

LITHIC ANALYSIS OF AN EARLY LATER STONE AGE ASSEMBLAGE AT  
MALONY'S KLOOF, A ROCK SHELTER IN THE  
NORTHERN CAPE PROVINCE OF  
SOUTH AFRICA

by

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## **DEDICATION**

For Xoaquín and Tesla

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## **ABSTRACT**

The Early Later Stone Age (ELSA) plays a major role in understanding the technological shift which occurred between the end of the Middle Stone Age (MSA) and beginning of the Later Stone Age (LSA). The ELSA has potential to represent a discrete cultural unit, but it is vital to find additional sites. The research presented within this thesis aims to aid in this endeavor by adding one site to the overall library of evidence. The site this thesis focuses on is Malony's Kloof in the Northern Cape Province in South Africa. Malony's Kloof was discovered in 2004 during a survey of the Ghaap Escarpment, a geological formation located about 70 km northeast of the town of Kimberley. The main research question is: Does Malony's Kloof qualify as an ELSA site? If so, then artifacts must include evidence of bipolar flaking, increased use of quartz, lack of formal tools, and little to no prepared cores nor multifaceted platforms. There must also be evidence of blades and bladelets (Beaumont 1978, 1981; Kaplan 1990; Low and Mackay 2016; Mitchell 1988; Orton 2006; Orton et al. 2011; Plug 1981; Wadley 1987). This research endeavor applies the present definition of the ELSA to Malony's Kloof and argues the site does not meet all of the criteria but still represents a technological transition that includes evidence of Robberg technology in its younger occupation layers.

The assemblage from Malony's Kloof Rockshelter A qualifies as a "legacy collection" since there was a substantial time lapse between excavation and analysis. The processing and analysis of legacy collections is vital to the field of archaeology and in the

case of this research project, the only way to derive lithic technological information from Malony's Kloof. However, it was coupled with several challenges.

## I. INTRODUCTION

The intent of this thesis is to emphasize the need for archaeological investigations into the Early Later Stone Age (ELSA) in South Africa. The ELSA plays a major role in understanding the technological shift which occurred between the end of the Middle Stone Age (MSA) and beginning of the Later Stone Age (LSA). The stark difference in stone tool production suggest a reaction to surrounding ecological pressures which forced the adoption of a new technology or changes in mobility strategies which may have distributed stone tool production knowledge to new populations (Bousman and Brink 2018). Lithic production in the MSA involved finely produced implements with specific functions while the ELSA represents a more quickly produced tool kit with generalized functions. This transition is not well understood nor commonly represented in the South African archaeological record.

The ELSA has potential to represent a discrete cultural unit, but it is vital to find additional sites. The research presented within this thesis aims to aid in this endeavor by adding one site to the overall library of evidence. The site this thesis focuses on is Malony's Kloof in the Northern Cape Province in South Africa. Malony's Kloof was discovered in 2004 during a survey of the Ghaap Escarpment, a geological formation located about 70 km northeast of the town of Kimberley. Researchers were investigating the paleoanthropological potential of this area due to its proximity to the Taung site, a World Heritage site where the skull of the first Australopithecine was found. Excavations were planned within this rockshelter after Later Stone Age lithic artifacts and were seen protruding out of the breccia.

Malony's Kloof is one of the many rockshelter that are cut into large tufa fans that developed over the Ghaap Escarpment, located about 70 km northeast of Kimberley in the Northern Cape Province of South Africa (Figure 1.1). Malony's Kloof is within Gorrokop, a smaller tufa complex. Although portion of these tufa have been mined by Holcim Ltd., the building material company that owns the area, Malony's Kloof has remained intact (Curnoe et al. 2006).

Radiocarbon dates and information from Dr. Herries indicate that there are at least three distinct occupation periods represented in the stratigraphy (Herries, et al. 2007). The oldest is the ELSA occupation which occurred between 30ka and 26ka. This occupation was cemented and preserved by a tufa growth cycle that occurred between 16k and 4ka. The second occupation is about 2,000 years old and the deposits are mixed but analysis of the assemblage revealed it may be Robberg. The final occupation is much younger and historic. The historic occupation is likely responsible for the ashy layers and the wooden post in the southern part of the site since it is in the top most layers.

The deepest part of the excavation was 30 cm below datum, so it is not known whether earlier human occupations are preserved within the rockshelter. The area surrounding Malony's Kloof however has extensive indications of older human occupations. Groot Kloof which is another tufa complex approximately 3 km (as the crow flies) northeast of Malony's Kloof, contains Early Stone Age (ESA) and Middle Stone Age (MSA) artifacts, including Fauresmith handaxes which represent a transitional industry between the ESA and MSA (Curnoe et al. 2006; Curnoe et al. 2005). Fauresmith artifacts are dated to about 154ka to around 350ka (McBrearty and Brooks 2000; Morris

and Beaumont 2004; Szabo and Butzer 1979). The area around Malony's Kloof has potential to contribute valuable information to paleoanthropology.



Figure 1.1. Location of Malony's Kloof (Sources: Esri, HERE, Garmin, FAO, NOAA, USGS)

Three rockshelters were recorded and named Rockshelter A (MKA), B (MKAB) and C (MKC) respectively. This thesis focuses on the assemblage Rockshelter A. No formal excavation occurred within the other rockshelters. Five units were excavated in total. A four-meter by one-meter trench was excavated within the rock shelter while one unit was placed at the bottom of the talus cone. The units within the rockshelter were named Squares N3, N2, N1 and C1 with N3 being in the deepest, southernmost part of the rockshelter. The square at the bottom of the talus was named C2. Based on

stratigraphic information, squares N3 through N1 were made up of intermixed soft sediments with younger dates while C1 and C2 were hard breccia with ELSA dates. The lithic analysis compares artifacts from N squares with C squares based on this premise. The site was excavated by Dr. Andy Herries in 2005 and artifacts were analyzed by the author in 2016 and 2017.

The assemblage from Malony's Kloof Rockshelter A qualifies as a "legacy collection" since there was a substantial time lapse between excavation and analysis. The processing and analysis of legacy collections is vital to the field of archaeology and in the case of this research project, the only way to derive lithic technological information from Malony's Kloof. However, it was coupled with several challenges. The first major challenge was not being present during excavations and not being able to visit the site. Not being present at the excavation meant that all information had to be pieced together from photographs and notes. This challenge was compounded by the fact that artifacts were recovered in a way that do not meet modern curation standards (Macfarland and Vokes 2016). The majority of the assemblage was analyzed prior to receiving field notes which meant information on artifact bags was unclear, site identifiers were obscure, and it was difficult to decipher which information related to provenience. Many of the lithics were inaccessible since they were encased in large nodules of breccia which had to be dissolved. Once field notes were received, it was discovered that they were incomplete and that site nomenclature was not consistently applied throughout the excavation, making it difficult to decode provenience.

Despite these challenges however, the goal research endeavor aims to answer the question: does Malony's Kloof qualify as an ELSA site? If so, then artifacts must include

evidence of bipolar flaking, increased use of quartz, lack of formal tools, and little to no prepared cores nor multifaceted platforms. There must also be evidence of blades and bladelets (Beaumont 1978, 1981; Kaplan 1990; Low and Mackay 2016; Mitchell 1988; Orton 2006; Orton et al. 2011; Plug 1981; Wadley 1987). This research endeavor applies the present definition of the ELSA to Malony's Kloof and argues the site does not meet all of the criteria but still represents a technological transition that includes evidence of Robberg technology in its younger occupation layers.

This manuscript is divided into nine chapters. Chapter 2 outlines a brief overview of technological changes within South African archaeology as well as an introduction to the terms used. Chapter 3 presents the environmental background information. Chapter 4 paints a picture of the current research by outlining information about other Early Later Stone Age sites. Chapter 5 discloses methodologies employed by the author during the laboratory analysis as well as those surmised from the inherited excavation notes provided by Dr. Andy Herries. Chapter 6 describes Malony's Kloof in depth. Results of the excavation are discussed in chapter 7. The lithic analysis of recovered artifacts is outlined in chapter 8. In chapter 9, results and analysis are discussed and concluded.

## II. STONE AGE SUMMARY OF SOUTH AFRICA

The Stone Age designations as they are known today are revised and refined versions of those created by Astley J. H. Goodwin and Clarence van Riet Lowe (1929). Initially, Goodwin and van Riet Lowe separated the eras into the Early Stone Age (ESA) and the Later Stone Age (LSA). The addition of the Middle Stone Age (MSA) was included later. They identified several industries within each period. (Figure 2.1). This chapter discusses the history of how these terms came to be as well as present an overview of the Later Stone Age (LSA), the Early Later Stone Age (ELSA), and the Robberg industries.

South Africa.		European and North African counterparts.
Age.	Industry.	
Earlier Stone Age	Stellenbosch . . . . Victoria West . . . . Fauresmith . . . .	Chellean. ? {Acheuleo- Mousterian.
Middle Stone Age	A variety of industries with Mousterian affinities. Incompletely studied.	Mousterian.
Later Stone Age .	Smithfield { A . . . . B . . . . C } . . . . Wilton . . . .	{Capsio- Aurignacian. Upper Capsian.

Figure 2.1. Goodwin and van Riet Lowe’s sequence of Stone Age cultures of South Africa and their assumed European and North African equivalents (Goodwin and van Riet Lowe 1929:152).

## History

The Early Stone Age (ESA) as defined by Goodwin and van Riet Lowe (1929) includes three industries: Stellenbosch, Victoria West and Fauresmith. Stellenbosch is analogous to the now abandoned concept of the European Chellean handaxe industry. Victoria West is akin to the Acheulian Industry in Africa. Fauresmith is similar to Micoqian in Europe, a transformational industry at the end of the Acheulian Industry (Chazan 2015; Goodwin and van Riet Lowe 1929; Herries 2011). Goodwin and van Riet Lowe’s Middle Stone Age (MSA) period included Still Bay, Glen Grey and other industries which they describe as having North African “Mousterian origins.” Goodwin and van Riet Lowe separated the Later Stone Age into Smithfield A, Smithfield B, Smithfield C, and Wilton which correspond to the Capsio-Aurignacian and Upper Capsian industries in Africa. The latter terms are no longer in use. Overall, except for some local inceptions, Goodwin and van Riet Lowe were of the opinion that many of South Africa’s industries were population influxes from the north. These designations were rearranged in 1957 at the Third Pan African Congress of Prehistory (Clark 1957) (Table 2.1).

Table 2.1. Nomenclature as of 1957 (after Sampson 1974:8).

Chronological stage	Industries and variants
5. Later Stone Age	Wilton, Smithfield, <i>Strandloper</i>
4. Second Intermediate	<i>Magosian</i> , Howiesonspoot, <i>Modderpoort</i>
3. Middle Stone Age	Stillbay, Pietersburg, Mossel Bay, <i>Mazelspoort</i> , <i>Alexandersfontein</i>
2. First Intermediate	Sangoan and <i>Fauresmith</i>
1. Earlier Stone Age	<i>Pre-Chelles - Acheuls</i> , <i>Chelles – Acheuls</i>

In 1974, C. Garth Sampson (1974) presented the first synthesis of the archaeological record with radiocarbon dates from various South African sites and presented reclassifications of the Goodwin and van Riet Lowe's designations (Table 2.2). He applied recommendations for cultural historical models that were outlined during the 1967 Burg Warner Symposium on Terminology (Clark and Langenheim 1968). Sampson (1974) divided the Later Stone Age into Oakhurst, Wilton and Smithfield complexes. Oakhurst Complex (previously known as Smithfield A) was further divided into Oakhurst, Lockshoek, and Pomongwan industries (Sampson 1974). Sampson divided the Wilton into Early, Classic, Developed and Ceramic with regional patterns known as Interior Wilton (formerly Smithfield C) and Coastal Wilton (Table 2.3), and van Riet Lowe's Smithfield B became known as Smithfield.

Table 2.2. Revised Nomenclature of Stone Age Industrial Complexes (after Sampson 1974:8).

Complex	Industry	Phase
11. <i>Coastal</i>	Sandy Bay	<i>Preceramic and Ceramic</i>
10. Smithfield	Smithfield	<i>Preceramic and Ceramic</i>
	Coastal and <i>Interior</i> Wilton, Matopan,	<i>Early - Classic - Developed –</i>
9. Wilton	Pfupian, <i>Zambian</i> Wilton, Nachikufan	<i>Ceramic</i>
8. <i>Oakhurst</i>	<i>Oakhurst, Lockshoek, Pomongwan</i>	Early and Late
7. ?	Howiesonspoor, Umguzan	--
6. ?	"post-Howiesonspoor"	--
5. Bambata	Bambata, Mwulu, Florisbad, Stillbay?	--
4. Pietersburg	Pietersburg, <i>Orangian</i> , Mossel Bay	Early and Late

	Complex	Industry	Phase
3.	Sangoan	Sangoan	Early and Late (Charaman)
2.	Acheulian	--	Typical, Late and <i>Final</i>
1.	Oldowan	--	Typical and Developed

Additions and revisions to the Sampson scheme were not long in coming. Klein (1972) first recognized the LSA microlithic Robberg Industry as predating the Oakhurst Complex at Nelson's Bay Cave while Sampson's 1974 book was in print, and H.J. Deacon and Mary Booker (1976) codified the Coastal Sequence in the cultural history of the Southern Cape. H.J. Deacon (1976) further explained the changes in the cultural sequence by proposing that the LSA cultural changes represented stable periods with fluctuations in technology that reflected a reaction to environmental factors. At the same time Beaumont and Vogel (1972) first identified the Early Later Stone Age (ELSA) from Beaumont's (1978) excavations at Border Cave, and predating the other LSA complexes.

Currently the Later Stone Age is divided in ELSA, Robberg, Oakhurst, Wilton, Final LSA and Ceramic Final LSA. Robberg and ELSA are also known as the Late Pleistocene microlithic. Oakhurst Complex is now divided into Albany, Lockshoek, and Kuruman industries. Wilton now is the Springbokkoog industry. Final LSA is now post-classic Wilton and Holocene microlithic (Smithfield, Kabeljous, Wilton). Ceramic Final LSA is further divided into the ceramic post-classic Wilton, Doornfontein and Swartkop (Sampson 1974).

Table 2.3. The South African and Lesotho Stone Age sequence (Lombard et al. 2012:125).

Period	SAL technocomplex	Also known as (including regional variants)	Broadly associated MISs
<b>Later Stone Age</b> <40 ka	<i>ceramic final Later Stone Age</i> <2 ka	ceramic post-classic Wilton, Late Holocene with pottery (Doornfontein, Swartkop)	MIS 1
	<i>final Later Stone Age</i> 0.1–4 ka	post-classic Wilton, Holocene microlithic (Smithfield, Kabeljous, Wilton)	MIS 1
	Wilton 4–8 ka	Holocene microlithic (Springbokog)	MIS 1
	Cakhurst 7–12 ka	Terminal Pleistocene/early Holocene non-microlithic (Albany, Lockshoek, Kuruman)	MIS 1
	Robberg 12–18 ka	Late Pleistocene microlithic	MIS 2
<i>early Later Stone Age</i> 18–40 ka	(informal designation); Late Pleistocene microlithic	MIS 2 to MIS 3	
<b>Middle Stone Age</b> >20 to <300 ka	<i>final Middle Stone Age</i> 20–40 ka	(informal designation) MSA IV at Klasies River, MSA 4 generally	MIS 2 to MIS 3
	Sibulu 45–58 ka	late MSA/post-Howieson's Poort or MSA III at Klasies and MSA 3 generally (all informal designations)	MIS 3
	Howieson's Poort 58–66 ka		MIS 3 to MIS 4
	Still Bay 70–77 ka		MIS 4 to MIS 5a
	pre-Still Bay 72–96 ka	(informal designation)	MIS 4 to MIS 5
	Mossel Bay 77–105 ka	MSA II at Klasies River, MSA 2b generally (Pietersburg, Orangian)	MIS 5a–c
	Klasies River 105–130 ka	MSA I at Klasies River, MSA 2a generally (Pietersburg)	MIS 5d–e
<i>early Middle Stone Age</i> 130–300 ka	(informal designation)	MIS 6 to MIS 8	
<b>Earlier Stone Age</b> >200 ka	ESA-MSA transition >200–600 ka	(informal designation) (Fauresmith, Sangnan)	MIS 7 to MIS 15
	Acheulean 300 ka–1.5 Ma		MIS 8 to MIS 50
	Oldowan 1.5–2 Ma		MIS 50 to MIS 75

### Later Stone Age (LSA)

The associated dates with the Later Stone Age are 46ka to historic (Figure 2.2) with the latter portion including pottery (Deacon 1984a; Lombard et al. 2012). J. Deacon (1984a) suggests that assemblages from the beginning of the LSA are marked by a decrease in formal tools and the miniaturization of lithic pieces, although this is not true across all regions. Lithic miniaturization is exemplified in the Robberg industry which starts appearing in the record at about 23ka (Deacon 1984a). Robberg assemblages have evidence of increased use of bipolar production when compared to previous industries and are primarily made up of bladelets (Deacon 1984b). Evidence of body decorations

and formal burials also emerge during the LSA (Deacon and Deacon 1999; McBrearty and Brooks 2000).

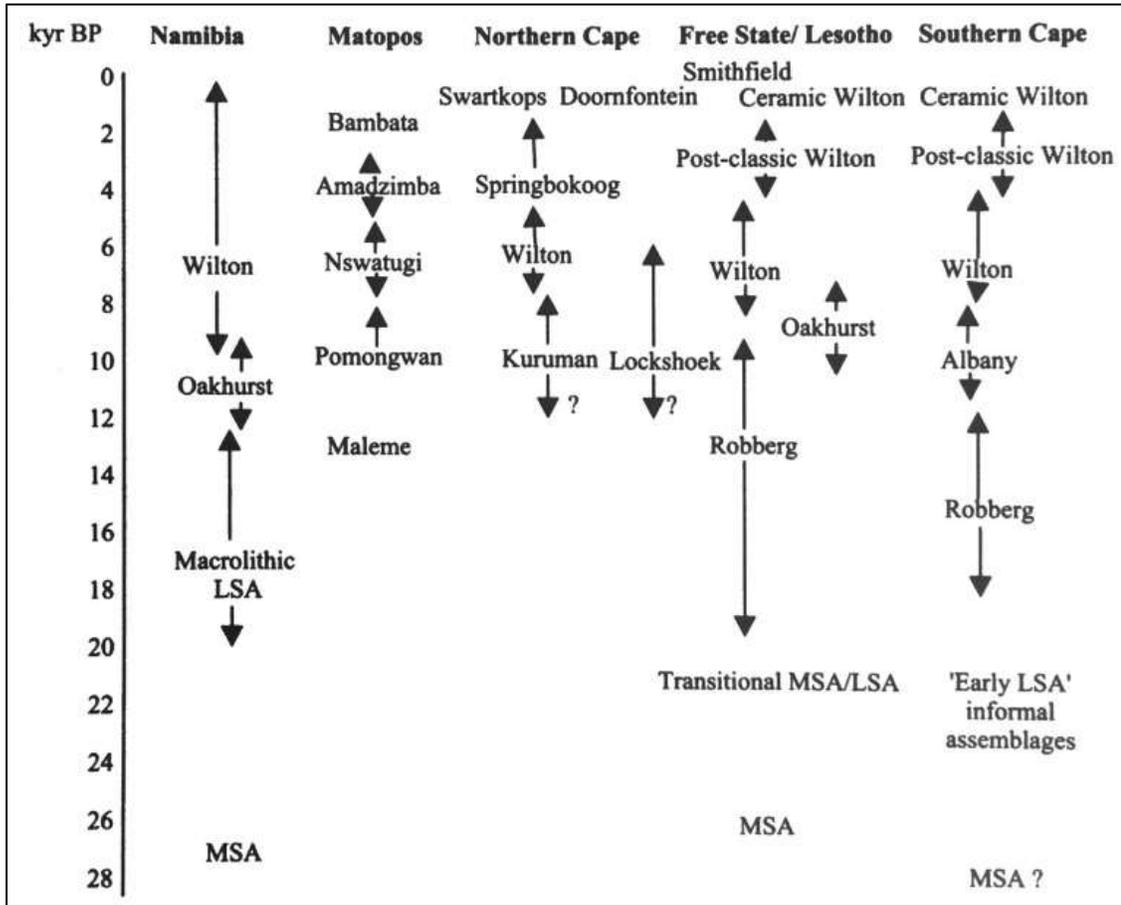


Figure 2.2. Later Stone Age traditions in South Africa (Mitchell 2002: Figure 2.17: 30)

The term microlith in the context of LSA assemblages can be used to either describe an artifact type, a technological approach or a descriptor of size (Pargeter 2016). Microliths generally refer to backed (retouched) tools (Figure 2.3) but may also include the systematic production of small flakes using bipolar production (de la Peña and Wadley 2014). Size is a debatable element since many researchers have varying criteria

for what qualifies as a microlith. Table 2.4 provides an overview of the different definitions associated with microliths.



Figure 2.3. Example of a microlith (backed tool) (Benito 2006)

Manufacture and use of specialized implements like hunting and fishing tools, sewing tools, skin working tools as well as containers, bags, netting scrapers as well as the introduction of non-lithic items such as ostrich eggshell (OES) beads and worked bone appear in the archaeological record at the end of the LSA (Deacon 1984b; Mitchell 2002).

Table 2.4. Overview of common definitions for ‘microliths’ (after Pargeter 2016:222).

