	2	3
T500/16/7	90	65	45	340	1	1
T500/14	122	100	32	587	1	3
T500/14	120	90	64	779	1	2
T500/14	107	100	45	540	2	3
T150/4	115	90	43	600	1	3
T500/8	115	70	60	650	1	1
T500/12	110	85	38	420	2	1
T500/10	100	96	45	520	2	1
T500/10	87	110	47	660	1	1
T500/10	100	120	47	835	1	1
T500/10	102	96	40	765	1	1
T500/13	135	118	50	1215	1	5
T500/13	135	68	60	840	2	3
T500/13	145	77	53	765	1	3
T150/6	125	96	65	990	2	1
T500/10	83	60	38	250	2	3
T500/10	95	82	50	450	1	1
T500/10	70	45	35	120	1	2
T500/15	115	62	58	530	1	1

***(Trajectory):**
1=hammerstone
2=block to hammerstone
3=preform to hammerstone
4=transverse snap to hammerstone
5=core to hammerstone

Table 8.6 Summary of hammerstones

	H/stones of stone used for axes	H/stones of stone from quarry, not used for axes	Total	H/stones of exotic stone	Total
Gulgong					
Across whole site	35	7	42	11	53
% of site	*83*	*17*	*100*		
On Transects	21	3	24	1	25
% of site	*87*	*13*	*100*		
Warren					
Across whole site	53				
% of site	*100*				
On Transects	21				
% of site	*100*				

Table 8.7 Battering on hammerstones

	Number of battered points 1	2	3	Total
Gulgong				
Across whole site	42	8	3	53
% of total	*80*	*15*	*5*	*100*
On Transects	20	5	0	25
% of total	*80*	*20*	*0*	*100*
Warren				
Across whole site	37	15	1	53
% of total	*70*	*28*	*2*	*100*
On Transects	14	7	0	21
% of total	*67*	*33*	*0*	*100*

Table 8.8 Hammerstones compared with axe preforms

	Preforms	Hammer stones	Total
From whole site:			
Gulgong	350	53	403
%	*87*	*13*	*100*
Warren	235	53	288
%	*82*	*18*	*100*
From transects:			
Gulgong	222	25	247
%	*90*	*10*	*100*
Warren	124	21	145
%	*86*	*14*	*100*

Table 8.9 Large hammerstones recorded at Gulgong

Location	Length (mm)	Weight (gm)
Length >250mm and heavier than 2kg		
Excavation:		
Extraction face	295	4750
FM1 2C spit 9	260	2100
Transect:		
T3 M70	280	6156
T 18 M35	270	2372
T 11 M31	265	3320
Heavier than 2kg		
Transect:		
T7C/10	236	2493
T11 M24	215	2831
T11/6	185	2570
Ga 30N	247	2050

Table 8.10 Hammerstones grouped by weight

	Weight in grams (gms)						
	<300	300 - <650	650 - <1000	1000 - <1500	1500 - <2000	>2000	Total
Gulgong:							
N	3	15	5	10	1	9	53
%	*25*	*28*	*9*	*19*	*2*	*17*	*100*
Warren:							
N	2	21	21	7	2	0	53
%	*4*	*40*	*40*	*13*	*4*	*0*	*100*

Table 8.11 Trajectory of hammerstones from all recordings at Gulgong

Trajectory	Raw material used				
	Axe material	Coarse grain from quarry	Ofsite Exotic	Total	*% of total*
As hammerstone	18	7	10	35	*66*
From blocking out	4	0	0	4	*8*
From shaping and thinning stage	13	0	0	13	*24*
From other tool form (muller)	0	0	1	1	*2*
Total	35	7	11	53	*100*
% of total	*66*	*13*	*21*	*100*	

Table 8.12 Trajectory of hammerstones from all recordings at Warren

Trajectory	N	%
As hammerstones	20	*38*
From blocking out	4	*7*
From shaping and thinning stage	18	*34*
From transverse snap	9	*17*
Core for flakes	2	*4*
Total	53	*100*

Table 8.13 Hammerstones from transects by type of material used and point in the production trajectory

Trajectory	Raw material used				
	Preform	**Coarse grain**	**Exotic**	**Total**	*%*
Gulgong					
As hammerstone	12	3	1	17	*64*
From block	2	0	0	2	*0*
From preform	7	0	0	7	*28*
From transverse snap	0	0	0	0	*0*
From core	0	0	0	0	*0*
Total	**21**	**3**	**1**		*100*
%	*84*	*12*	*4*	*100*	
Warren					
As hammerstone	7				*33*
From block	1				*5*
From preform	9				*43*
From transverse snap	4				*19*
From core	0				*0*
Total	**21**				***100***
%	*100*				