Definition	Notes on size	Reference
Small implements with “proof of design in their manufacture”	Size not specified	(Honeywood 1877: 180)
Small modified geometric artifacts	Size not specified	(Mortillet 1896)
Pygmy implements: small retouched tools	20–30 mm length, 3–4 mm width	(Abbott 1913)
Flakes with the bulb of percussion removed and steep secondary reworking	Size not specified	(J. G. D. Clark 1933)
Bladelets and “flakelets” transformed into backed tools and small convex scrapers	Length < 50 mm for bladelets and flakelets	(Clark 1985)
Bladelet production with low frequencies of retouched tools	Bladelets < 12 mm width	(Deacon 1984a; Mitchell 1988)
Small retouched tools, frequently geometric	Length < 40 mm, thickness < 4 mm	(Orliac 1997)
Any backed flake regardless of size	Size not a determining factor	(Ambrose 1998)
Any very small backed flake	Size not specified	(Ambrose 2002)
Any very small retouched flake (backed or not backed)	Size not specified	(Belfer-Cohen and Goring-Morris 2002)
Small blades (or bladelets) transformed by abrupt retouch	Size not specified	(Kuhn and Elston 2002)
Small retouched tools, frequently geometric	< 30 mm in length	(Burdukiewicz 2005)

Definition	Notes on size	Reference
Microblades and retouched geometrics	Contextual-based size cut-off	(Petraglia et al. 2009)
Systematic microblade and/or backed artifact production	Size not specified	(Clarkson et al. 2009)
Small unretouched flakes	Size not specified	(Villa et al. 2012)
Small bladelets retouched into geometrics/high frequencies of small tools	< 50 mm length for bladelets	(Brown et al. 2012)
Small flakes and bladelets used retouched or unretouched	Size not specified	(Villa et al. 2012)
Systematic small flake and bladelet production	Size not specified	(de la Peña and Wadley 2014)

According to Mitchell (2002) the transition from MSA to LSA is identified by the disappearance of flake blades and formal tools like knives, unifacial points and bifacial points. Additionally, there was a change in core reduction, most notably the lack of Levallois and radially prepared cores with an increase in the use of bipolar flaking and bladelet production. Agreeing with many other researchers, Mitchell argues that the MSA to LSA transition shows a shift in raw material use toward finer grained rocks such as opalines, quartz and silcretes. Some of these materials are not local to the areas that they are found lending to the idea that people were more mobile at the end of the Pleistocene (Ambrose and Lorenz 1990; Elston and Kuhn 2002; Pargeter 2016; Pargeter and de la Peña 2017).

## Early Later Stone Age (ELSA)

The Early Later Stone Age was first defined by Peter Beaumont and John Vogel (1972) from artifacts found at Border Cave (Beaumont et al. 1978). Their definition included informal scrapers, large circular scrapers, scaled pieces (*outils écaillés*) as well as broad irregular flakes and microblades with plain striking platforms (Beaumont and Vogel 1972). Assemblages that match this pattern are sometimes also designated as “MSA/LSA transition” (Mitchell 1988, 2002, 2008; Stahl 2005).

This time frame was dominated by the use of quartz, microliths, a lack of or low quantities of formal tools, an increased use of bipolar flaking and an absence of MSA features like prepared cores (Beaumont 1978; Clark 1997; d’Errico et al. 2012; de la Peña 2015; Kaplan 1990; Orton 2006; Orton et al. 2011; Wadley 1987, 1993). It is also marked by microlithization in some assemblages followed by the introduction of bladelet technology at around 18ka B.P. (de la Peña 2015; Deacon and Deacon 1999; Low and Mackay 2016; Mitchell 1988, 2002; Plug 1981; Villa et al. 2012; Wadley 1993). However not all ELSA sites include microlithics as is the case in Erfkroon in the Free State (Bousman and Brink 2018).

Small irregular flakes and blades are found in some ELSA assemblages as well as non-microlithic artifacts. This variation poses a challenge to the characterization of the ELSA (Ambrose 2002; Beaumont and Vogel 1972; Clark 1997; Kaplan 1990; Lombard et al. 2012; Low and Mackay 2016; Mitchell 2002; Opperman 1987; Villa et al. 2012; Wadley 1991; Wendt 1976).

The ELSA is a vital portion of the South African archaeological record because the transition from MSA to LSA is not well understood (Lombard et al. 2012; Wadley 1993). The number of sites is minimal and there is no consensus as to what congruity exists between the assemblages (Bousman and Brink 2018; de la Peña 2015; Mackay et al. 2014; Ossendorf 2013; Wadley 1993). Recent re-calibration of radiocarbon and OSL dates, however, elucidates a clearer pattern. According to Bousman and Brink (2018), many sites that were previously considered to fall under the “MSA/LSA transition” criteria, such as Ha Makotoko, Rose Cottage and Sunnyside 1, should be considered ELSA.

Bousman and Brink (2018) note that the transition from the Final MSA to the ELSA was time transgressive and moved from east to west with the earliest sites appearing in the summer rainfall zone (SRZ) which makes up most of the northwestern part of the country (Figure 2.4 a-b). The transition from ELSA to Robberg was much more punctuated and was focused on the southern part of the Cape and through the Drakensberg Escarpment. The end of the ELSA ends quickly throughout all rainfall zones. Inferences as to what led to the shift in tool use across the landscape range from population migration to the spread of technological innovation (Bousman and Brink 2018).

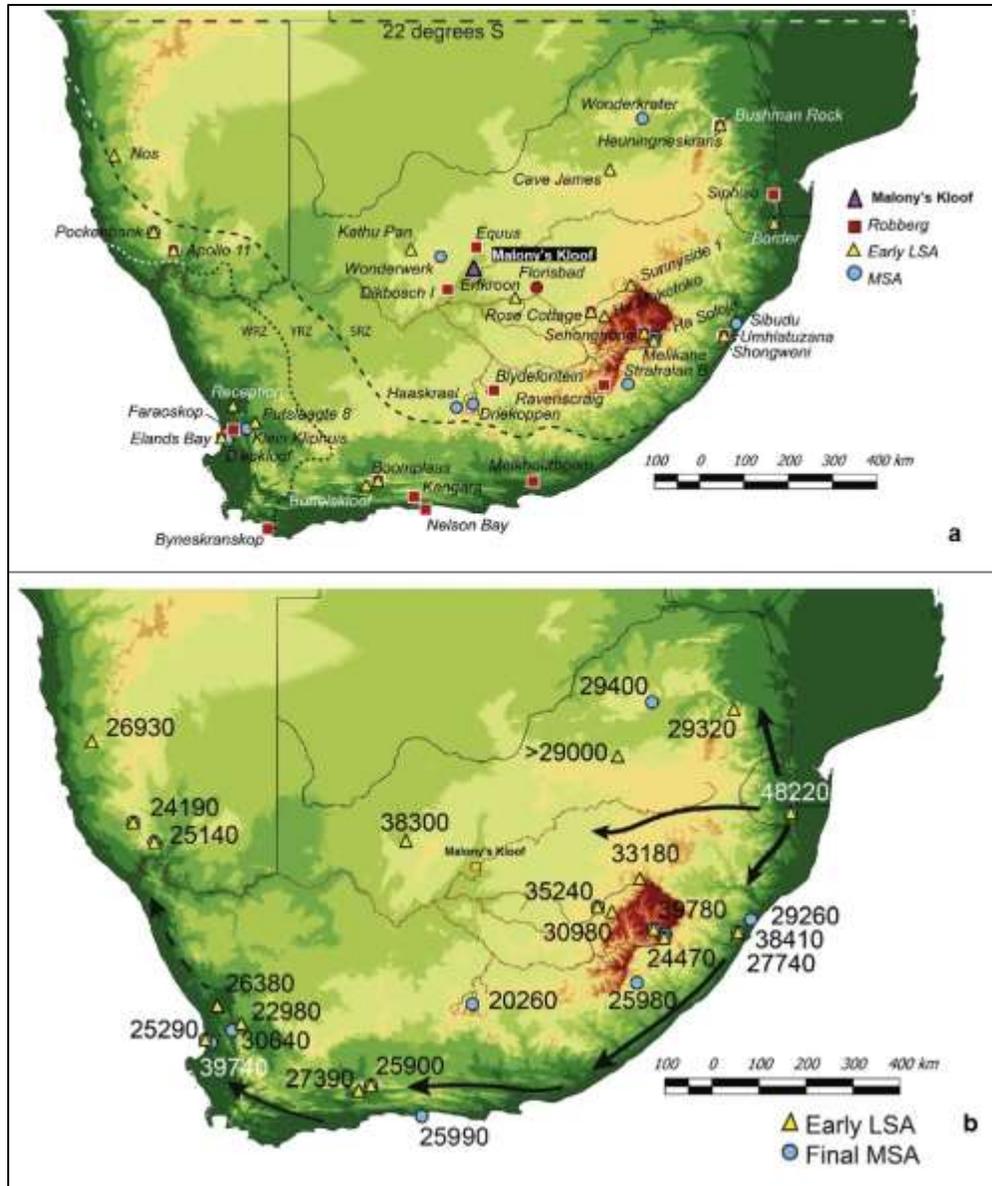


Figure 2.4. a) Map of relevant archaeological sites. Boundaries of Winter Rainfall Zone (WRZ), Year-round Rainfall Zone (YRZ) and Summer Rainfall Zone (SRZ) (Bousman and Brink 2018: Figure 1:125) b) Map illustrating the youngest possible Late/Final MSA components and the oldest possible ELSA components with hypothetical migration/transmission routes (Bousman and Brink 2018: Figure 5a:129).

## **Robberg**

The ELSA culminates with a transition to the Robberg bladelet industry. The Robberg Industry was first recognized at Rose Cottage Cave and called the “Pre-Wilton” by B. D. Malan (Malan 1952, 1958). It not clearly defined until the early 1970s at Nelson Bay (Deacon 1984a, 1984b; Deacon et al. 1979; Klein 1974) and subsequently found at Boomplaas, Melkhoutboom and Kangkara Cave (Deacon 1976; Deacon et al. 1979; Klein 1972, 1974). It is identified by the systematic production of bladelets from a single and opposed platform bladelet cores and a lack of formal tools. Concurrent with bladelet production, Robberg assemblages also include specialized bladelet cores, flat bladelet cores, as well as pieces produced using bipolar reduction such as bipolar cores, flakes and *pièces esquillées*. Quartz and cryptocrystallines seem to be preferred and there are few formal retouched pieces. Robberg assemblages are found across most of the country (Bousman 2005; Clark 1997; Deacon 1995; Deacon and Deacon 1999; Deacon 1984a, 1984b; Humphreys 1974; Humphreys and Thackeray 1983; Lombard et al. 2012; Mitchell 1988, 1995, 2002; Wadley 1991, 1993, 1996).

## **Summary**

The designations used to categorize the South African Stone Ages provide a way to organize patterns and aid in analysis (Humphreys 2005; Pargeter 2014). For instance, taking into account the traits that are used to identify LSA assemblages, traits fluctuate through time and space. Although there are some common features that appear at ELSA

sites, the challenge exists because there is not one site that encompasses all archaeological features. For instance, Table 2.4 highlights the differences across time by listing seven common traits used to identify LSA assemblages and how uses these traits to create a “score” of how representative a time frame of the LSA definition. Data used to create this table is from Elands Bay Cave, Sehonghong and Border Cave exemplify this diversity (Mitchell 1988; Pargeter 2014; Wadley 1993, 2005) (Table 2.5).

An additional challenge Stone Age researchers must be mindful of is the idea that tool types or tool industries do not necessarily equate to groups of people from a known culture or linguistic groups (Childe 1963; Pargeter 2014). The technological variability in the LSA makes it difficult to connect assemblages to any existing ethnographies or modern peoples (Pargeter 2014; Pargeter et al. 2016). The Pleistocene environment in South African is not analogous to modern times thus prehistoric hunter-gatherer groups dealt with different conditions than those who thrived in the early Holocene. Additionally, time and mobility would have shuffled populations around the landscape so it would be difficult to pinpoint the descendants associated with LSA artifacts. In fact, the term hunter-gatherer itself, connotes a sense of homogeneity that is not necessarily real (Kelly 2013).

This chapter provided a brief overview of the history of South African Stone Age archaeological research with an emphasis on the Later Stone Age. These synopses should provide the necessary context to understand how the assemblage from Malony’s Kloof fits into the ELSA, how it may be connected to Robberg and how it relates to the overall Later Stone Age.

Table 2.5. Common traits used to identify LSA assemblages compared to the archaeological record of the last 66ka years (after Pargeter 2014:2).

Trait	Time Period					
	66-58ka	58-45ka	40-18ka	18-12ka	12-8ka	8-4ka
Untouched bladelets	✓	×	☒	✓	☒	☐
Absence of prepared cores	✓	☒	☒	✓	✓	✓
Abundance of bipolar cores	✓	✓	×	×	☒	☒
Backed pieces	✓	×	×	☒	×	✓
Dominance of scrapers	×	×	×	×	×	✓
Bone ornaments/points	✓	×	✓	☒	✓	✓
Ostrich eggshell ornaments	×	×	✓	✓	✓	✓
<b>LSA 'Score'</b>	<b>5</b>	<b>1.5</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>6.5</b>

☒ = weak or possible occurrence and half a point

☐ = weak or possible occurrence and full point

### III. ENVIRONMENT

Malony's Kloof is located within Gorrokop's tufa complex near the city of Ulco (Figure 3.1), in the Northern Cape Province, about 70 km northeast of Kimberley (Figure 1.1). Several rockshelters were recorded during the initial survey in 2004, three of which were within the Malony's Kloof area. These rockshelters were named Rockshelter A, B and C respectively. Rockshelter A (MKA) and B (MKB) are in close proximity of each other.

This thesis aims to contribute to Early Later Stone Age studies by focusing on the Northern Cape Province. Additionally, the late Pleistocene paleoenvironmental conditions will be discussed.

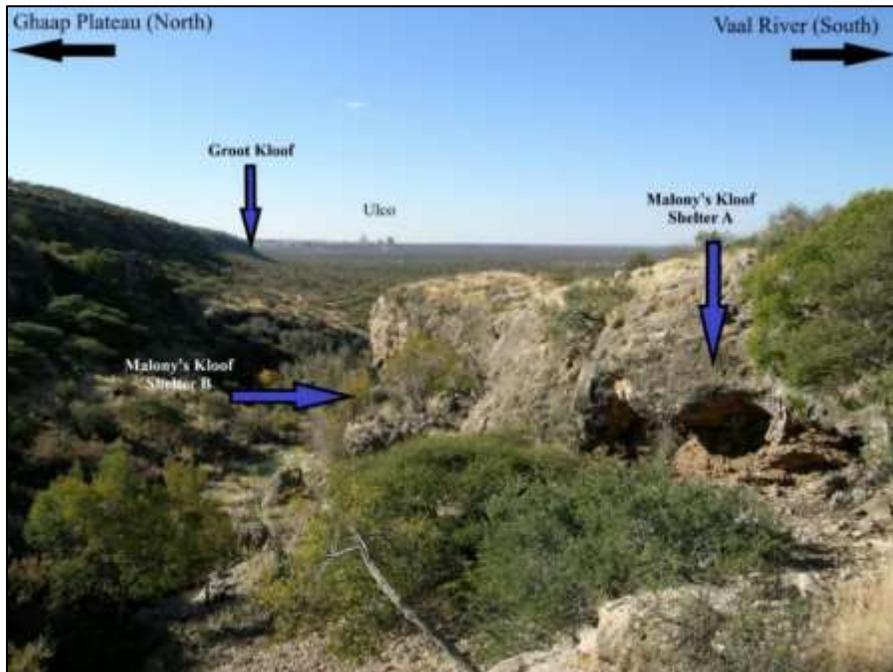


Figure 3.1. Location of Malony's Kloof and Groot Kloof in relation to Ulco. Photo courtesy of Andy Herries.



edge of the Ghaap plateau (Figure 3.4a-b). It is a prominent cuesta. Its steep side runs northeast to southwest along the southeastern boundary of the Kalahari Desert (Butzer et al. 1978; Doran 2010). The Ghaap Escarpment is about 100 m in height and 280 km in length. The difference in elevation is highlighted in Appendix A.

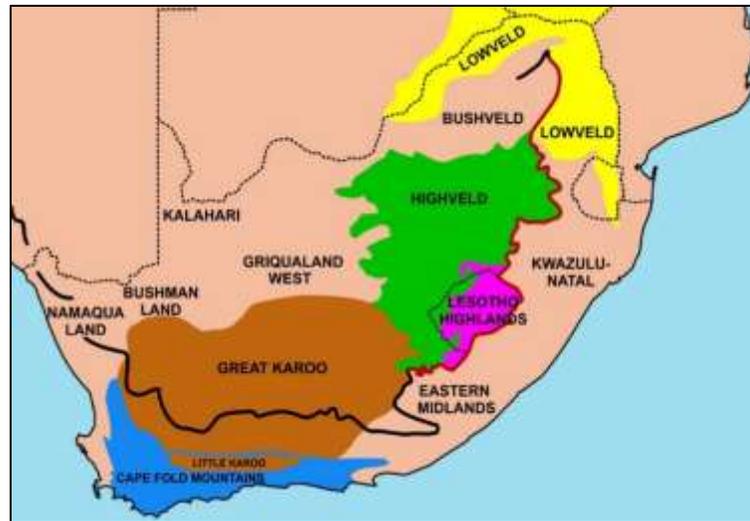


Figure 3.3. General geographic regions in South Africa. Thick line represents the Great Escarpment. Red line indicates the Drakensberg section of the Great Escarpment. (Oggmus 2014)

The escarpment and plateau form an 80,000 km<sup>2</sup> exposure of the Campbell Carbonates (Doran 2010). Below the carbonates lie the Griqualand West Sequence dolomite of the Transvaal System (Curnoe et al. 2006). Since the bedding of the Griqualand West Sequence dolomite is very horizontal, extensive drainages do not develop. This accounts for the lack of underground caverns (Butzer 1974; Curnoe et al. 2006; Doran 2010). The steep cliff which marks the escarpment edge is a part of the Ventersdorp Supergroup which are basement rocks that consist of green to gray

amygdaloidal andesitic lava underneath the Griqualand West Sequence (Figure 3.5). The Ghaap Escarpment has several developed Pleistocene-aged tufa where rockshelters like Malony's Kloof have formed.

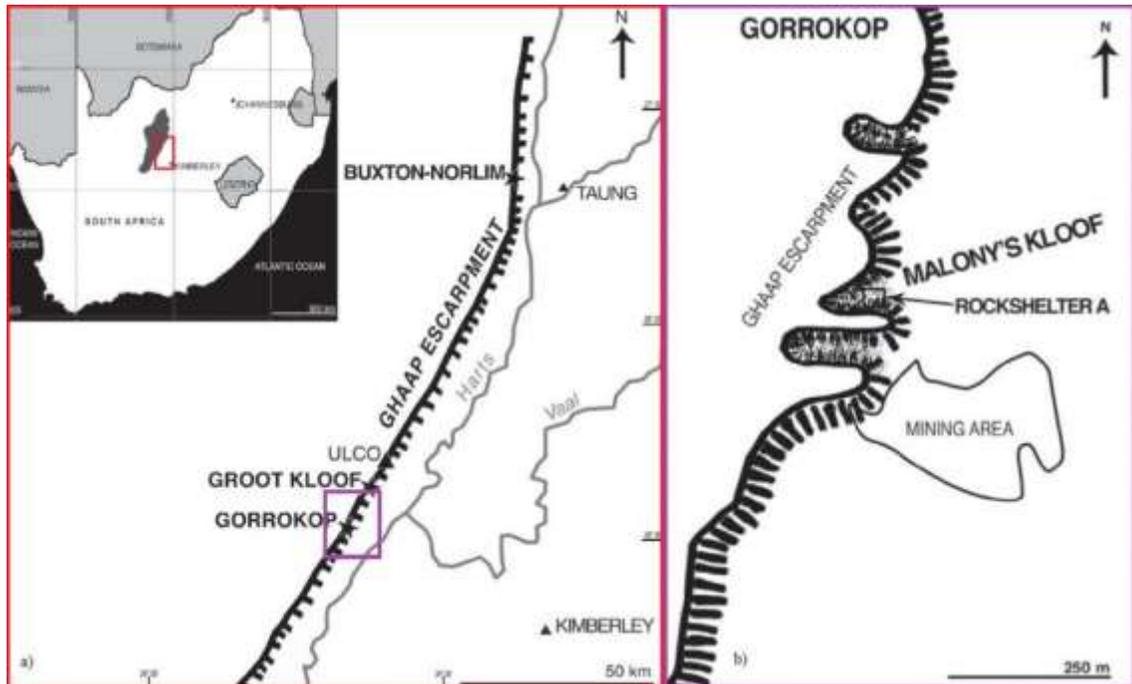


Figure 3.4a-b. Location of Malony's Kloof within the Ghaap Escarpment (modified from Doran et al. 2015:2; Figure 1).

Bedrock weathering through karst processes has created subterranean aquiludes. Aquiludes develop from the karst weathering of the bedrock. This weathering produces subterranean dykes that form a network of impermeable compartments with groundwater. These aquiludes feed springs along the northern and eastern edges of the plateau (Butzer 1974; Butzer et al. 1978; Doran 2010; Partridge 1985, 2000). Rainfall seeps through alluvial deposits and becomes spring discharge through karst cavern systems (Butzer 1974; Doran 2010; Partridge 1985). The topography is undulated with smooth slope



## *Tufa*

The discharged karstic spring water deposited several tufa or freshwater limestone formations along the escarpment at drainage line points, intersections of faults, dykes and master joints (Butzer et al. 1978; Doran 2010; McKee 1993). The semi-arid environment of the Ghaap Escarpment caused the tufa deposits to form waterfall formations and aprons with steep fronts (Doran 2010; Viles et al. 2007). The tufa in the area around Malony's Kloof formed because the Steenkop River cuts through a diabase (dolerite) dyke on the back side of the escarpment, which used to flow east to Ulco before being rerouted by drainage systems in Groot Kloof (Butzer et al. 1978; Doran 2010). The tufa at Malony's Kloof formed from runoff of a 50 km<sup>2</sup> catchment behind the escarpment (Butzer et al. 1978; Doran 2010). Caves and overhangs in this area were formed by water running over the tufaceous surface and creating cavities within the larger over hanging tufa formations (Figure 3.6 and 3.7) (McKee 1993).

Tufa formations are complex and well developed in the Ulco area (Butzer 1974; Curnoe et al. 2006). Around the Ulco Quarry, the tufa hangs over the escarpment about 4 m wide and 1.3 km deep while in Groot Kloof and Malony's Kloof there are small tufa fans over the cliffs (Butzer 1974). The relief of the escarpment reaches 90 – 120 m in this area (Butzer 1974).

Groot Kloof also has lithics and fossils preserved within its tufa. Uranium-series dates show that tufa in this area is contemporaneous with tufa at Taung and spring deposits at Florisbad which contained the hominin cranium (Brink 1988; Curnoe et al. 2006; Curnoe et al. 2005; Grün et al. 1996; Vogel and Partridge 1984).

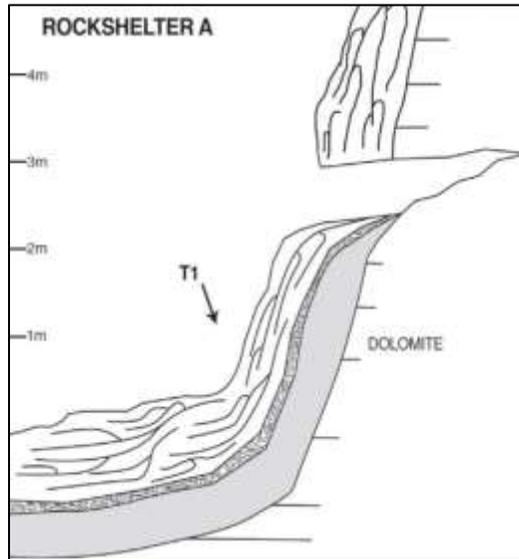


Figure 3.6 Cavity dug into Malony's Kloof Rockshelter A (modified from Doran et al. 2015:2; Figure 1).

The Malony's Kloof fan complex extends from the escarpment 2.8 km south (Butzer 1974). The tufa creates a 1.8 m façade along the escarpment because tufa carapaces overlap older tufa fans (Butzer et al. 1978; Curnoe et al. 2005; Doran 2010). Tufa flow covers the 8-meter-long calcified talus slope at Rockshelter A. This tufa has been weathered by drip flow, which has allowed disaggregated sediments to accumulate (Curnoe et al. 2005; Doran 2010). At the bottom of the site, there is a small stream that runs down from Gorrokop. Area photos can be found in Appendix B. Based on stable isotope compositions, the tufa deposited at Malony's Kloof can be grouped into three temporal groups, the Pliocene, the Middle Pleistocene and the Terminal Pleistocene-Holocene. The Middle Pleistocene aged tufa cemented the ELSA assemblage.

Organic materials such as bone and vegetation preserve well within the tufa (Doran 2010) which allows researchers to obtain clear records of climate change throughout time (Partridge 2000).



Figure 3.7. Malony's Kloof Rockshelter A cut into large tufa. Human for scale. Photo courtesy of Andy Herries.

### **Paleoenvironment**

Recreating the environment of the past is vital in order to better understand the circumstances under which LSA people were living in and how this affected their livelihood decisions. Recreating a simple paleoclimate model is difficult because there is not a single or long continuous record from inland sites so it limits the efforts of paleoecology and pollen research (Scott and Neumann 2018; Scott et al. 2012).

No pollen samples were collected at Malony's Kloof, however, pollen studies would have had limited results as pollen does not preserve well in breccia since breccia is

this area is continuously exposed to groundwater. This causes the fossil pollen to wash out and be replaced by younger pollen (Carrión and Scott 1999; Scott 1995; Scott and Bonnefille 1986). Thus it is unreliable as a proxy for environmental conditions (Scott and Neumann 2018) at Malony's Kloof. Rather, information about the area's flora can be derived from pollen information collected at the nearby site of Equus Cave (Scott 1987).

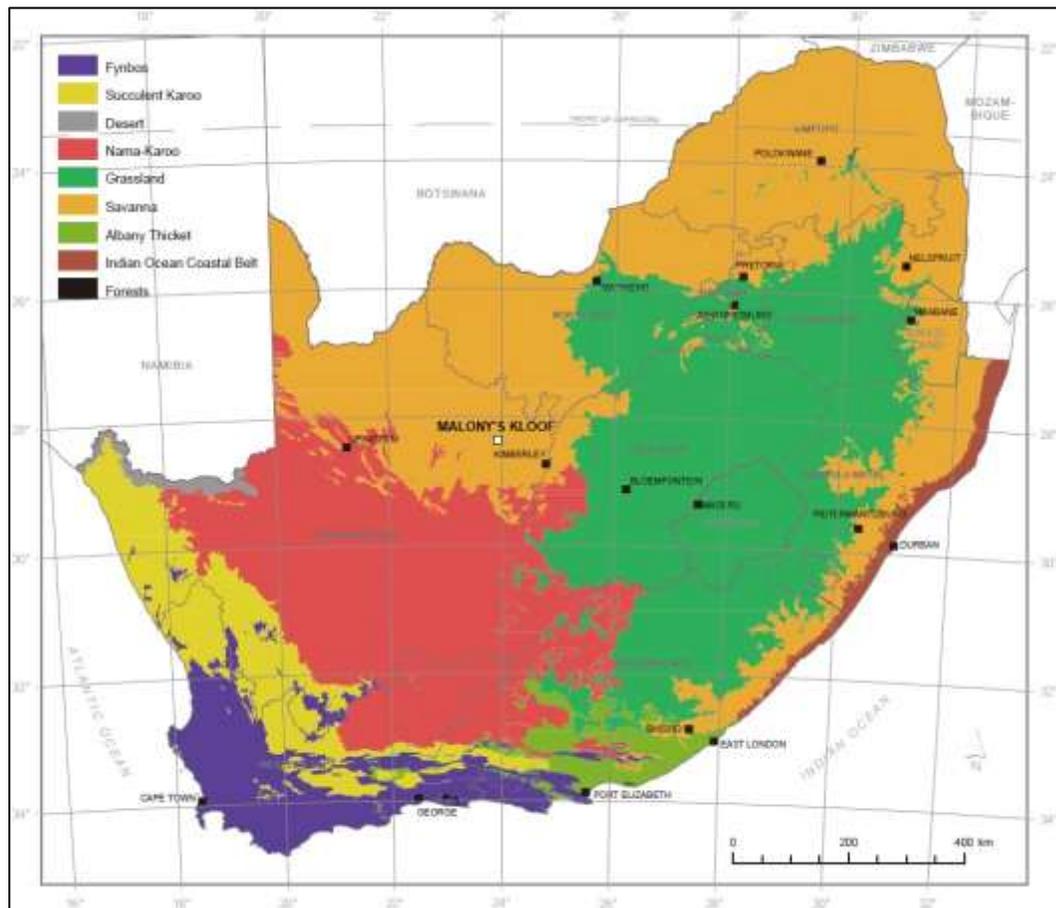


Figure 3.8. South African biomes (Rutherford et al. 2006:33; Figure 3.2)

Malony's Kloof is located within the Savannah biome that stretches across most of the northern portion of South Africa and south along the eastern part of the country (Figure 3.8). The savannah biome is characterized by summer rainfall, grasses and frost

sensitive trees (Mucina and Rutherford 2006). The specific vegetation community at Malony's Kloof is the Kalahari Thornveld and consists of low savannah grass with woody species (Acocks 1988). Pollen collected from the nearby Equus Cave shows that there was a high diversity of plant types (Scott and Neumann 2018). Malony's Kloof is within the Summer Rainfall Zone (Figure 3.9) (Chase and Meadows 2007).

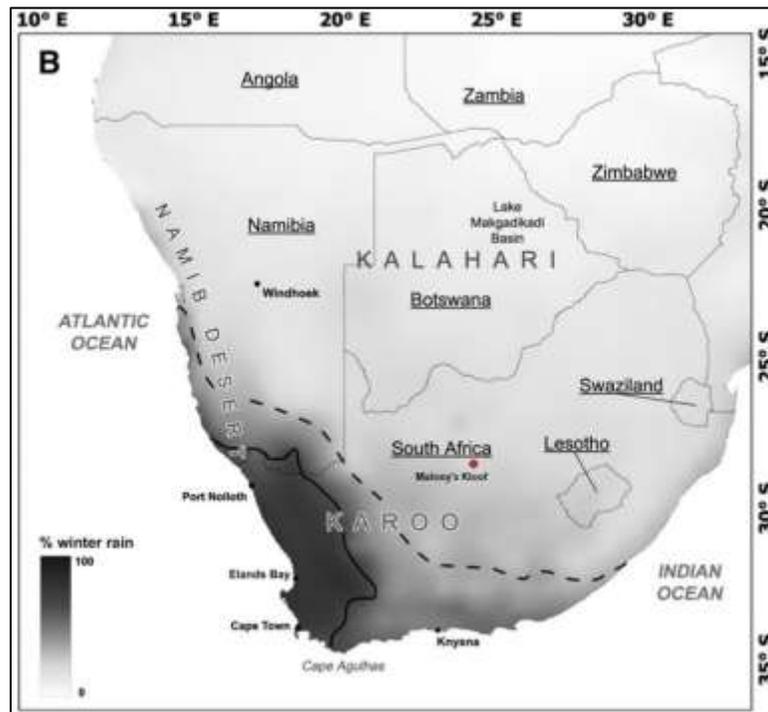


Figure 3.9. Rainfall levels in South Africa. Left of the solid line represents the Winter Rainfall Zone (WRZ). Right of the solid line represents Year-round Rainfall Zone (YRZ). Right of the dashed line represents Summer Rainfall Zone (SRZ) (Chase and Meadows 2007:104; Figure 1).

South Africa is situated at the interface of subtropical and temperate climates which are influenced by oceanic circulations systems from the Indian Atlantic and

Southern oceans (Chase and Meadows 2007). The climate to the west is much drier and wetter to the east and north (Scott and Neumann 2018). Tufa from Ghaap Escarpment show periods of high humidity between 37,500 cal BP and 19,700 cal BP (Butzer 1984a; Butzer et al. 1978; Chase and Meadows 2007). Widespread settlement tends to occur during eras of high moisture (Butzer 1988). Drier times tend to create high mobile groups which may appear in the archaeological record as cultural hiatuses such as those seen between the LSA and MSA at Rose Cottage Cave (Butzer 1984a, 1984b). This is important to note since the ELSA occupation at Malony's Kloof occurred within that time bracket.

### **Summary**

The environmental conditions at Malony's Kloof during the ELSA were ideal for occupations. The Ghaap Escarpment is prone to tufa formations where rockshelters form. Aside from having shelter options, occupants of Malony's Kloof would have also had a high diversity of plant life at their disposal. A varied plant life would have sustained a healthy animal population that humans can depend on for sustenance. Likewise, the low grasses would have provided suitable nourishment for the area's bovid population which would have in turn become food for humans. Based on the paleoenvironmental information, Malony's Kloof would have been a highly habitable area for late Pleistocene humans in the Northern Cape Province.

#### IV. EARLY LATER STONE AGE SITES

This chapter describes the excavation history, available dates and technological markers of Early Later Stone Age sites in order to provide a thorough background of the current state of ELSA research. Notable attributes found within the assemblages of these sites are the ELSA's increased use of bipolar flaking, the presence of scaled pieces (*outils écaillés*), as well as large circular scrapers, informal scrapers, broad irregular flakes and microblades with plain striking platforms (Beaumont and Vogel 1972). Some of these sites have been the subjects of extensive research projects and offer a plethora of information while others have major gaps in their evidentiary records. The sites are organized chronologically beginning with sites where ELSA appears first. Following this pattern, sites will be outlined based on years the ELSA first appeared at the site.

Organizing the sites in chronological order elucidates an east to west pattern (Figure 2.4a-b) (Bousman and Brink 2018). The earliest sites such as Border Cave, Umhlatuzana, Kathu Pan, Rose Cottage Cave and Sunnyside are all on the western part of the country. The youngest dates were derived from sites such as Putslaagte 8, Apollo 11 and Elands Bay Cave which are on the west coast. Based on the available evidence, it seems the ELSA lasted about 26,750 years and stopped rather abruptly around 20,000 years ago. The cessation was especially evident in the southern cape, eastern Lesotho and the eastern part of the Drakensberg mountains where the sudden shift in technology happened rather simultaneously (Figure 4.1) (Bousman and Brink 2018). All dates included in headings are calibrated dates from Bousman and Brink (2018).

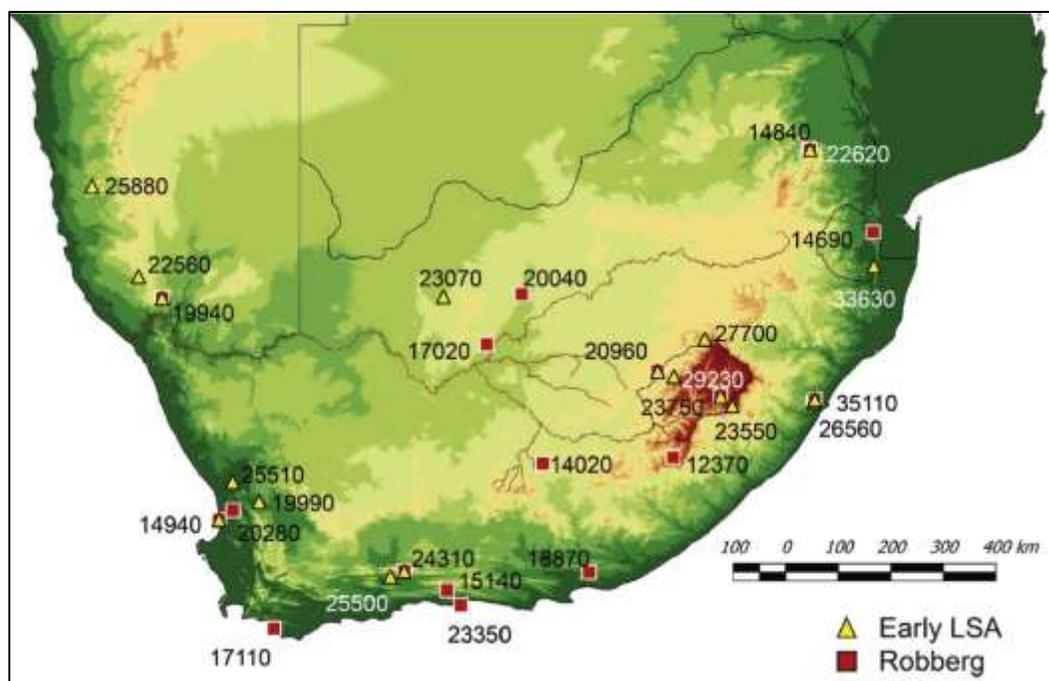


Figure 4.1. Most recent terminal ELSA dates with oldest possible Robberg dates (Bousman and Brink 2018: Figure 5a).

### **Border Cave (48,220 – 33,630 cal BP)**

The Early Later Stone Age appears the earliest in the KwaZulu-Natal Province of South Africa at the site of Border Cave. It is the type site for the ELSA and was first identified as so by Peter Beaumont and John Vogel (Beaumont and Vogel 1972). It is located near the South African and Swaziland border, along the Lebombo Mountains. The site was first excavated by Raymond Dart in 1934. A pit was dug for the purposes of selling the ash-rich sediment as agricultural fertilizer in the 1940's by W.E. Horton. Portions of a human frontal lobe and some limb bones were recovered during the excavation of this pit but are not dated and the context is for the most part lost (Beaumont 1978; d'Errico et al. 2012; Villa et al. 2012). A second professional excavation was

conducted by B.D. Malan, H.B.S. Cooke and L.H. Wells in 1941 – 1942. It was during these field seasons that an infant burial was discovered (Beaumont 1980; d’Errico et al. 2012; Grün and Beaumont 2001; Villa et al. 2012). Beaumont excavated the site in 1970 – 1971, and briefly again in 1975 for his master’s thesis (Figure 4.2). Beaumont identified the cultural sequences as follows, from the bottom to the top: MSA 1, Howiesons Poort, MSA 3 (post-Howiesons Poort), and ELSA. Above the ELSA layers, there is an austere layer with little artifacts followed by an Iron Age occupation (Beaumont 1973; d’Errico et al. 2012; Villa et al. 2012). Organics from the ELSA occupation at Border Cave were analyzed by d’Errico et al (2012). He outlined several important findings that suggest modern hunter-gatherer behavior might have emerged as early as 46,000 years ago in South Africa. These findings include notched bones that may have served notational functions, decorated bone points reminiscent of modern San arrowheads, a beeswax mixture that implies hafting technology, and several cultural artifacts like ostrich eggshell and marine shell beads (Figure 4.3) (Beaumont et al. 1978; d’Errico et al. 2012).

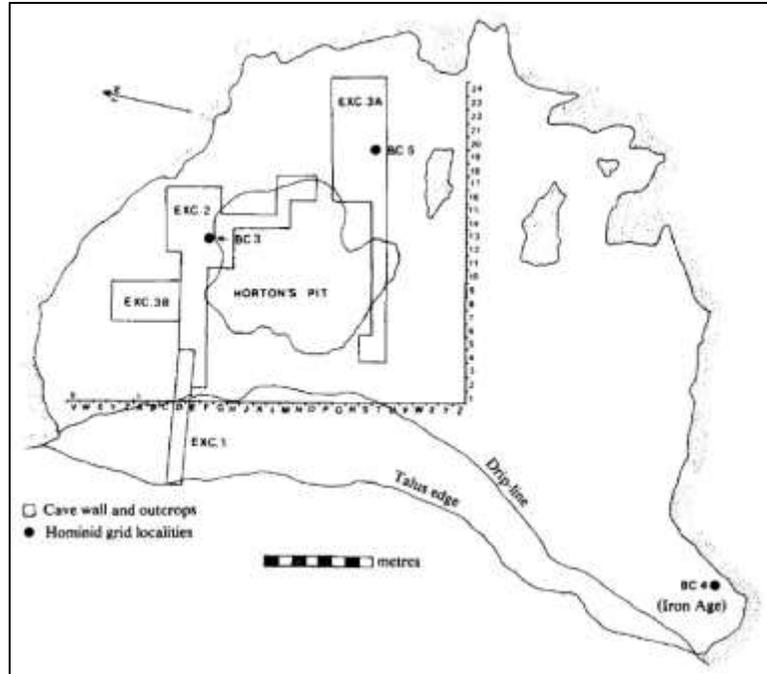


Figure 4.2. Border Cave site map (Beaumont et al. 1978: Figure 1: 409).

There are three strata that associated with the ELSA, 1WA and 1BS Lower B+C (Beaumont et al. 1992; d’Errico et al. 2012; Villa et al. 2012). Excavations from the 1970’s referred to 1BS Lower B+C as only 1BS Lower, but it was later renamed and separated (d’Errico et al. 2012). Layer 1WA (White Ash), dates to about 44,200 – 43,000 cal BP (Table 4.1) and may have lasted about 1,300 years (Beaumont et al. 1992; d’Errico et al. 2012; Villa et al. 2012). Layer 1BS Lower C may have lasted up to 350 years and dates to 43,000 – 42,500 cal BP (d’Errico et al. 2012; Villa et al. 2012). Layer 1BS Lower B lasted about 400 years and dates to about 42,500 – 41,900 cal BP (d’Errico et al. 2012; Villa et al. 2012). Taking into account the modeled 2 sigma range of ages, the best estimate for the temporal span of the ELSA at Border Cave is 46,690 – 33,630 years ago (Bousman and Brink 2018).

Table 4.1. Border Cave dates and calibration two sigma age spans (after Bousman and Brink 2018).

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Border Cave	Pta-1190	45,000	±2800/-2200	...	45,190	Sq R19 IWA (base), Excavation 3A	Vogel et al., 1986
Border Cave	Pta-4880 (Pta-424)	39,800	620	44,240	41,420	1WA, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-4793	39,300	1900	48,230	40,600	1BS Lower B, Excavation 4A	Beaumont et al., 1992; d'Errico
Border Cave	Pta-4775 (Pta-4710)	39,200	1000	45,000	41,790	1BS Lower C, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-4744	39,000	1200	45,390	41,370	1BS Lower B, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-4776 (Pta-4697)	38,900	1200	45,330	41,280	1BS Lower C, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-4779	38,700	1200	45,200	41,090	1BS Lower B, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-4856 (Pta-4852)	38,700	1700	46,940	40,120	1WA, Excavation 4A	d'Errico et al., 2012
Border Cave	Pta-704	38,600	1500	46,020	40,350	Sq 21, IBS.LR (base)	Beaumont and Vogel 1972; Vogel et al., 1986
Border Cave	ANUA-17304	38,540	±850/-950	44,640	42,570	1WA, Sq V20, LRA-L19	Bird et al., 2003; d'Errico et al., 2012
Border Cave	Pta-4758	38,500	1200	45,040	40,860	1BS Lower B, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-4903 (Pta-4854)	38,300	1400	45,430	40,250	1WA, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-4711	38,200	1100	44,530	40,700	1BS Lower C, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	KIA-44423	38,020	1240	44,730	40,250	1BS Lower B-C, Sq R22, 1BS LR	d'Errico et al., 2012
Border Cave	Pta-4778	37,900	1500	45,420	39,660	1BS Lower B, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-5015	37,900	1300	44,800	40,020	1BS Lower B, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Border Cave	Pta-4875	37,700	590	42,880	41,150	1WA, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	Pta-422	36,800	1000	42,960	39,430	Ex3A, SqT21, 1.0 meters, upper third first White Ash	Beaumont and Vogel 1972, Vogel et al., 1986
Border Cave	Pta-423	36,100	900	42,230	38,910	Ex3A, SqT21, 1.1 meters, middle third first White Ash	Beaumont and Vogel 1972; Vogel et al., 1986
Border Cave	OxA-X-2418-47	35,750	500	41,430	39,250	1BS Lower B-C, Sq W16, 1BS LR	d'Errico et al., 2012
Border Cave	OxA-W-2455-52	35,410	360	40,860	39,080	1BS Lower B-C, Sq 19, 1BS LR	d'Errico et al., 2012
Border Cave	Pta-4706	35,400	960	42,020	38,180	1BS Lower C, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	OxA-23172	34,940	370	40,290	38,630	1BS Lower B-C, Sq S20, 1BS LR	d'Errico et al., 2012
Border Cave	Pta-4700	34,800	930	41,470	37,100	1BS Lower C, Excavation 4A	Beaumont et al., 1992; d'Errico et al., 2012
Border Cave	LJ-2892	31,600	1200	38,990	33,620	T22, IBS.LR (top)	Linick 1977
Border Cave	OxA-23173	20,420	90	24,900	24,180	1BS Lower B-C	d'Errico et al., 2012

The lithic technology associated with the ELSA at Border Cave includes an increased use of the bipolar technique to produce microliths, including scaled pieces (*pièces esquillées*) (Beaumont 1978; Bousman and Brink 2018; Villa et al. 2012). The lithic artifacts are described as expedient but wasteful as the manufacturers seem to be producing high amounts of debitage. Two technological approaches emerged as markers of the Border Cave ELSA. The first is the production of small blanks made out of chalcedony, milky quartz and crystal quartz. Bipolar percussion was used to make flakes, bladelets, and scaled pieces (d'Errico et al. 2012). The second is the production of

unstandardized rhyolite cores using direct hammer percussion as well as creating large flakes (about 3 – 7 cm) and blades (Villa, et al. 2012).

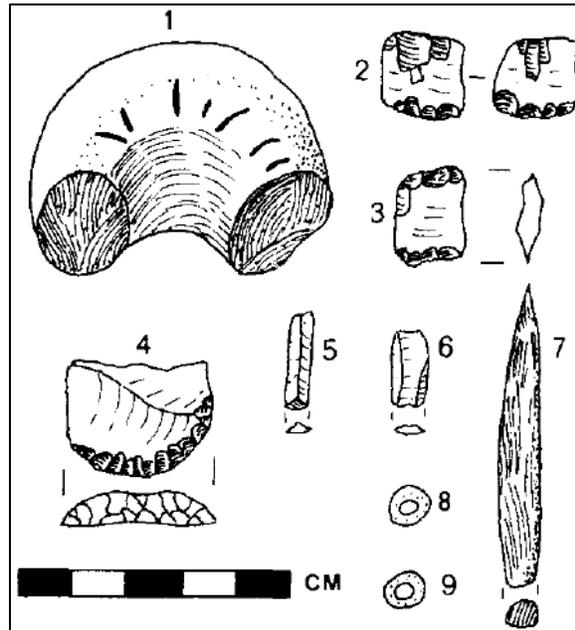


Figure 4.3. ELSA artifacts from Border Cave. 1. Broken bored stone with incised notches around orifice; 2 – 3. Scaled pieces; 4. Convex-edged scraper; 5 – 6. Microbladelets; 7. Ground bone point; 8 – 9. Ostrich eggshell beads. (Beaumont et al. 1978: Figure 4d: 411).

### **Umhlatuzana (38,410 – 35,110 cal BP)**

Umhlatuzana was discovered in 1982 by R.R. Maud during a salvage archaeological effort prior to the road construction between Durban and Pietermaritzburg. The site is located in the KwaZulu Natal Province about 35 km west of Durban, on the Kerman 915 farm. It is named after the nearby river. It was excavated in 1985 and produced 2.8 meters of deposits spanning between the MSA and the LSA. The site was

formed after softer basal zone sandstones and shales from the Natal group below the ortho-quartzite horizon eroded (Kaplan 1990).

This site saw a marked increase in bladelet technology within the deposits dated between 45,000 – 12,000 (Kaplan 1990). Layer 18 is dated to 35,500 ± 930 (Pta-4663) and 35,100 BP ± (Pta-4331) and Layer 15 dates to 27,800 BP ± 780 (Pta-4389) (Kaplan 1990). The site consists of six 1-x-1 meter units (Figure 4.4). Units J2, K2 J3 and K3 were excavated to 2.5 m until bedrock. J2 was excavated to a depth of 2.65 m. Units J4 and K4 were removed to a depth of 1.5 m.

The ELSA (or final MSA as Kaplan prefers it) assemblage consists of bladelets, backed tools, single platform cores, bipolar cores and *pièces esquillées* (Bousman and Brink 2018; Kaplan 1990; Wadley 1993).

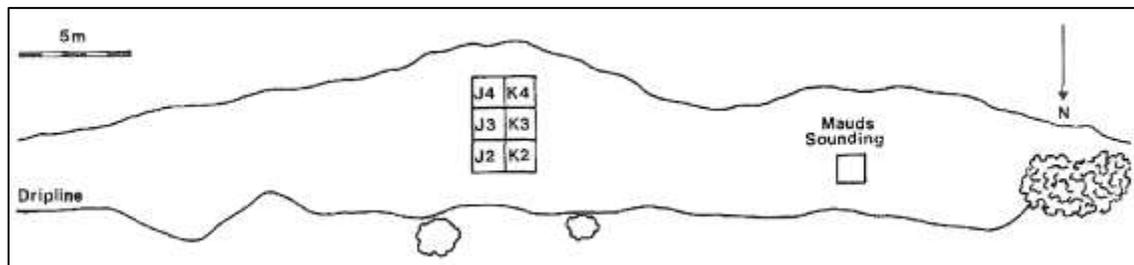


Figure 4.4. Umhlatuzana Rockshelter site plane (Kaplan 1990: Figure 5: 5).

### **Kathu Pan (38,300 – 23,070 cal BP)**

Kathu Pan is an open air site measuring about 300,000 square meters. The site was discovered by Beaumont in 1974 when he found faunal remains and handaxes. The site was then excavated from 1978 to 1990 by Beaumont (Morris and Beaumont 2004). In the general area, eleven sites were found and excavated. Seven of those sites were

sediment filled sink holes (Beaumont and Morris 1990; Morris and Beaumont 2004).

Although the Kathu Pan area has several sites, focus is generally placed on Kathu Pan 1 (Beaumont and Morris 1990; Morris and Beaumont 2004; Wilkins 2013).

Stratum 1 of Kathu Pan 1 is the youngest layer and is made up of young peat layers that date as far back as 4,700 years ago (Table 4.2) (Beaumont et al. 1984). This layer contains Ceramic LSA. Stratum 2 contains ostrich eggshell beads and possibly Robberg artifacts. Nearby however, at Kathu Pan 5 there are LSA scrapers that are older than 32,000 B.P. Artifacts that characterize the post-MSA assemblage are microlithic quartz tool (Beaumont and Morris 1990). Stratum 3 is older than ELSA and dates to about 64,000 B.P. It produced few ostrich eggshell beads with MSA artifacts like Howiesons Poort (Morris and Beaumont 2004). The well sorted eolian sands with the increased calcification indicate that this stratum was laid down during arid times with cold temperatures (Morris and Beaumont 2004; Wadley 1993).

Table 4.2. Kathu Pan dates and calibration two sigma age spans (after Bousman and Brink 2018).

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Kathu Pan	Pta-3586	19,800	280	24,450	23,070	upper Stratum 2b, deep grey sand, KP5, 2.3e2.32m	Beaumont et al., 1984; Beaumont and Morris 1990
Kathu Pan	Pta-3566	27,500	530	32,870	30,700	lower Stratum 2b, deep grey sand, KP5, 2.65e2.7m	Beaumont et al., 1984; Beaumont and Morris 1990
Kathu Pan	Pta-3591	32,100	780	38,310	34,640	lower Stratum 2b, deep grey sand, KP5, 2.85e2.9m	Beaumont et al., 1984; Beaumont and Morris 1990
Kathu Pan	I-13040	26,930	750	32,860	29,460	base Stratum 2b, deep grey sand, KP5, 2.9e3.0m	Beaumont et al., 1984; Beaumont and Morris 1990

### Rose Cottage Cave (35,240 – 20,960 cal BP)

Rose Cottage Cave is located in the eastern part of the Free State Province. The site was first excavated by B. J. Malan in the 1940s then again by Beaumont in 1962 (Figure 4.5). In 1977, Butzer collected sediment and charcoal samples (Wadley and Vogel 1991).

The importance of Rose Cottage Cave stems from its extensive archaeological record with a clear record of the transition between MSA and LSA (Clark 1997, 1999). Transitional MSA/LSA assemblages exhibit a bipolar percussion technique as well as scaled pieces (Clark 1999) that are evident in other ELSA sites. Recent investigations have added information in regards to dating of the site by providing new OSL dates and re-evaluating radiocarbon dates. OSL samples from Layers G which are designated MSA/LSA Transition are dated to  $31,700 \pm 1800$  (Pienaar et al. 2008). Radiocarbon dates from layer G and Layer Ru range from 20,953 – 33,962 cal B.P. (Clark 1997; Pienaar 2007; Pienaar et al. 2008; Wadley and Vogel 1991) (Table 4.3).

Table 4.3. Rose Cottage Cave dates and calibration two sigma age spans (after Bousman and Brink 2018).

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Rose Cottage	Pta-5598	20,600	250	25,430	24,130	Sq L4, Level G/G2, 3.4m	Wadley and Vogel 1991; Clark 1997a, 1997b; Pienaar et al., 2008
Rose Cottage	Pta-7289	19,600	250	24,150	22,930	Level G/G2	Pienaar et al., 2008
Rose Cottage	Pta-7390	17,800	180	21,960	20,950	Level G/G2	Pienaar et al., 2008

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Rose Cottage	RCC 19*	31,700	1800	35,250	28,040	Level G/G2	Pienaar et al., 2008
Rose Cottage	Pta-1417	22,650	240	27,430	26,330	Layer 6a	Wadley and Vogel 1991, Pienaar et al., 2008
Rose Cottage	Pta-1416	23,380	200	27,850	27,250	Layer 6a	Wadley and Vogel 1991, Pienaar et al., 2008
Rose Cottage	GrN-5300	25,640	220	30,460	29,170	Sq Jf, yellow sands 30 cm below base grey-black ash stratum	Beaumont and Vogel 1972, Pienaar et al., 2008
Rose Cottage	Pta-211	29,430	520	34,590	32,210	Sq Jf, 135 cm depth, near base of grey-black ash, base Pre-Wilton	Beaumont and Vogel 1972, Vogel and Marais 1971; Wadley and Vogel 1991, Pienaar et al., 2008

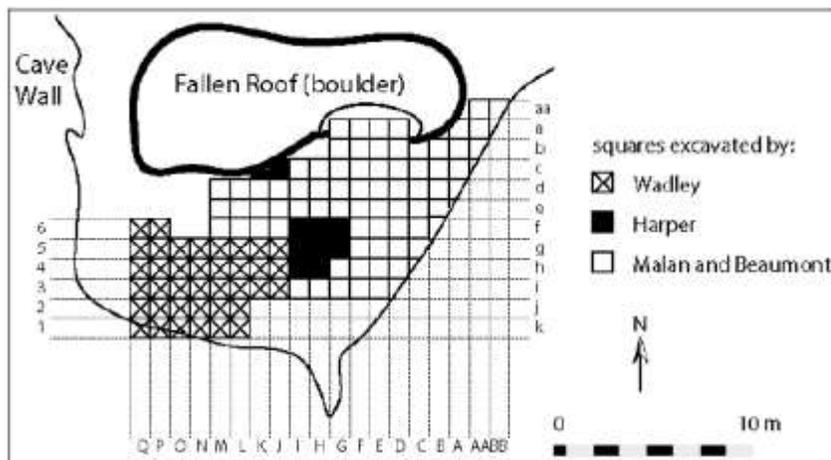


Figure 4.5. Rose Cottage Cave site plan (Pienaar 2007: Figure 2.1:11).

### Sunnyside 1 (33,380 – 27,700 cal BP)

Sunnyside 1 is located about 8km southeast of the town of Clarens, in the Free State Province of South Africa. It is in the mid-eastern part of the country, north of Lesotho. Archaeologist Susan Kent was working on the site prior to her death in 2003. She was hoping to research the spatial distribution of lithic artifacts in order to identify

activity areas. After her death, multi-disciplinary team of Free State researchers continued her work (Henderson et al. 2006).

Due to the lack of preserved organics, radiocarbon dating was not possible so OSL dating techniques were employed. The site dates to 33,300 – 27,700 cal BP (CLR-3). The lithic assemblage is described as being either final MSA or transitional MSA/LSA based on its similarity to the transitional MSA/LSA assemblage at Rose Cottage Cave (Henderson et al. 2006).

### **Ha Makotoko (33,180 – 29,230 cal BP)**

Ha Makotoko is a rockshelter located within Lesotho's Caledon Valley, near the border of South Africa's Free State Province. The Mohokare River meanders near the site. The opening of the shelter faces northwest which means it would have received sunlight throughout day in both summer and winter. The shelter is 60 m long and 22 m deep with a total area of 820 m<sup>2</sup>. The site was excavated in 1989 and again in 2010 as a part of a cultural resource management project triggered by the construction of the nearby Metolong Dam. Aside from MSA and LSA occupations, Ha Makotoko is known for its many samples of San rock art (Mitchell and Arthur 2014).

This site produced what is referred to as transitional MSA/LSA in Phase 1 of Trench 61 (Figure 4.6). Two radiocarbon samples from this trench (UGAMS-11595 and UGAMS-11598) create an age range for this occupation of 33,180 – 29,230 cal B.P. (Bousman and Brink 2018; Mitchell and Arthur 2014).

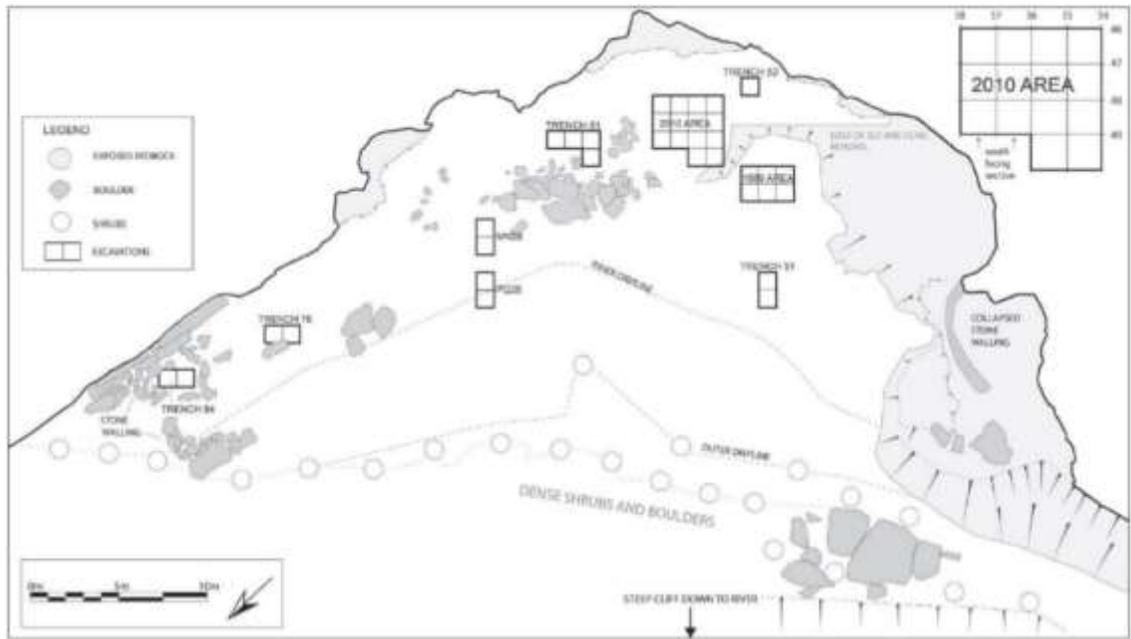


Figure 4.6. Ha Makotoko site plan (Mitchell and Arthur 2014: Figure 5: 210).

### **Sehonghong (30,990 – 29,240 cal BP)**

The Sehonghong rockshelter is located in eastern Lesotho. It was excavated by P.L. Carter and Pat Vinnicombe in 1971. The site exhibits extensive sequence of deposits that date from 70,000 B.P. to the historic period in the 1800's (Carter 1976; Carter et al. 1988; Mitchell 1988). Unlike wet rockshelters in eastern Lesotho, dry sites like Sehonghong and Melikane (discussed below), often have occupations through the end of the MSA, into the LSA (Carter 1976). This supports the idea that there was a higher diversity of animals after the Last Glacial Maximum (LGM) compared to those in the MSA (Carter and Vogel 1974; Mitchell 1988). Sehonghong has a rock fall that coincides with the beginning of the Last Glacial Maximum between 30,900 and 32,150 years (Carter 1976).

It is the type site for the Sehonghong Bladelet Industry (also known as Late Pleistocene Industry and Bladelet Industry) which dates to 13,200 - 12,200 B.P. (Mitchell 1988; Wadley 1993). The raw material that the assemblages are made of consist mainly of crypto-crystalline silica like chalcedony and some agate, but also contain some hornfels (Mitchell 1988). The assemblage is made up of many unmodified bladelets and bladelet cores. Many of the cores are high backed, characteristic of Robberg although unlike Robberg there are not many scaled pieces. As would be expected for an early microlithic assembly, there are not many formal tools (Mitchell 1988).

Formerly excavated units were reassessed as part of the Adaptations to Marginal Environments during the Middle Stone Age (AMEMSA) project. They have re-calibrated many radiocarbon dates (Loftus et al. 2015; Pargeter et al. 2017; Stewart et al. 2016). Although a ELSA designation is not explicitly mentioned, the time frame which they call “Transitional MSA/LSA” dates to about 29,890 – 23,745 cal B.P. (Figure 4.7) (Carter and Vogel 1974; Loftus et al. 2015; Mitchell and Vogel 1994; Pargeter et al. 2017). Artifacts show signs of bipolar production (Carter et al. 1988). Recent paleoenvironmental findings suggest that there was a reduction of woodland and an increase in grassland cover and riverine shrubs that could have been due to the increasing drying coldness (Stewart and Mitchell 2018).

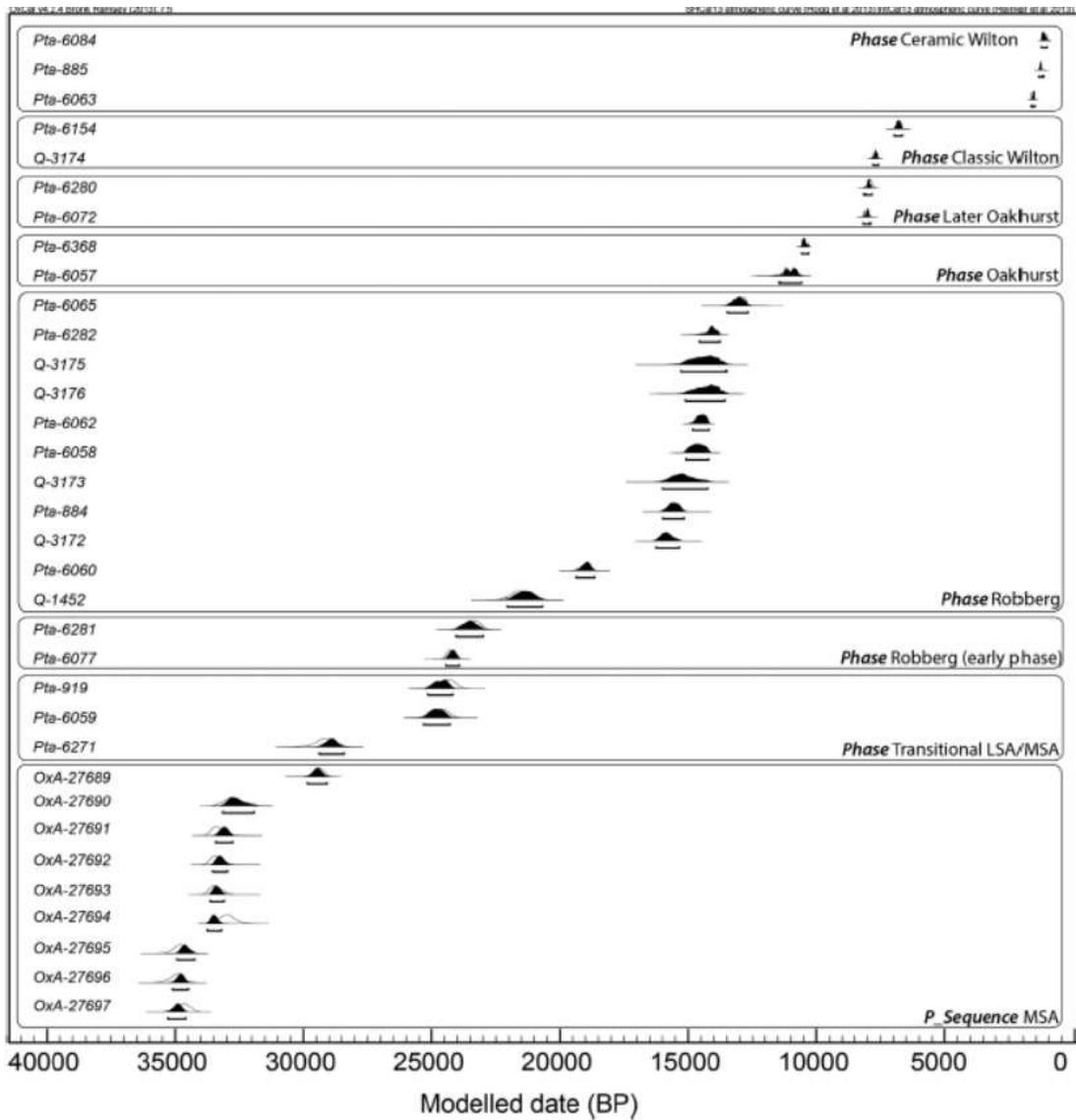


Figure 4.7. Calibrated radiocarbon dates from Sehonghong (Loftus et al. 2015: Figure 3:811)

### Shongweni (27,740 – 26,560 cal BP)

Shongweni is a series of small caves inside of a Durban nature reserve near the Umlaas River, about 25km away from where the river connects to Natal Bay. The site was discovered in 1952 by Dr. V. Hinchy, a chemist with Durban Waterworks. Bringing

along Dr. R.C. Walsh who later served as an informant for archaeologist Oliver Davies, they dug a 1-by-1-meter test pit and found pottery shards, vegetable material, grass ropes and pointed sticks. The preservation of the site is quite good and some of the oldest vegetable matter come from Shongweni. There is evidence that there were two separate rock falls. One between 4,000 B.P. and 11,800 B.P. The other happened before 23,000 B.P. This rock fall coincides with other rock falls that date to around the same time in Rhodesia and the Cape around 25,000 B.P. This could be because the Antarctic air penetrated during the LGM and caused repeated freezing (Davies 1975).

Excavations in the South Cave were conducted in 1971 by Oliver Davies with the Natal Museum in Pietermaritzburg (Figure 4.8). The cave was separated into Upper Occupation and Lower Occupation. The upper occupation contained Iron Age remains with evidence of cereal cultivation (Davies 1975; Vogel et al. 1986). The area of the site that is of interest to the study of the ELSA are units J2 and J3. Level VII which is 115 to 122cm deep contains hearth charcoal that has been dated to  $23,000 \pm 310$  (Pta-966).

The stone tool assemblage within this area of interest in the northern part of the cave is limited and undiagnostic. The assemblage consists of 1400 pieces (Langejans and Dusseldorp 2014) many of which were made from imported stone (Davies 1975). One flake made of quartz had signs of usage. There were no microlithic cores which are diagnostic of ELSA although there are some microblades made of quartz and a material Davies refers to as lydianite, also known as hornfels (Davies 1975).

Shongweni North Cave is about 10 meters north of South Cave and was excavated by Davies and Tim Maggs in 1979 and 1981 (Vogel et al. 1986). It produced additional dates that coincided with the ELSA. The North Cave was opened in order to

corroborate stratigraphy within the South Cave. The site was dug using natural stratigraphy with 10 cm sub-samples (arbitrary levels). The lithic assemblage consists of 205 pieces, mostly which are under 20mm (Langejans and Dusseldorp 2014).

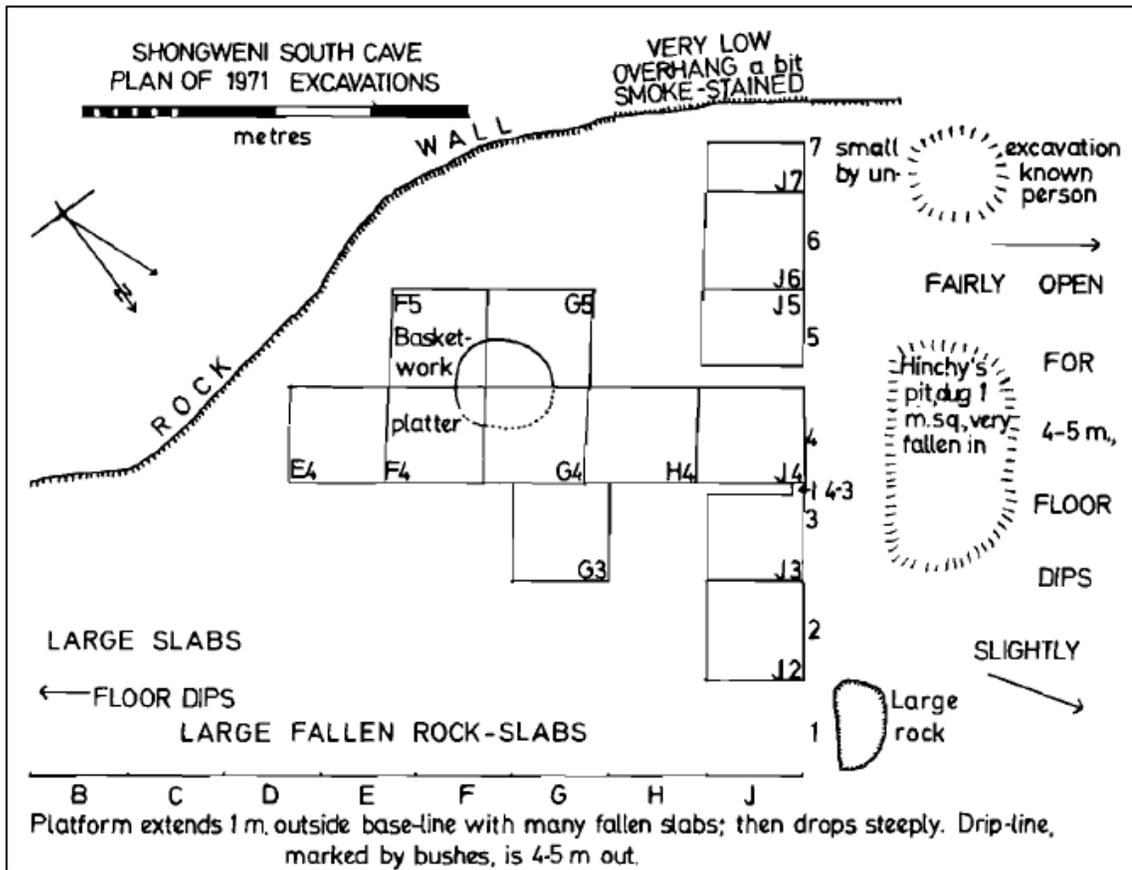


Figure 4.8. Shongweni site plan (Davies 1975: Figure 2: 629).

### Buffelskloof (27,390 – 25,500 cal BP)

Buffelskloof is of interest because of the dates from its HE2 layer, fall within the ELSA time frame. However, the 1974-75 excavations produced only preliminary data.

Figure 4.9 illustrates Buffelskloof's site map. The dates are 22,575 BP ± 270 (Pta-1807)

and  $22,800 \pm 850$  (UW-339) respectively. Buffelskloof was excavated because it was hypothesized by Opperman (1978) that there were two different types of Wilton assemblages, those that correspond to the northeastern areas of the Cape and those that correspond to the southern side. It was found that the assemblages at this site were much more like the Wilton type site and the northeastern Wilton. Wilton, however, is not being considered in this project so this detail is really for informational purposes. In terms of the ELSA, there are several cores, most of which are single platform cores. The predominant material found at this site was quartzite and silcretes.

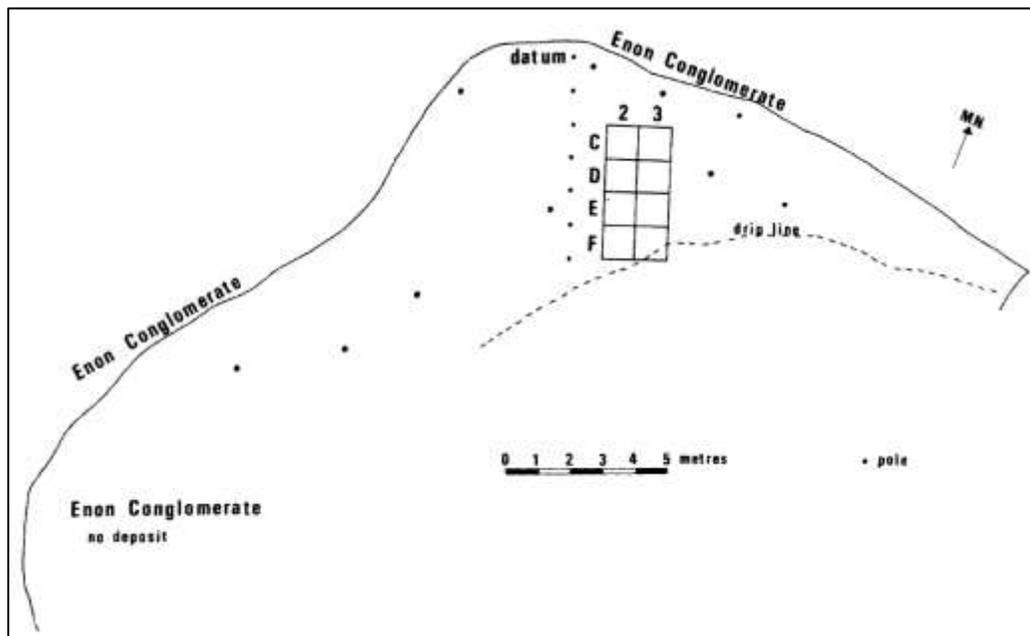


Figure 4.9. Buffelskloof site plan (Opperman 1978: Figure 2: 19).

**Nos (26,930 – 25,850 cal BP)**

Nos is located in the central Namib desert, within a basin amidst the Awasib and Chowagas mountain ranges (Ossendorf 2013; Vogel and Visser 1981). There are several

springs near which likely provided fresh water to prehistoric inhabitants. Rock art renditions of extinct animals line the walls of the cave confirming that humans occupied the site. The rock art at Nos is the most abundant in Namibia (Ossendorf 2013).

Excavation information is limited. The site was discovered and initially excavated by W.E. Wendt in 1970 and radiocarbon dates were submitted in 1973 (Vogel and Visser 1981). There are a few photos of the excavation available (Ossendorf 2013; Wendt 1973) which shows a 2-by-2 meter unit was dug with two 2-x-1 meter units labeled A2 and A3 (Figure 4.10). Samples taken from a 6.5kg lens in Square A3 at a depth of 15 – 30 cm and was dated  $22,00 \pm 220$  B.P. (Pta-1750). Nos is one of the oldest ELSA sites in the northwestern region (Bousman and Brink 2018). Based on available information from Wendt, the assemblage was characterized as indeterminate by Vogel and Visser (1981) but was found to be comparable to assemblages with similar dates from Apollo 11 and Pockenbank (Vogel and Visser 1981). Ossendorf (2013) emphasizes that more information would need to be collected since the artifacts have yet to be formally analyzed, however the assemblage included microliths and evidence of bipolar percussion.

A2		A3	
A2/-13		40 ± 50 BP	A3/-8
A2/-17	A2/-18 330 ± 50 BP		A3/-15
A2/-24			A3/-18
A2/-30		22.1 ka ± 50 BP	A3/-24
A2/-40			A3/-30
			A3/-35

Figure 4.10. ELSA layers at 30cm in square A3 (Ossendorf 2013: Appendix 11.3:25).

### **Reception Shelter (26,380 – 25,820 cal BP)**

Reception Shelter is a small enclosed shelter located in the Northern Cape Province within the Namaqualand Region, south of the Orange River. It is inside of the Varsche River Farm 260, about 43 km from the coast. The area has various forms of reliable water sources year round such as the nearby Varsche River and Hol River. There are also numerous springs but these are sulfurous (Orton et al. 2011).

The shelter is at the southwest end of a limestone outcrop, on the southern bank of the Varsche River. It is 4 m by 7 m and 1.3 m high. It includes a stumbled historical stone wall inside. This site has not been extensively excavated so there is still much to learn about its archaeological record (Orton et al. 2011).

Later Stone Age deposits of interest come from Level 6 of unit TU2. Ostrich egg shells were radiocarbon date to  $21,900 \pm 120$  B.P (AA-89908) which calibrates to 26,380 – 25,840 cal BP (Bousman and Brink 2018).

The lithic assemblage associated with Level 6 of unit TU2 was dominated by fragmented quartz. Diagnostic pieces include a quartz scraper fragment, a silcrete thumbnail scraper, a cryptocrystalline double backed bladelet and bipolar cores (Orton et al. 2011).

Although Reception Shelter is in the west where the ELSA dates are younger, it is one of the oldest sites in this region along with Nos. ELSA starts at 26,389 cal B.P. in Reception Shelter.

### **Boomplaas Cave (25,900 – 24,310 cal BP)**

Boomplaas Cave is located within the Congo Caves, a limestone formation in the Western Cape Province. The cave is about 80 km from the Indian Ocean coast (Deacon 1979; Pargeter et al. 2018). The site is 700 m above sea level and rests between the Great Karoo and the Little Karoo. Although the area surrounding the site is arid, Boomplaas Cave has a stable source of freshwater due to its proximity to the mouth of the Grobbelaars River which drains into the Congo Valley (Pargeter et al. 2018).

Boomplaas Cave was found by Hilary Deacon and Janette Deacon in the 1970s while they were purposefully seeking inland Southern Cape sites with LSA sequences. They were interested in comparing to coastal and Eastern Cape sites. Initially, they were motivated by their 1960s finds in Melkhoutboom which did not fit with the Goodwin and van Riet Lowe's Stone Age sequence at the time as well as by Klein's discovery of Robberg in Nelson Bay (Deacon 1979; Deacon and Deacon 1999). The Deacons wanted to know how widespread the Robberg industry was so they went searching for a cave or rockshelter that promised to have evidence of continuous human occupations through the Upper Pleistocene into the Holocene as well as decent preservation of artifacts, features, plants and animal remains (Deacon 1979). They wanted to search for something that fell within the 30,000 – 20,000 years ago time frame because it marked the MSA to LSA transition. With the help of the Speleological Society who had mapped several caves, they finally settled on an open shelter on the Boomplaas farm in the Congo Valley. They were shown this area by a farmer, Abrie Botha. They excavated 4.3 meters and found a sequence of occupational horizons (Deacon and Deacon 1999). This site is part of a broader project that focuses on the archaeology and paleoecology of the Southern Cape,

similar to the project that Andy Herries is undertaking with the Northern Cape (Herries et al. 2007). The site was chosen because of its deep stratified deposits that extend to 5 meters without major hiatuses. It shows intermittent human occupation over the last 80,000 years. They expected bone to be preserved beyond 10,000 years (Deacon et al. 1979). Excavations started in 1974. One hundred 1-by-1 meter squares were excavated on the surface but only one 1-x-1-meter unit was excavated to bedrock (Figure 4.11). The site contained preservation of macroscopic plant remains, pollen and diatoms (Deacon et al. 1979). The transition between MSA and LSA was found in layer YOL, although it has not been dated. The assemblage embedded within includes small flakes, tool made using bipolar reduction, *pièces esquillées* and an increased use of quartz (Deacon 1995; Deacon 1984a, 1984b; Pargeter 2016; Pargeter et al. 2018). Additional dates are outlined in Table 4.4.

Table 4.4. Boomplaas dates and calibration two sigma age spans (after Bousman and Brink 2018).

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Boomplaas	Pta-2298	21,070	180	25,800	24,870	Strat member LPC, stalagmite	J. Deacon 1982; Vogel 2001
Boomplaas	UW-300	21,110	420	26,150	24,310	Strat member LPC, Sq P12, hearth in LP AF1, top LPC	J. Deacon 1982; Fairhall et al., 1976
Boomplaas	Pta-1810	21,220	190	25,900	25,080	Strat member LPC, Sq P12, hearth in LP AF1, top LPC	J. Deacon 1982; Vogel 2001

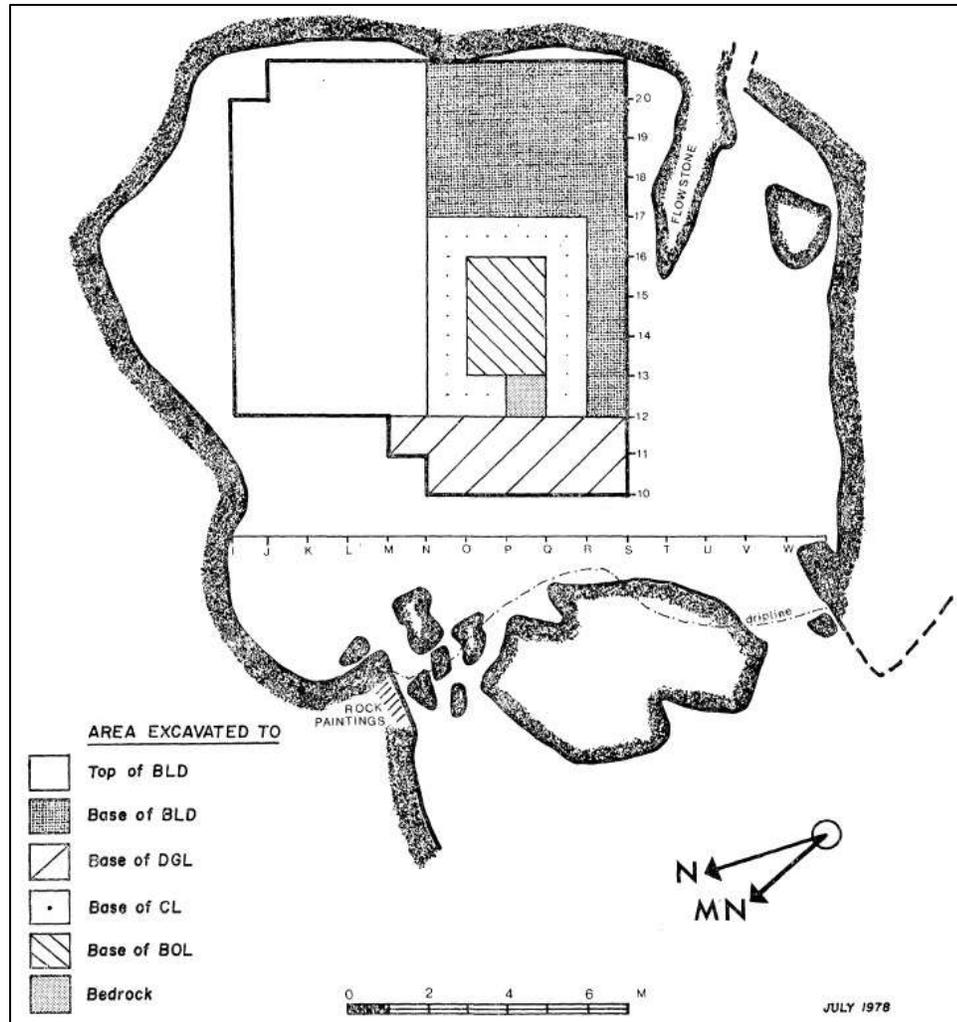


Figure 4.11. Boomplaas site map (Deacon 1979: Figure 2:243).

### Elands Bay Cave (25, 290 – 14,940 cal BP)

Elands Bay Cave is located about 50 m from the Atlantic coast in the Western Cape Province. It is about 200 km north of Cape Town. The cave is 10 m deep and 18 m wide and its opening faces west. It is formed out of the Table Mountain Group sandstone and contains sediments that represent Pleistocene and Holocene occupations (Tribolo et

al. 2016). Initial excavations were conducted by John Parkington in the 1970s (Miller et al. 2016; Parkington 2016; Porraz et al. 2016).

Phase F of Elands Bay Cave is associated with the ELSA. It produced many artifacts made out of quartz with little standardization. Tool manufacturers employed bipolar percussion. Radiocarbon dating produced a date of  $19,120 \pm 90$  B.P.

(Gifa13003/SacA31985) (Parkington 1992; Porraz et al. 2016; Tribolo et al. 2016). For additional dates see Table 4.5.

Table 4.5. Elands Bay dates and calibration two sigma age spans (after Bousman and Brink 2018).

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Elands Bay	Pta-1597	20,180	220	24,910	23,680	Sediment Unit Fro, DSO6	Parkington 1992
Elands Bay	Pta-5304	20,500	240	25,300	24,040	Sediment Unit Furb, OAKO	Parkington 1992
Elands Bay	EBC1*	19,000	2000	22,950	14,940	Sediment Unit Furb	Tribolo et al., 2016
Elands Bay	Gifa13003/SacA31985	19,120	90	23,340	22,660	Sediment Unit Fael	Tribolo et al., 2016
Elands Bay	Gifa13004/SacA31986	18,720	90	22,810	22,350	Sediment Unit Farik	Tribolo et al., 2016
Elands Bay	Gifa13006/SacA31988	18,780	90	22,870	22,400	Sediment Unit Frida	Tribolo et al., 2016
Elands Bay	Gifa13007/SacA31989	19,100	90	23,300	22,620	Sediment Unit Fro	Tribolo et al., 2016
Elands Bay	Gifa13008/SacA31990	19,960	90	24,250	23,680	Sediment Unit Fro	Tribolo et al., 2016

### **Apollo 11 (25,140 – 19,940 cal BP)**

Apollo 11 houses one of the earliest examples of art in the African continent. The art dates approximately to 27,000 years ago. The site was first excavated in 1969 by W.E.

Wendt (Wendt 1972, 1976). There are seven main cultural layers lettered from A (youngest) to H (oldest). The ELSA appears in layer D (Figure 4.12). Dates are outlined in Table 4.6.

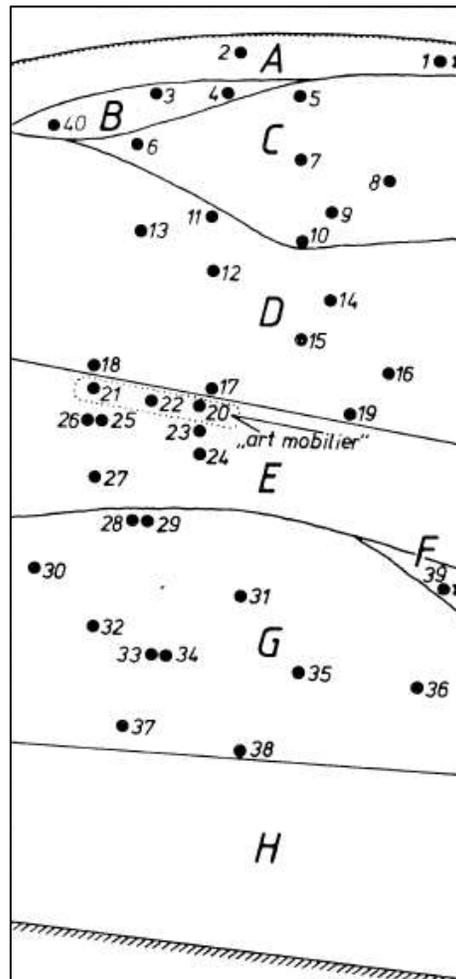


Figure 4.12. Cultural layers from Apollo 11. Numbered bullet points represent  $^{14}\text{C}$  samples taken in 1976 by W.E. Wendt (Wendt 1976: Figure 1: 6)

Apollo 11 is located in Namibia, near the Nuob River. Focus on this site is important because of its nearly complete and well dated occupational layers. The ELSA happens much later in this area, especially in comparison to sites in the east like Border

Cave. The ELSA may have started later in this area, although it is possible that it was developing at the same time as sites to the (Bousman and Brink 2018). The assemblage includes ostrich eggshell beads, microliths, bipolar production, limited amounts of tools and bladelet cores (Freundlich et al. 1980; Ossendorf 2013; Vogelsang et al. 2010).

Table 4.6. Apollo 11 dates and calibration two sigma age spans (after Bousman and Brink 2018).

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Apollo 11	KN-4067	17,380	160	21,410	20,510	ELSA II, B9/p13, Unit L	Vogelsang et al., 2010; Ossendorf 2013
Apollo 11	Pta-1039	18,500	200	22,780	21,840	ELSA II, base of Layer D, A8x2/-2, 51e57 cm; 2007 Unit L	Vogel and Visser 1981; Vogelsang et al., 2010; Ossendorf 2013
Apollo 11	KN-4042	18,650	170	22,920	22,040	ELSA II, B8/-2, Unit L	Vogelsang et al., 2010; Ossendorf 2013
Apollo 11	KN-2057	18,660	210	22,980	21,960	ELSA II, A9x2/p12, Unit L	Vogelsang et al., 2010; Ossendorf 2013
Apollo 11	KN-I.812	19,760	175	24,200	23,280	ELSA II, A7/-28, Unit L	Vogelsang et al., 2010; Ossendorf 2013
Apollo 11	AP1, lower De component*	22,600	1300	25,150	19,940	ELSA II, Unit L	Vogelsang et al., 2010; Ossendorf 2013

### **Melikane (24,470 – 23,550 cal BP)**

Melikane is a northeast facing rockshelter in eastern Lesotho, within the Quacha's Nek District. It is about 24 km south of Sehonghong. It sits 1806 meters above sea level, near the Melikane River, a tributary of the Orange River. It was formed due to erosion of interstratified sandstone and marl beds of the Clarens Formations (Stewart et al. 2012). The site was originally excavated in 1974 by P.L. Carter (Carter 1976; Carter and Vogel 1974). He created a 12 meter squared trench and reached bedrock after 2.6 meters. Carter

originally named seven stratigraphic units (Carter 1978). In 2007, as a part of a project aimed at studying human adaptations in ecologically challenging environments of South Africa named Adaptations to Marginal Environments in the Middle Stone (AMEMSA), Stewart et al., (2012) reexamined Carter's trench. Additionally, the multidisciplinary team excavated a new 2-by-3-meter unit in 2008 and 2009, a meter east of the previous excavation. They reassessed the stratigraphic layers, used exposed sections from Carter's trench as references and assigned 30 layers (Stewart et al. 2012).

The ELSA in Melikane occurs in the AMEMSA layer 5, which corresponds to Carter's Layer 3. (Carter excavated in spits). The lithic assemblage consists of informal tools, bipolar cores and scaled pieces (*pièces esquillées*) (Stewart et al. 2012). The ELSA layer dates to  $20,000 \pm 190$  (OxA-23028) (Stewart et al. 2012; Stewart et al. 2016) which calibrates to 24,470 – 23,540 cal BP.

### **Pockenbank (24,190 – 22,510 cal BP)**

Pockenbank is located in Namibia, 60 km southeast of the town of Lüderitz, between the southern part of the Namib Desert and the Great Escarpment (Schmidt et al. 2016; Vogel and Visser 1981). Two test pits were first excavated by W.E. Wendt in 1969 and subsequently published in 1972. The limestone cave has some rock paintings and rock engravings.

According to Vogel and Visser (1981), the LSA (which they described as poor) occurred at 40 cm and had no microliths. Typical MSA is found at 220 cm (Vogel and Visser 1981; Wendt 1972). Freundlich et al., (1980) also described the LSA layer as not being “true LSA.”

Of the eleven radiocarbon dates collected from the site (Ossendorf 2013), only a few corresponded with ELSA dates. One sample was collected from a layer at a depth of 12 – 16 cm in Square A5 (Pta-1203). The samples were pretreated with acid and alkali and date to  $19,700 \pm 220$  which calibrates to 24,193 – 23,088 cal B.P.

Additional dates were published in 1980 (Freundlich et al. 1980). Two samples correspond with ELSA dates. KN-I.625 was taken from charcoal at 52 – 54 cm in Square A7 which contained worked ostrich eggshell and microliths which were described as “atypical.” This layer is similar to Layer D in Apollo 11. Sample KN-I.627 was also taken from charcoal fragments in Square A7 at 113 – 115 cm. The assemblage in this section was described as crude (Freundlich et al. 1980). There was also an increase in the use of quartz and bipolar production (Ossendorf 2013).

### **Heuningneskrans (23,320 – 22,620 cal BP)**

Heuningneskrans is a western-facing cave located above a valley floor in the Mpumalanga Province in the northeastern portion of South Africa. It developed in shale Precambrian dolomite with the aid of a dead karst spring within the formation (Butzer 1984a). Butzer (1984) refers to five layers (KNK-1 through HNK-5) as being ELSA, two of which were sampled for radiocarbon dates (Pta-100 and Pta-101). Vogel and Marais (1971) however, only refer to HNK-3 as being ELSA. This layer dates to  $24,630 \pm 300$  and calibrates to 29,317 – 27,965 cal B.P using the SHCal13 atmospheric curve (Hogg et al. 2013) from OxCal 4.3.102 (Ramsey 2017). Additional dates are outlined in Table 4.7.

Table 4.7. Heuningneskrans dates and calibration two sigma age spans (after Bousman and Brink 2018).

Site	Sample	Age (BP)	Error	Unmodelled 2 Sigma cal BP		Provenience	References
				From	To		
Heuningneskrans	LJ-3135	19,320	240	23,830	22,620	Sq A12, Stratum 1c, 290 e335 cm	Linick 1977
Heuningneskrans	LJ-3136	19,980	260	24,690	23,320	Sq A14, Stratum 1d, 328 e351 cm	Linick 1977
Heuningneskrans	LJ-3137	20,510	270	25,370	23,990	Sq A12, Stratum 1e, 404 e419 cm	Linick 1977
Heuningneskrans	AA-6451	21,940	230	26,720	25,720	Stratum 3e, 373e434 cm	Miller et al., 1992
Heuningneskrans	LJ-3138	23,400	500	28,580	26,570	Sq A12, Stratum 1f, 450 e488 cm	Linick 1977
Heuningneskrans	Pta-101	24,630	300	29,320	27,960	Sq A12, Stratum 1e, 435 e442 cm	Vogel and Marais, 1971; Beaumont and Vogel, 1972; Linick 1977
Heuningneskrans	AA-8565	24,700	250	29,320	28,130	Stratum 3e, 373e434 cm	Miller et al., 1992; Wadley 1993

Lithic technology at Heuningneskrans shelter is also dominated by bipolar flaking (Beaumont 1981) with a decrease in the amount of formal tools. The most abundant raw material is quartz (Mitchell 1995, 2002; Mitchell and Vogel 1994).

### **Putslaagte 8 (22,980 – 19,990 cal BP)**

The Early Later Stone Age starts fairly late at the site of Putslaagte 8. The small rockshelter is located in a low canyon near the Putslaagte River, a tributary of the Doring River. Putslaagte 8 is one of eight sites in a 100 by 100 km area located between the Fynbos and Succulent Karoo biomes, about 82 km from the modern coast line. It is east

of the northern Cederberg Mountains. The geology of the area is made up of Table Mountain Sandstone. Along the river, there are beds of knappable stones, although silcrete cobbles are less common.

The area of the rockshelter that makes up the site only goes into the canyon about 3 meters and it is about 2 meters high. The shrubbery that grows in front of the rockshelter keeps it secluded and may have served as a hunting blind. It was excavated from October to November 2010 by Alex Mackay, Zenobia Jacobs and Teresa E. Steele. Two 1-x-1 meter squared units were excavated to bedrock (Figure 4.13). The site contains evidence of cultural activities that span over 75,000 years (Low and Mackay 2016). ELSA artifacts were found in spits 19 – 16 of the site, which date to about 25ka to 22ka. These were found underneath the layers with distinctive Robberg artifacts (Low and Mackay 2016). The ELSA assemblage was dominated by the use of quartz and hornfels. Artifacts include bipolar cores with larger blades (compared to those found in Robberg layers). The use of bipolar production and the increased use of quartz starts in the ELSA and continues in larger quantities in the Robberg layers and matches assemblage patterns found at other sites. However, the ELSA at Putslaagte 8 is also marked by expediently made bladelets and prepared cores (Low and Mackay 2016).

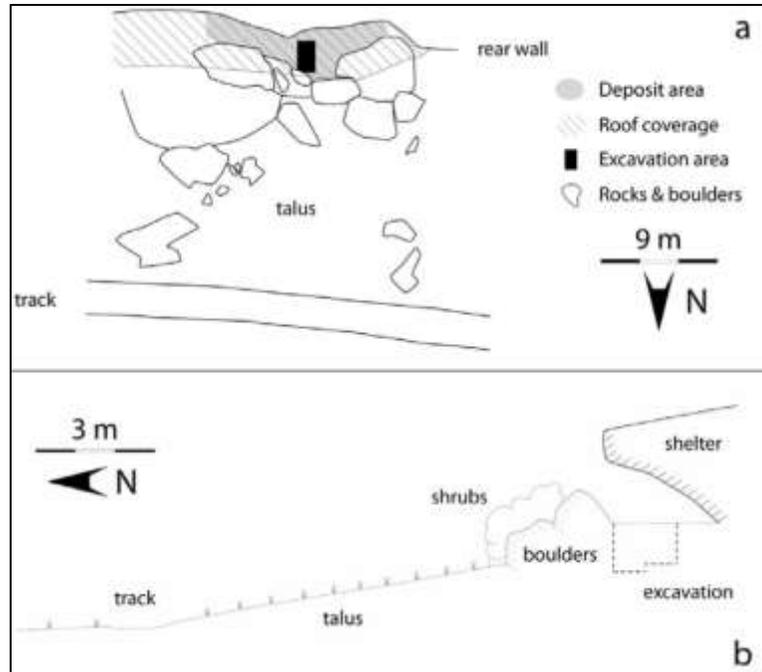


Figure 4.13. Putslaagte 8 site plan (Mackay et al. 2015: Figure 2: 74)

## Summary

The culmination of sites and their respective dates suggest that the technology associated with the Early Later Stone Age was migrating from the eastern coast to the west through two routes. The first went through the interior while the second followed the southern coast. The ELSA ends first in the northeastern region and then in the interior. It ends quickly in all of the rainfall areas and along the coasts below the Great Escarpment (Bousman and Brink 2018).

## V. METHODS

This chapter presents information about the excavation of the site, the theoretical frameworks driving the analysis as well as the coding procedure for the lithic analysis. Importantly, limitations that the analysis had to circumvent are detailed. These issues were mainly due to the extended time lapse between the excavation and the analysis.

### **Analytical Theoretical Frameworks**

Analysis and interpretation of the assemblage is guided by protocols outlined in Andrefsky's *Lithics: Macroscopic Approaches to Analysis* (2005) and function under the assumption that lithic technology follows a standardized reduction sequence (Collins 1975; Muto 1970). Further assumptions used in this analysis protocol include the idea that prehistoric lithic technology follows a continuum with informal/expedient tools on one end and formal/complex/maintainable tools on the other (Andrefsky 2005; Binford 1979; Bleed 1986). Tools which are produced expediently tend to be simpler, are created faster. Complex tools take more time, effort, planning but are more reliable (Andrefsky 2005; Bleed 1986).

Expedient tool production depends on available time for manufacture, length of occupation of a site and raw material availability (Nelson 1991). Expedient tool production is a responsive technology to readily available raw material sources which are collected on an as-needed basis and with minimal planning (Kuhn 1990, 1995).

Raw material availability is an important factor in tool producing behavior. For instance, if a mobile group is entering an area of uncertain material availability, they may

decide to provision their own material, especially if they are relying on formal tools which require more time and design constraints to produce. The amount of material they provision depends on the amount they can carry (Binford 1980, 1982). If the group's mobility is dictated by predictable activities that occur at the same time every year like a seasonal hunting expedition, the group's procurement strategy might include caching or stockpiling material in areas of uncertain availability (Kuhn 1990). At Malony's Kloof, quartz is available around the rockshelter and there is a chert outcrop about 2.8 km (as the crow flies) from the site (Figure 5.1).



Figure 5.1. Distance between Malony's Kloof and chert outcrop (Google Earth 2018)

Another assumption that guides this thesis is the idea that debitage quantity correlates with site function. Large amounts of debitage indicate a manufacturing site or

workshop. Ideally, accurate provenience information can help elucidate whether debitage indicates a knapping floor where prehistoric people were manufacturing items (primary deposition) or the characteristic accumulation that is created after cleaning up a manufacturing site (secondary deposition) (Olausson 2010). Unfortunately, it was not possible to derive this level of detail from Malony's Kloof due to the unclear proveniences.

Lithic research such as replicative studies and debitage analysis have evolved from merely attempting to recreate artifacts to outlining the problem solving process and the manufacturing stages (Callahan 1979; Crabtree 1966, 1967; Sellet 1993). Flintknapping is a reductive process which entails not just fine motor skills but cognitive mastery, thus lending itself well to studies of prehistoric planning, problem solving and expertise (Karlin and Julien 1994; Madsen 1992; Pelegrin 1990). This process, which is referred to within the literature by its French moniker, *chaîne opératoire*, is often accessed through experimental flintknapping (Sellet 1993). Through experiencing the process, modern knappers can reveal prehistoric mental process, the stages of manufacturing, as well as the function of debitage shape and sizes (Callahan 1979; Crabtree 1966; Newcomb Jr. 1990; Whittaker 1994). Additionally, information gained by modern knappers can help inform analysts of prehistoric knappers' skill, raw material workability, traditions, styles, equifinality potential and information transfer (Coles 1979; Crabtree 1967; Pigeot 1990; Shott 2003; Whittaker 1994).

These frameworks guide research questions such as whether Malony's Kloof represents Early Later Stone Age technology and what sort of lithic manufacturing was occurring at the rockshelter. For instance, artifacts with more cortex are thought to be in

the beginning stages of manufacturing and indicate proximity to raw material source. The type of raw material is considered to assess if inhabitants of Malony's Kloof were using quartz as is expected by ELSA standards or the chert available in nearby outcrops.

### Excavation Information

The discovery of Malony's Kloof was a result of a larger interdisciplinary project aimed at investigating paleoenvironments and the paleoanthropological potential of the Northern Cape Province and the Ghaap Escarpment (Curnoe et al. 2005; Herries et al. 2007). Although the area is home to Taung, the World Heritage site where the skull of the first Australopithecine was found, the area has remained largely uninvestigated.

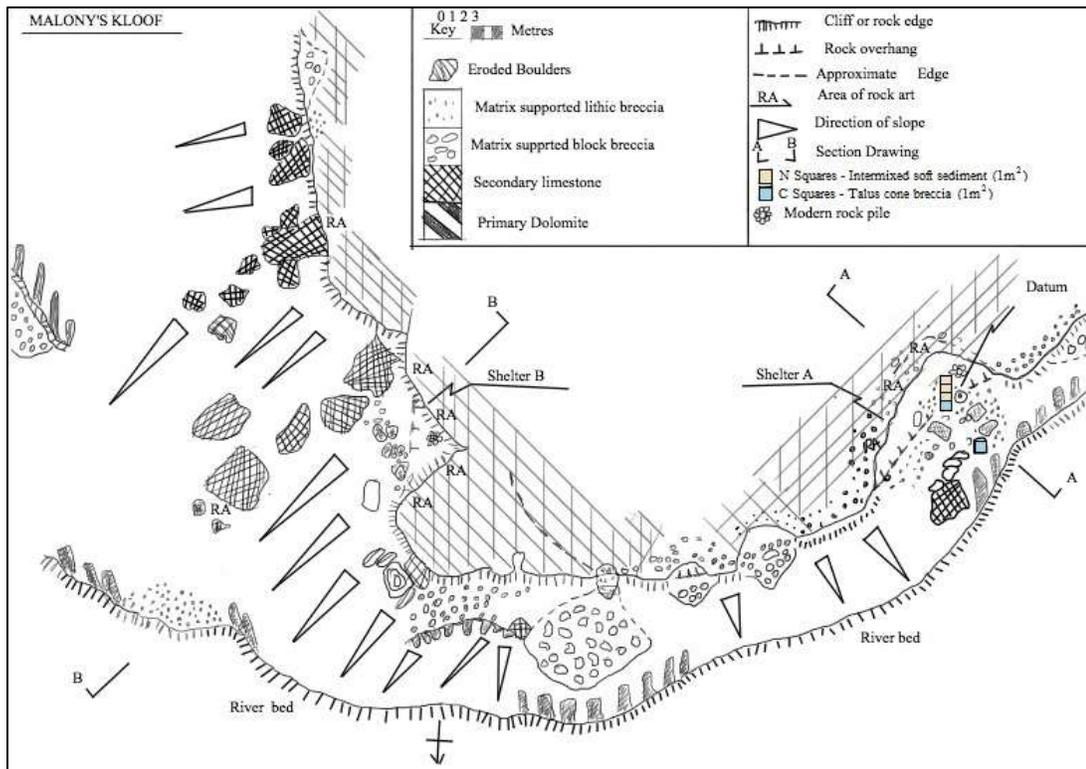


Figure 5.2. Malony's Kloof Site Map

Surveys around Malony's Kloof in 2004 revealed fossils and lithic artifacts within the site's extensive breccia. The excavation was led by Dr. Andy Herries in June 2005 and was considered a test excavation to assess the archaeological potential of Malony's Kloof. Three rockshelters were identified and named Rockshelter A (MKA), Rockshelter B (MKB), and Rockshelter C (MKC) (Curnoe et al. 2005). Rockshelter A and B are in proximity of each other (Figure 5.2). This thesis focuses on the lithic assemblage found in Rockshelter A. The location of the five units from MKA are in the right side of the Figure 5.2. The squares in light yellow represent units with younger, intermixed and decalcified deposits (N Squares). The squares in light blue represent the older breccia and are associated with ELSA dates (C Squares). Figure 5.3 illustrates a generalized cross section of MKA that is not to scale.

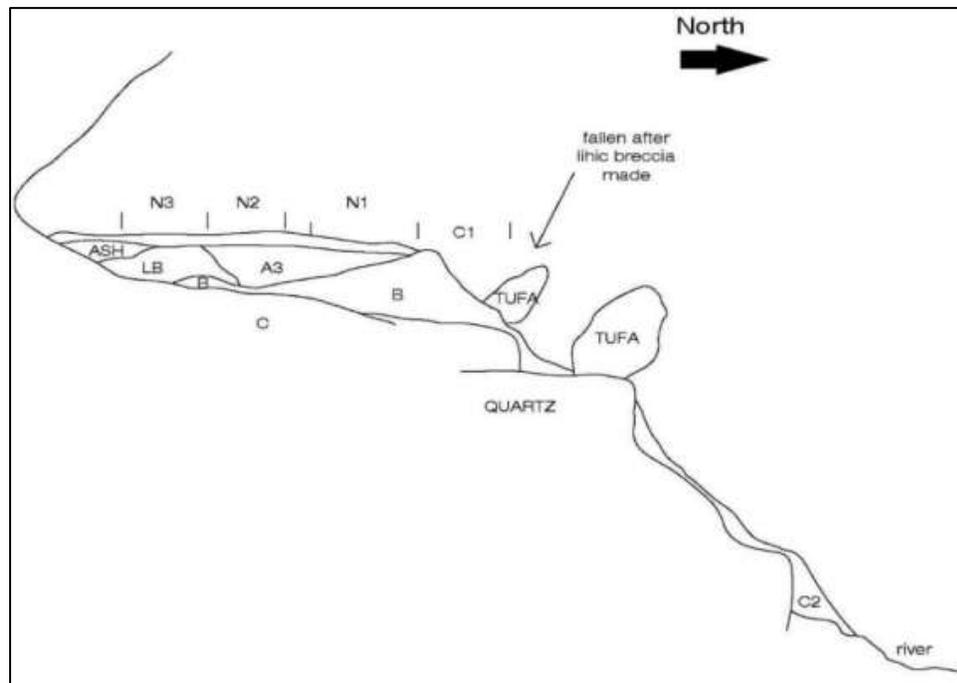


Figure 5.3. Cross section of Malony's Kloof Rockshelter A

Since the site was not excavated by the author, collection methods were reconstructed using photos and information supplied from Dr. Andy Herries. Four squares forming a 4-x-1 meter trench (Figure 5.4) were placed inside Rockshelter A while one square was placed at the bottom of the talus cone (Figure 5.5a). These squares were named N3, N2, N1 and C1. Since C1 was mainly breccia, it was excavated last. The square at the bottom of the talus slope was named C2 (Figure 5.5b). The reasoning behind the naming of the squares is not known. Field notes alluded to C being named as such since these artifacts were collected rather than excavated. However, that does not explain why the ancient breccia at the bottom of the excavation was also named C. The deepest part of the excavation reached 27 – 35 cm based on unit sketches. The difference in depth is likely due to the ancient breccia and rubble that was found at this depth, making it difficult to continue excavating. Additional unit photos can be found on Appendix C.

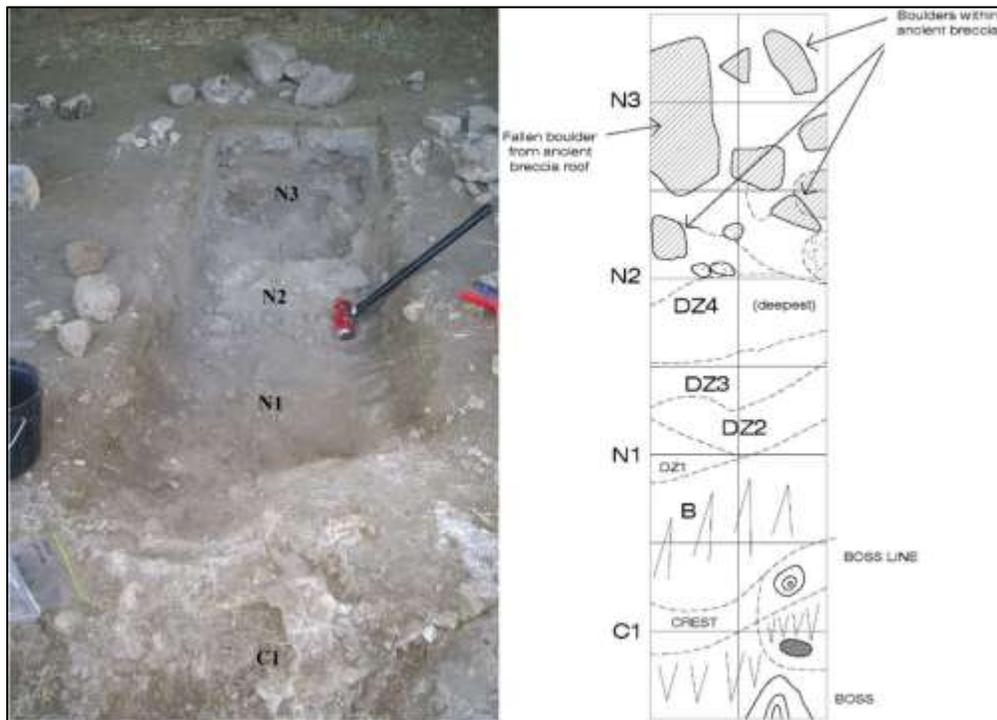


Figure 5.4. Squares N3 – C1 (diagram represents 1 meter by 4-meter trench)

The talus breccia where square C1 was placed is 174 meters in width around the base, 42 meters long and at its maximum thickness it is no greater than 3 meters. Three cubic meters of breccia were removed and processed from the talus slope at the opening of the shelter (Figure 5.6) (Curnoe et al., 2005). Based on the photos, it seems that softer sediments were collected and screened using 1/8 in screens.



Figure 5.5a-b. a) Square C2 from the talus. B) Square C2 with 12-inch metal ruler for scale



Figure 5.6. Processing breccia on the talus

Surface collections are indicated in the analysis as “surface,” “cleanings” or “sweepings.” Squares were excavated using natural stratigraphic layers and centimeters below datum were recorded. The datum is located to the west of square N2 (Figure 5.2).

File names on photos indicate that Dr. Herries’ crew worked on the site from approximately June 27, 2005 to July 15, 2005. The crew seemed to consist of about 4 to 5 people. The inherited field notebook is 16 pages of diagrams and notes with 2 pages of radiocarbon laboratory results. The only date referenced in the field notes is July 2, 2005. It is not clear if all notes were written on this date or if the rest of the notes were written in at different times but not dated. There seems to be two distinct sets of handwriting so at least two people contributed to the field notes.

## Coding Procedure

All data were inputted into an Excel spreadsheet. The following categories were noted during the analysis: Artifact ID, Square, Layer/Block, Quad, Depth, Comment on Layer, Raw Material, Artifact Type (Detailed), Platform, Cortex Percentage, Length, Breadth, Thickness, and Comments. Later in the analysis, additional columns were introduced in order to organize more specific or hierarchical information. The additional categories were: Layer/Block (Assumptions), Surface/Non-Surface (in-situ), Size Sorted, Color Detail, Group (Tools, Cores, Debitage), Subgroup (Core-derived, Core-based), Class (Core/Flake/Flake/Blade/Biface/Non-Biface), Subclass I (formal/expedient), Subclass II (modified/unmodified), Artifact Type (General), Other, and Complete/Fragment.

The initial purpose of the creating additional categories was to run the data through R, an open-source coding environment with a widely available set of software packets that can be used for data manipulation, calculation and visualization (Foundation 2019). The categories were created as new research questions were developed. Manipulating the various aspects of the data was easier when certain columns acted as parameter that could be kept or removed, depending on the question. This endeavor, however, was cancelled after the author decided that the cost of time spent debugging code was surpassing the benefit of using the program. The additional categories were not used in the analysis. The organization of the coding sheet remained useful during analysis since it allowed for manipulations of pivot tables within excel.

The initial set of categories were based on information written on artifact bags. The artifact ID was assigned based on the sequence of photographs. For instance, artifact

MKA-001 was the first artifact to be photographed. The artifact ID was not necessarily related to its context. The Square section contains the unit information (N3, N2, N1, C1, and C2). The Layer/Block section referred to stratigraphic layers in squares N1, N2, N3, and C1. Since the artifacts recovered from square C2 were collected from the surface, the square was separated into sections which excavators called “blocks” (Figure 5.7). It can only be assumed that the letters used to name the blocks are in sequence of their collection. During laboratory analysis, only blocks A, C, D, H, J and L2 were found. It is not known if the other letter designations had artifacts.

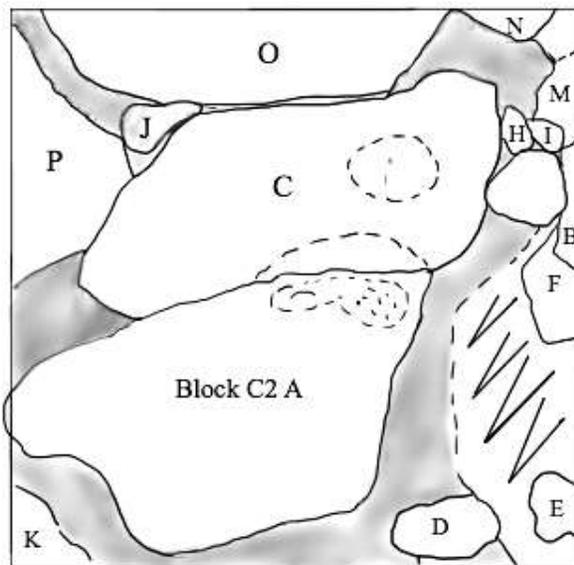


Figure 5.7. Sections of square C2 referred to as “blocks” (Scale: 1-x-1-meter square)

Each square inside the rockshelter (excluding C2) was further divided into quadrants with cardinal directions (SW, NW, SE, NE). However, not all artifact bags contained this information so this section was not completely filled. The Comment on Layer section included any additional information that was on the bag. For instance,

some bags indicated the date they were excavated as well as the general size of the artifacts found within the bag. Some artifact bags also indicated the centimeters below datum. When available, this information was inputted into the Depth section.

The Raw Material category kept track of the geologic material that made up the artifacts. The raw material was classified based on morphological assessments by the author and Dr. Britt Bousman. The raw materials that were recorded were: CCS (cryptocrystalline), chert, dolerite, hornfels, ironstone, quartz, quartzite, and siltstone. Initially color was also recorded in this section. As it became apparent that more categories would need to be added, the color information was removed from this column and added to a column of its own. However, without a Munsell Rock Color Chart, there was no accurate way to pinpoint hue, value and chroma. Rather, artifacts were categorized into general colors like whites, grays, blacks, oranges, browns, greens, pinks, purples, red, yellows and multi-colored.

Lithic artifact types were classified hierarchically. The first level of organization sorts artifacts between chipped stone tools ground stone tools. There were no ground stone tools at Malony's Kloof. Chipped stone artifacts can be classified as debitage, cores and tools (as outlined in the Group category mentioned above). Debitage consisted of flakes and shatter. Cores were classified as bidirectional, bipolar, bladelet, discoid, unidirectional, multidirectional, discoid, bipolar, *outils écaillés*, and pyramidal (Figure 5.8). Tool categories are outlined in Table 5.1 and coding categories are in Table 5.2. Completeness was recorded within this category as well as within the Complete/Fragment category in order to make comparisons of these kinds of details easier to manipulate within excel.

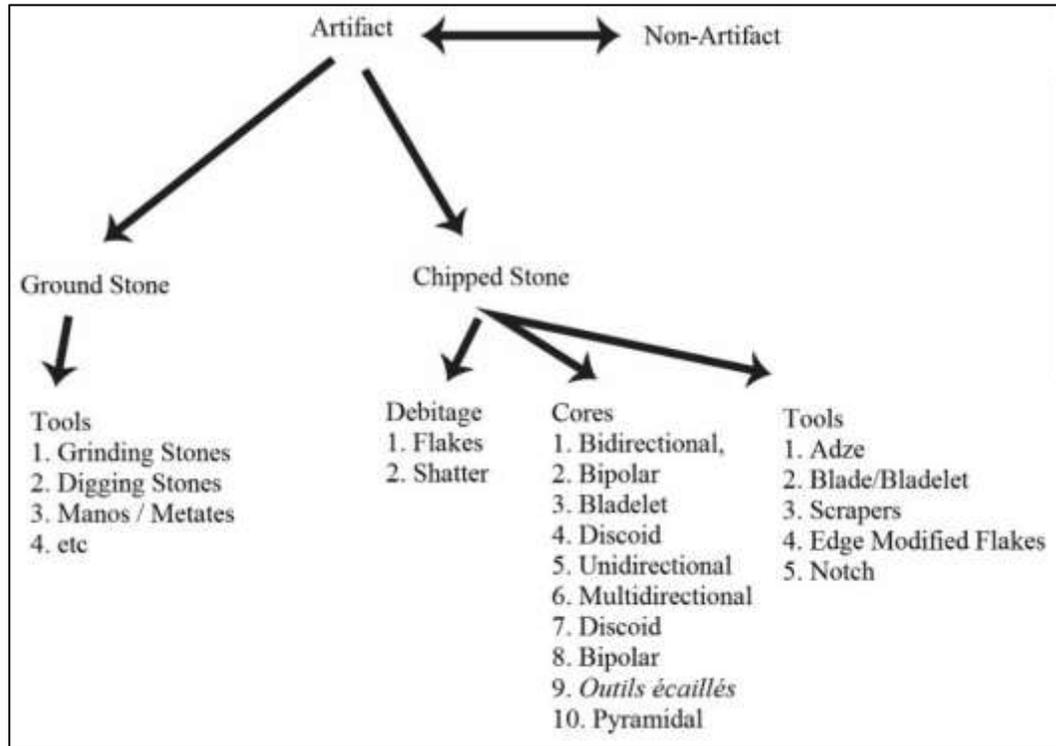


Figure 5.8. Stone Tool Organization as it pertains to the Malony’s Kloof assemblage

Table 5.1. Tool types.

Adze	Burin Spall
Bipolar - Fragment	Double Endscraper
Bipolar Wedge - Fragments	Endscraper
Blade	Flake - Edge Modified
Blade - Edge Modified	Flake - Edge Modified - Fragment
Blade - Edge Modified - Fragment	Notch
Blade - Fragment	Notch - Fragment
Bladelet	Scraper
Bladelet - Fragment	Scraper - Fragment

Adzes were identified based on their beveled bits that are often used to work wood. This was the only type of biface in the assemblage. Bipolar artifacts were identified as such if there was impact on opposing ends with compression rings moving

toward each other. Bipolar fragments were considered tools if their edges were modified. Bipolar wedges were also considered tools if their edges were modified. Blades were identified by their parallel margins and their dimensions since they are defined as being twice as long as they are wide (Andrefsky 2005). Bladelets exhibit linear dorsal flaking, are also twice as long as they are wide but are less than 25 mm (Deacon 1984a; Tixier 1963). Burin spalls are narrow and thick flakes used to re-sharpen the bit of a burin. Scrapers are a more general term used to describe flake tools that have retouched edges of approximately 60° to 90°. Endscrapers are scrapers with the retouch appearing at the distal end of the tool. Double endscrapers have retouch on both the distal and proximal ends. Edge modified flakes are portions that have been removed from a larger stone by percussion which have been subsequently modified by use or by re-sharpening (Andrefsky 2005). Additional lithic definitions are outlined in Appendix D.

Within the platform column, the categories that were recorded were: cortex, broken, crushed, dihedral, multifaceted, multiple, N/A, reduced and single. If the artifact did not have a platform as in the case of cores and some fragments, the entry was changed to N/A. A striking platform are the surface that is struck to remove the flake from the core. There are several factors that lead to the variety in platform morphology from the type of core, type of platform preparation and type of hammerstone (Andrefsky 2005). Platforms with only one facet were labeled as single while platforms with two facets were dihedral. If a striking platform had more than two facets, it was dubbed multifaceted whereas if the striking platform was made up of mainly cortex, it was labeled as such. Platforms which were either collapsed, crushed, reduced or broken were labelled as incomplete.

Cortex refers to the outer rind of the rock before it is chipped. It can be weathered through mechanical or chemical means. Mechanical weathering changes the outside texture of the stone, such as the smoothing that occurs when rolled through a river. Chemical weathering occurs when the stone is exposed to moisture or heat. This type of weathering changes the actual composition of the exposed portions of the stone, causing a change in color or texture (Andrefsky 2005). Cortex amounts are important in deducing the lithic artifact's reduction stage (Morrow 1984). There were five different categories used to describe cortex amount in the cortex column: 0%, 1 - 25%, 26 - 50%, 51 - 75%, 76 - 99% and 100%. The percentages refer to the estimated amount of cortex visible. If the artifact was removed from a core, such as a flake, then cortex was measured on the dorsal side. If the artifact was a core, then all surfaces of the artifact were considered.

Length was measured as a straight line from the middle of the platform down to the distal end of the flake. This line is transverse to the wide axis of the center of the platform. The center of the platform is measured by locating the proximal ends of the flakes. If the artifact was of a particularly odd shape, the longest point was also taken in case this metric might later serve a function.

The breadth column kept track of artifact widths. The width was measured at the midpoint of the midline and with the calipers measuring the transverse dimension. Thickness was measured at the widest point below the bulb of percussion.

The category Layer Block (Assumptions) was created in an attempt to make sense of the layers within the rockshelter. Since some of the stratigraphy was unclear, assumptions were made based on artifact bag photos, excavation photos, depth information and sketches. It was also an attempt to organize the data in a way that would

help elucidate patterns with pivot tables. The main function of this category was to consolidate some layers without losing the original provenience information which was recorded in the Layers/Block column. For example, some categories were clearly surface collections because the artifact bag stated it was from the surface. Others however, were assumed to come from the surface like those that came from bags labeled “general,” “hillside opposite MKA” or those that came from square C2 and had no block information. Some artifact bags from C2 were labeled only labeled as C2 while others were labeled as C2 General, C2 Surface, C2 Cleanings, C2 Sweepings or C2 Scrapings. These vague labels were re-labeled as Assumed Surface. As mentioned before, all artifacts from C2 are being treated as surface collections but some were labeled as coming from blocks A, A (1), C, D, H, J or L2. Blocks A and A (1) were consolidated into one category, Block A.

Another group that was consolidated were layers A3, “All + A3 Inter,” and “A3 under A5.” These names were taken directly from the artifact bags. This was grouped together as just A3 in the Layer/Block (Assumptions) column. All came from the southern part of square N2 so it seemed safe to assume the three designations were slightly different variations of layer A3.

The next group of layers that were consolidated into one group were B1, Block I, Block2, C8, B2 and some that had no layer info but were from square C1. These were all grouped together as layer B in the Layer/Block (Assumptions) column. These were all considered B as they seem to be a part of the breccia in square C1, in the northern end of the trench inside of the rockshelter. It was named B since that is what it is referred to as in the site’s side schematic (Figure 5.3).

Artifacts from Layer B1 occurred in the northwestern part of square N1 with two artifacts from the northeastern side. In square N2, artifacts labeled as being from layer B1 were found mainly on the southern part of the square (both southwest and southeast quadrants). Artifact bags that contained depth information indicated that some of these artifacts came from the deepest levels of the square (the artifact bag had “30-35 cm?” written on the bag). Figure 5.9 provides a reference as to where these artifacts were found in relation to the area that is generally referred to as B in most diagrams.

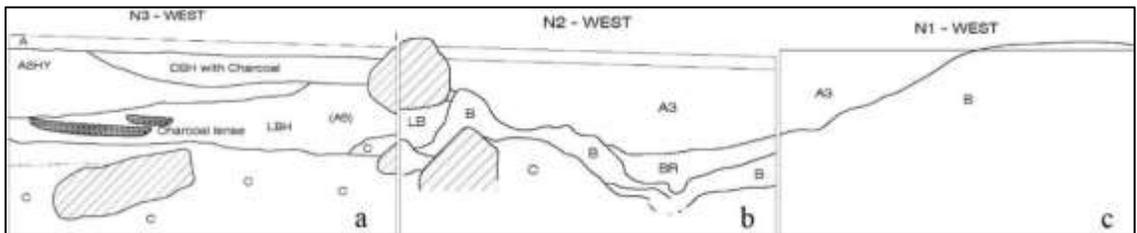


Figure 5.9. Western wall profiles of squares N3, N2, and N1

There were only three artifacts labeled Block I (Figure 5.10) and they came from square C1 so it was also consolidated into the B layer. There were only 23 artifacts labeled Block 2 and 33 artifacts labeled C8, which all came from square C1 so they were also included in the B layer. There was only one artifact labeled B2 and it was in the northwestern portion of square N1. Based on the excavation notes and sketches, this area contained breccia. It is not clear what Block I, Block 2 or C8 refers to.



Figure 5.10. MKA-055b from Square C1, layer Block I

The group of artifact that were incorporated in layer B but had no layer information were designated so because these artifacts came from square C1. Based on the excavation sketches and photos, square C1 is made up almost entirely of entirely breccia (Figure 5.3). All other artifact bags from square C1 also indicate they are part of layer B1.

With the exception of the layers mentioned above, all other layers maintained their name within the Layer/Block and Layer/Block (Assumptions) columns. The remainder of the columns are: Surface/Non-Surface (in-situ), Size Sorted, Color Detail, Subgroup (Core-derived, Core-based), Class (Core/Flake/Flake/Blade/Biface/Non-Biface), Subclass I (formal/expedient), Subclass II (modified/unmodified), Artifact Type (General) and Complete/Fragment. The date the artifact was analyzed was recorded in the event that this could add context to analysis if need be. All of the artifacts were analyzed by the author except for 140 pieces that were analyzed by Dr. Britt Bousman in 2014. The comments section held any information that might be useful to know but did not fit in any of the other categories like termination, odd colors, heat treatment or if the artifact was re-analyzed.

Previous analysis by former National Museum employee Zoe Henderson included 195 artifacts. These artifacts were not included in this thesis since they were in the box that was not found and permission to use the information was not obtained.

The initial analysis contained 2097 artifacts. Some were eliminated for various reasons such as being designated as natural rocks, incomplete data entry or unclear provenience. Thirty-two artifacts were removed because of unclear proveniences which may have been due to an error in data entry. Two were removed because they were bone, not lithic artifacts. The analysis within this thesis is based on the remaining 2056 artifacts.

Table 5.2. Coding Categories.

Artifact ID	Layer/Block (Assumptions)
Square	Surface/Non-Surface (in-situ)
Layer/Block	Size Sorted
Quad	Color Detail
Depth	Group (Tools, Cores, Debitage)
Comment on Layer	Subgroup (Core-derived, Core-based)
Raw Material	Class (Core/Flake/Flake/Blade/Biface/Non-Biface)
Artifact Type (Detailed)	Subclass I (formal/expedient)
Platform	Subclass II (modified/unmodified)
Cortex Percentage	Artifact Type (General)
Length	Other
Breadth	Complete/Fragment.
Thickness	Comments

## Limitations

Having inherited the collection, many challenges presented themselves while completing the lithic analysis. Reconstructing the field season required trying to piece together notes and photos with minimal information. It was later discovered that some of the field notes were incomplete. The missing lab notebook pages were not recovered. Dr. Andy Herries, who directed the excavation, served as my contact. Dr. Herries mentioned that some of the field notebooks and sketches may have been lost during the process of changing university jobs. He is now at La Trobe University. Dr. Herries' availability was limited during the writing of this manuscript so many ambiguous details were not clarified. Provenience information was described as best as possible.

### *Collection Bias*

Surface collections may represent the largest specimens since they are less likely to be moved by the elements. Additionally, since the breccia was cemented, portions of it that were processed on site were split with a mallet (Figure 5.11). Many of the artifacts could have been broken under the mallet blows. Figure 5.12 shows an artifact with recent cracks and all pieces were still together in the bag. It is unclear whether it was in fact broken by a mallet but it is likely. Based on the photos, it seems that large portions of breccia were removed and broken into smaller pieces over screens. Some of the artifacts were still encased in large nodules of breccia inside the artifact bags at the time of laboratory analysis. Breccia nodules were dissolved in commercially available hydrochloric acid (pool chlorine) to release artifacts.



Figure 5.11. Excavator using mallet to extract breccia



Figure 5.12. Cracked artifact

## *Squares and Levels*

Half of the lithic analysis was conducted in the summer of 2016 without prior knowledge of proveniences. Notes from the artifact bags served as the only information that guided the provenience information recorded on the excel sheet. Units were referred to as squares on the artifact bags, therefore that is how units are referred to in this manuscript. Similarly, some artifact bags referred to layers while others referred to blocks. Layers refer to the stratigraphic layers within the rockshelter squares while blocks refer to the sections within square C2. The reasoning behind the naming of the squares is unknown so it is unclear whether the square lettering (N versus C) represents anything specific.

The next challenge was the layers. It was clear that the layers were excavated in natural stratigraphic layers but there are also notes indicating that excavators were keeping track of centimeters below string. According to Figure 5.3, the major layers are A, LB, A3, B and C. According to correspondence from Dr. Herries, layer A is the soft sediment horizon, layer B is the breccia, layer B1 is the decalcified breccia and layer C is the solid floor at the base of the rockshelter. Of these layers, there were no artifact bags that referred to a single A layer, layer LB or layer C. According to the information on the artifact bags, however, the following layers were recorded within squares inside the rockshelter: A3, All + A3 Inter, B1, B2, Block 2, Block I, C8 and Surface.

### *Issues with A Layers*

Several layers that start with A were recorded. If the layer had an A but no other number, then it was assumed that the layer referred to the top, youngest layer. Excavation notes referred to layer A but there were no artifacts labeled as only A. It is assumed that artifacts within the rockshelter labeled Surface are from layer A. Based on the field notes, there were several layers that started with the letter A (layers A2 – A18), but not all of these layers contained lithic artifacts. Artifact bags had three different references to A3 layers: A3, “All + A3 Inter” and “A3 under A5.” According to the notes, they seemed to be within the larger A3 section (Figure 5.13). All were found in square N2. Within the analysis, they were treated as a single component (A3). Since Dr. Herries mentioned that most of the layers were variations of the same gray sediment and that it was mixed, the A layers have been consolidated. Since this analysis does not take into account square N2, all A layers are treated as young, intermixed soft sediments. There are potentially ELSA aged A layers but decalcification in deep layers of N2 and N1 make it unlikely that any present ELSA layers are pristine.

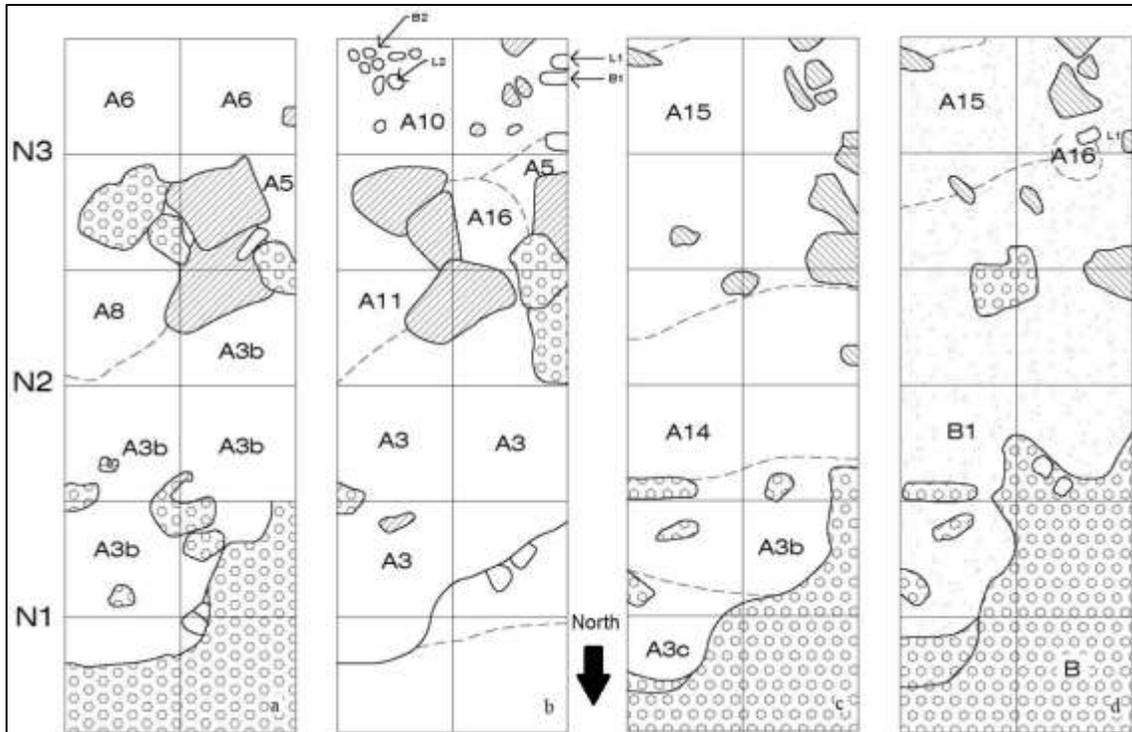


Figure 5.13 a-d. Bird's eye view of squares N3 – N1 at (a) 10 - 15, (b) 15 – 20, (c) 20 cm and (d) 25 cm below datum respectively. Illustrations represent a 3-x-1-meter trench.

Additional comments in regards to the diagrams above, Figure 13a and 13b did not have clear markings as to what depth they represented. Figure 13a had a number 10 in parenthesis above the sketch of the squares, so it was assumed that it represented the squares at 10 cm below the datum depth. However, there was a note in the excavation notes that indicated “A6 = 15 – 19.” Figure 13b seems to represent several different depths. The notes mentioned that layer A10 occurs at 15 – 20 cm and at 19cm in square N3, and A11 occurs at 10 – 15 cm. Figure 5.13c was clearly marked as being a representation of the squares at a depth of 20 cm.

The faunal analysis organized the A layers differently. Faunal information came from notes that were provided to Dr. Andy Herries by Dr. James Brink from the National

Museum, who analyzed the fauna. For instance, as it pertains to A, the fauna is separated into the following proveniences: A/Surface, A3, A2/A4 – A13, A14 – 18. It is likely these refer to horizontal squares. A/Surface is evident from the side profile (Figure 5.3) that it is the top most layer so there is not a discrepancy there. Although layer A2 is referred to in the faunal analysis notes, it is not mentioned in the field notes nor in any of the artifact bags. Layers A4 – A13 occur in the southernmost part of the site. They are mainly in Square N3 but extend to the southern part of Square N2. Separating specimens from A/Surface and A3 make sense but it is not clear why A2 was connected with A4 – A13 and then why A14 – A18 was designated together. Attempts to clarify with Dr. Herries were unsuccessful.

Another issue with the A layers is that they are referred to by different names throughout the field notes. As far as can be surmised from the notes, layers A4 – A13 are also considered layer LB according to the side profile (Figure 5.3). Dr. Herries considered the LB layer decalcified breccia with a mixture of old and new material. This section traverses squares N3 and N2. This section is sometimes referred to as LSAB in the field notes. To further compound the issues with the A layers, it appears that some of the deeper layers may be of ELSA age. Layer A15 is found in the southwestern corner of square N2 (Figure 5.12d) and is also the location of the ostrich eggshells that were recovered and dated to 29,129 – 30,742 cal BP (Sample OZKO52 & K564).

### *Issues with B Layers*

Layer B occurs in squares N2, N1 and C1. What is established is that B refers to the breccia in the northern part of the site (Figure 5.3). The main confusion with layer B

however, is that there are two other important layers which are referred to B. According to Dr. Herries, layer B is breccia. However, the field notes refer to B1, B2 and B3 respectively (Figure 5.14). It is assumed that excavators were distinguishing the layers within this larger B section. But B1 is also the label used for the LSA decalcified breccia, LSAB, and in some notes referred to as DBD (see above). For the sake of the analysis, layers B1 and B2 were consolidated into a single B designation. Artifacts labeled B2 were only found in the northwestern quadrant of N1 but artifacts labeled B2 were found in square N1 and the western half of N2. This is what supports the assumption that they are part of the larger layer B that transcends through both square N1 and N2 (Figure 5.3).

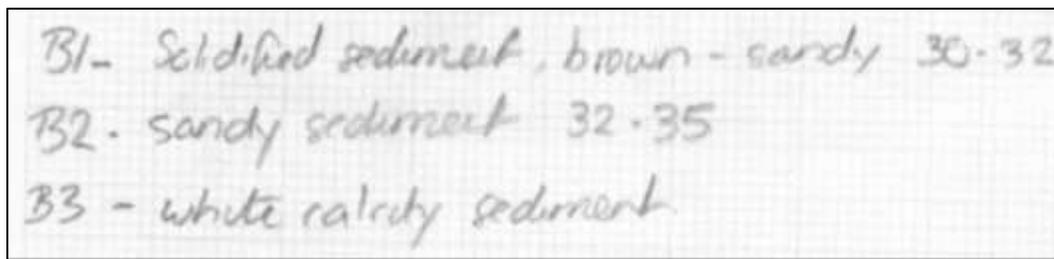


Figure 5.14. Mentions of B1 – B3 on page 6 of the field notes.

### *Issues with Layer C*

Layer C appears to be the bottom of the site (Figure 5.3) according to the side schematic. Dr. Herries described it as the solid floor at the base of the rockshelter. This portion might be part of the breccia talus that was calcified by the tufa and connected to square C1 and C2. The problem with layer C arises when it is not clear if the notes refer to layer C as in the base of the rockshelter or square C1 which is the northernmost square at the beginning of the talus. If the notes mean to reference square C1 then it is possible

that they are then referring to layer B. Additionally, there are some diagrams which refer to layer C as layer AB. It is assumed that AB mean ancient breccia. Figure 5.15 compares two wall profiles for square N3, one of which was mislabeled as “west.”

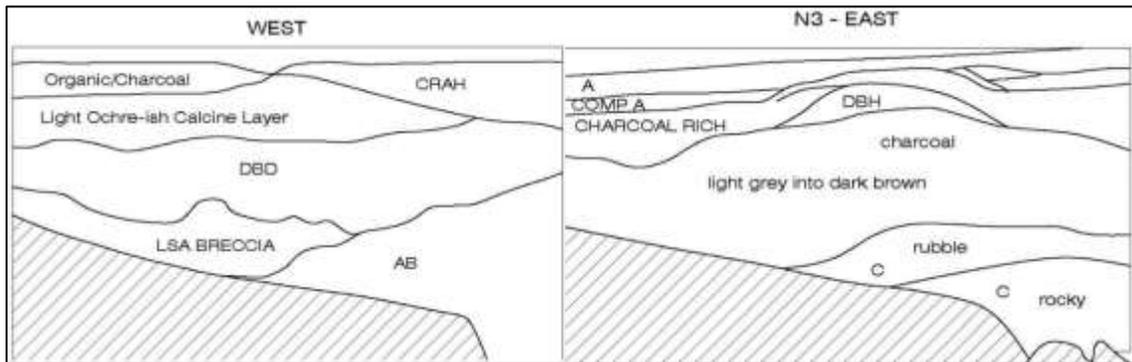


Figure 5.15. Two version of N3’s eastern wall profile.

### *Unclear Proveniences*

There are artifacts that were in bags labeled with proveniences that are not mentioned in the notes or unclear. For instance, there are 33 artifacts from layer C8 but there is no mention of C8 in the field notes. It is possible that the artifact label might have been CB but there is also no mention of a CB in the notes. CB sounds like a plausible designation since there was another bag labeled C1/CB (17 artifacts). Layer C1/CB was consolidated with square C1 and C1/CB was left as its own layer label.

Additionally, there were 23 more artifacts from an area referred to as Block 2. Twenty-two items in this group were consolidated with layer B since they were found in square C1 but one item was labeled as Assumed Surface since it was found in the hillside

opposite the site. Bags labeled “Hillside opposite,” “sweepings,” or “cleanings” were analyzed along with other surface collections.

In the western profile for square N2, there is an area called LB (Figure 5.9b) whereas this area seems to be called LBH in the western profile for N3 (Figure 5.9a). It appears again as LSAB in a profile labeled “east” (Figure 5.16).

### *Unclear Wall Profiles*

The confusion over layer nomenclature was exacerbated by three wall profiles that were mislabeled and drawn slightly different from their correctly labeled counterparts. One wall profile was labeled “west,” the other was labeled “east” and the final one had no label.

*West.* After comparing this wall profile to every other wall profile in the field notebook, as well as comparing it with the side schematic, it was discovered that this wall profile corresponds to the eastern wall profile of square N3 (Figure 5.15). This connection was not initially made since the layers were outlined in different ways and named differently as well. As briefly mentioned above in the Unclear Proveniences section, both of these profiles represent the same areas with different labels.

*East.* This diagram received equal amounts of scrutiny. After the “west” profile was matched with its corresponding profile, it was deduced that this profile was likely mislabeled as well. Like with the “west” profile, it was not initially obvious that they were two versions of the same wall due to the stark differences in layer outlines and labels. The boulder in the southern portion of the wall is what eventually provided the confidence to identify the “east” profile N3’s western wall profile. Both the “west” and

“east” wall profiles are testaments to how different excavators can perceive the same wall profile.

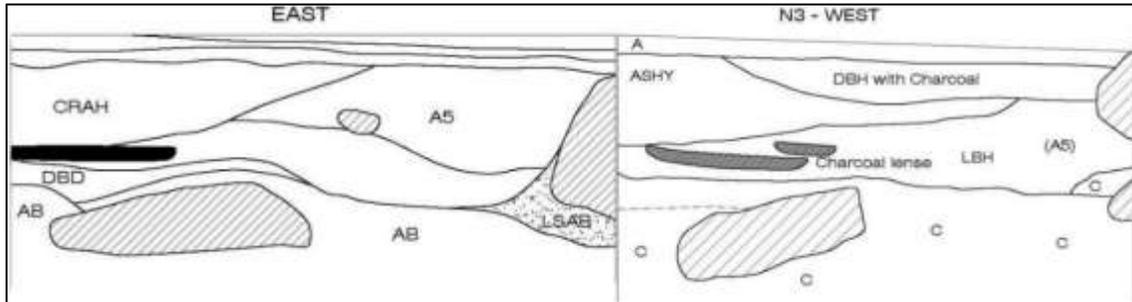


Figure 5.16. Mislabeled “east” wall profile & N3’s western wall profile

*Unlabeled.* The wall profile with no title was eventually connected to the site’s southern wall due to the distinctive wooden post intrusion (Figure 5.17). Although the western portion of the wall is blocked by large boulder (the same one evident in N3’s wall profile). There were enough identifying features that allowed for the match to be made.

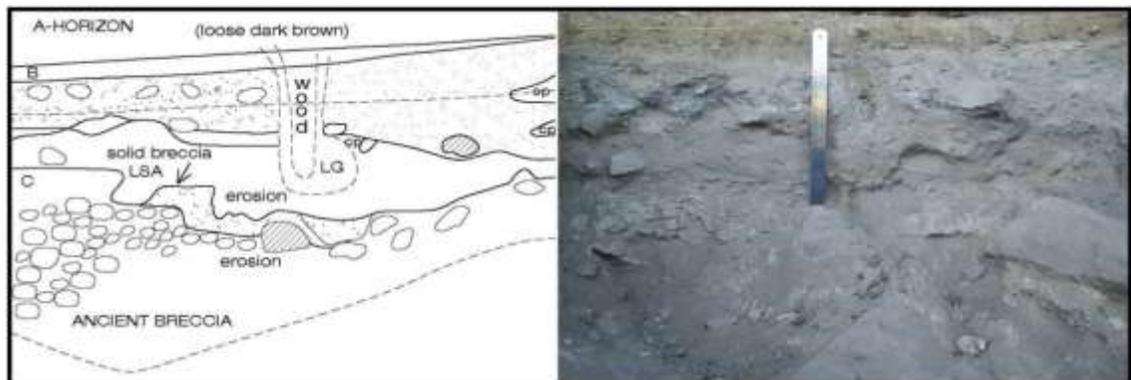


Figure 5.17. Unlabeled wall profile and N3’s southern wall profile. Photo courtesy of Andy Herries.

### *Lost Box*

Some of the Early Later Stone Age material was in the A15 layer of Square N3. Unfortunately, the box which contained all of the material from Square N3 was never found despite numerous attempts by Florisbad museum staff.

### **Summary**

Analyzing an inherited assemblage was a challenge, impacted by missing notes, labels changing during excavation and limited access to the assemblage. However, it is the goal of this thesis to supersede these challenges and provide an overview of the lithic technology found within Malony's Kloof Rockshelter A.

## VI. MALONY'S KLOOF

The purpose of this chapter is to provide an overview of stratigraphy, dating and faunal information that was collected as a result of the 2005 excavation. Stratigraphy will be discussed as well as its limitations. Dating information will be provided that shows Malony's Kloof association with Early Later Stone Age dates. Fauna that was recovered and analyzed by Dr. James Brink of the National Museum, Bloemfontein, will be presented. In order to keep track of stratigraphy information, Figure 5.3 is reproduced within this chapter.

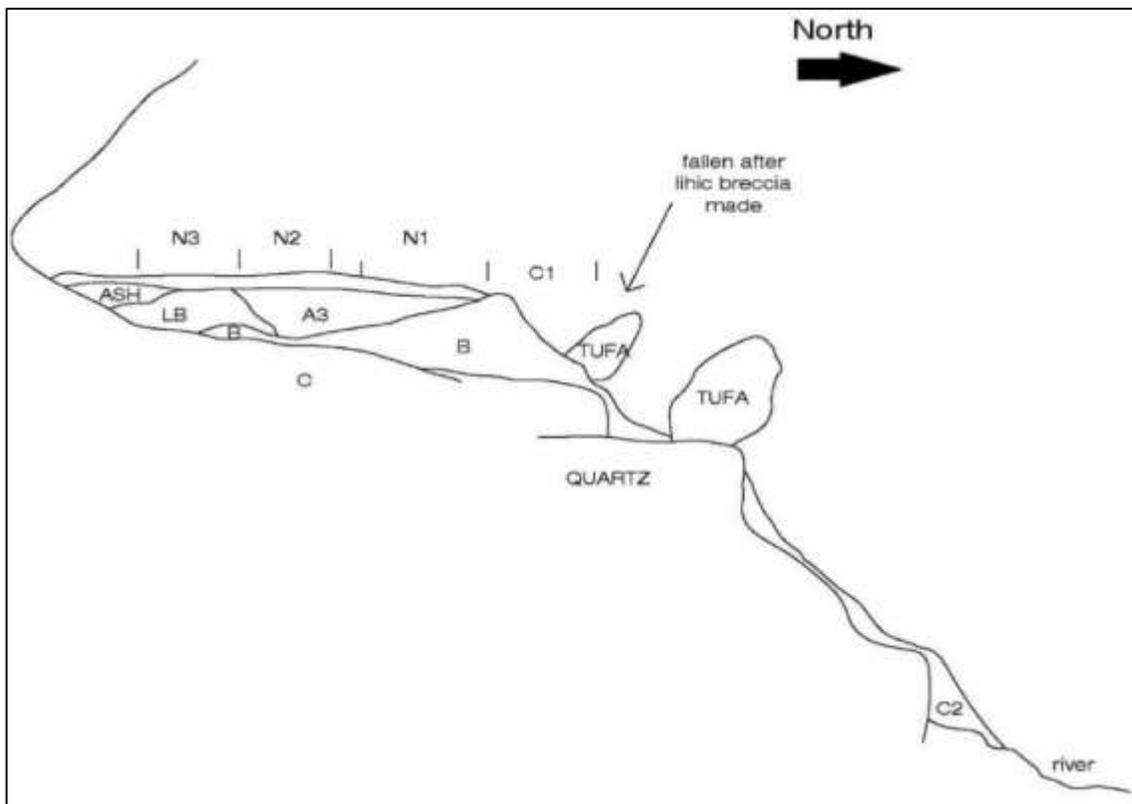


Figure 5.3. Cross section of Malony's Kloof Rockshelter A

## Stratigraphy

Lack of clarity regarding the layers was already discussed within the chapter 5. However, in order to remind the reader of the context, some details will be reiterated in this chapter. Stratigraphy will be explained as best as possible based on inferences derived from available field notes and commentary from Dr. Andy Herries. Some layers were re-named as the excavation progressed and some were consolidated into larger sections. Most of the A layers were variations of mixed, gray sediments while some were clearly part of hearth features and others seemed to be mixed deposits. Due to the field notebook missing some pages, the sequence of some layers is unclear and there are details missing from many A layers. There were 2 wall profiles that were re-drawn but were mislabeled, layers were drawn differently than in the original sketch so their corresponding square was initially unknown. One wall profile was not labeled at all and had to be matched to excavation photographs in order to determine its corresponding square. Despite the layer codification issues, this section will be divided into 6 sections which correspond to the site's side schematic. These areas are layer A, Ash, layer A3, layer LB, layer B and layer C.

### *Layer A*

Layer A is the organic layer that extends across the top layer of the site. It is most evident in squares N3 and N2. There were no artifacts with labeled as being just from A

although it is assumed that artifacts collected from the surface were associated with this layer.

Ash. The ash layer has many names throughout the excavation notes and wall profile sketches. Figure 6.1 shows two versions of N3's western wall profile. In Figure 6.1a, the area is called "Ashy." This wall profile differentiates between this area and the adjacent area called "DBH with charcoal." DBH stands for dark brown hearth. In Figure 6.1b, this area is referred to as CRAH which stands for charcoal rich ashy layer and seems to also include the dark brown hearth.

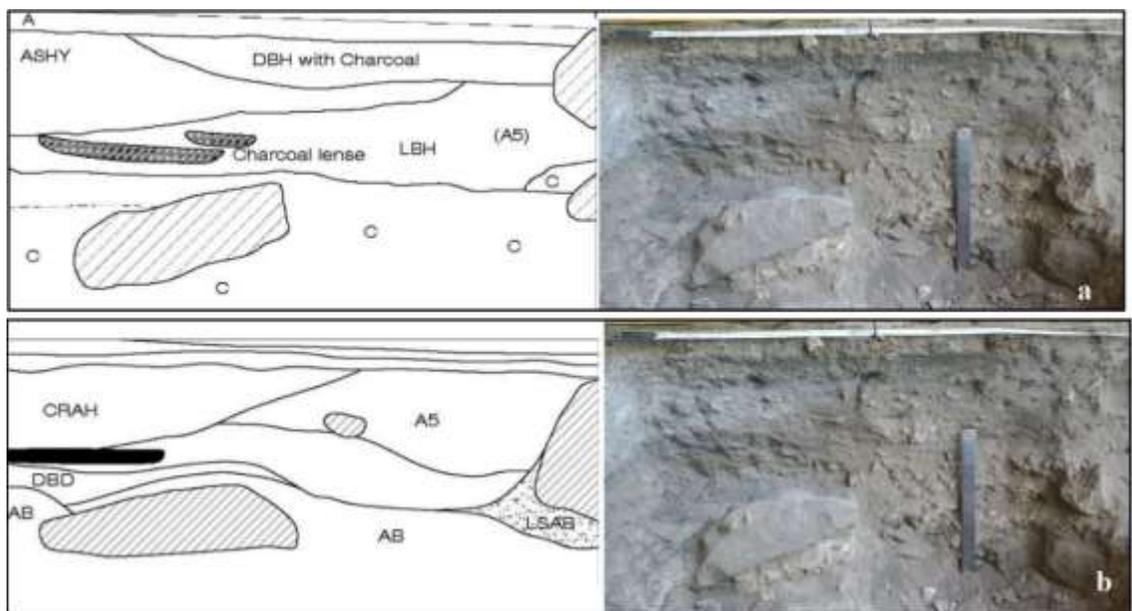


Figure 6.1 a-b. N3's western wall profiles compared to wall photo. Photo courtesy of Andy Herries.

Figure 6.2a-b shows two versions of N3's eastern wall. In Figure 6.2a, the area is separated into "Comp A," "Charcoal Rich," and "DBH." Figure 6.2b shows this area as

“organic/charcoal,” and “light ochre-ish calcine layer.” This area can also be seen in N3’s western wall photo (Figure 6.3).

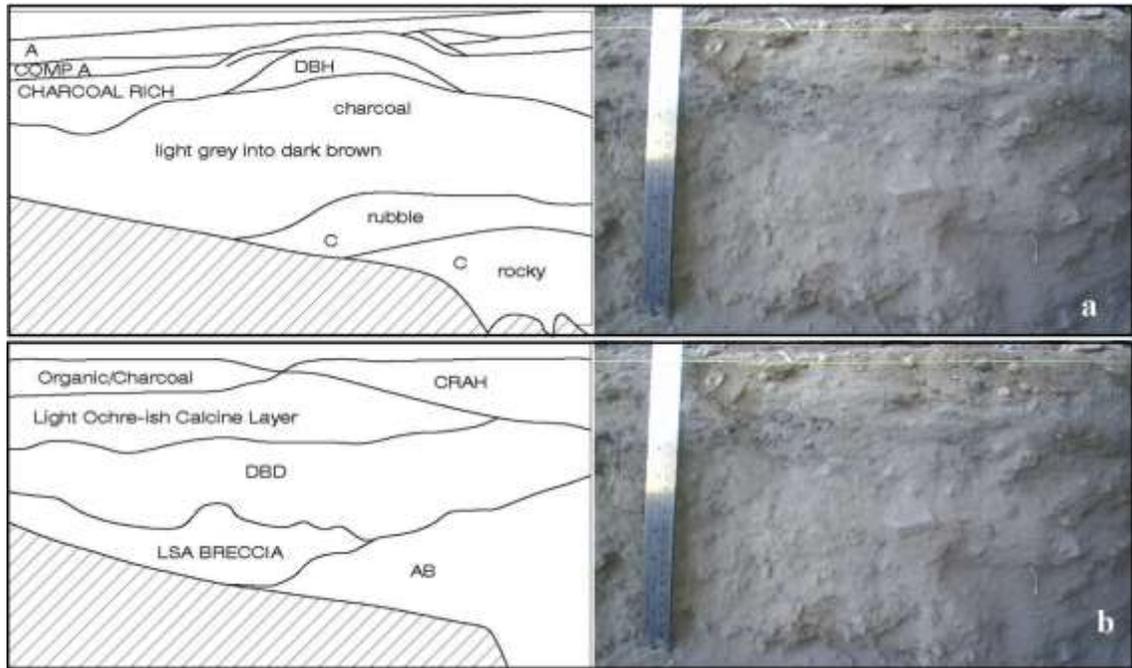


Figure 6.2 a-b. N3’s eastern wall diagrams compared to wall photo. Photo courtesy of Andy Herries.

Figure 5.17 shows N3’s southern wall. In this diagram, the area is called “charcoal rich ash/calcined layer.” All of the names indicate that excavators were noticing the ash as being different than the underlying dark colored soil. As can be seen from the photos, the charcoal was distinctive.

The layers that are associated with this area are A2 – A9 except for A5. A6 occurs at 15 – 19cm below datum. Charcoal and an ostrich egg shell from layer A6 were dated. The charcoal (Sample OZK059) was dated to 2153 – 1876 cal B.P. and the ostrich egg shell (Sample OZK051) was dated to 2136 – 1926 cal B.P. Although there was no

information about layer A9 in the field notebook, an ostrich egg shell was also dated from layer A9 which is a shallower deposit than A6 (5 – 10 cm below datum). The ostrich eggshell from layer A9 (Sample OZ058) dated to 2181 – 1986 cal B.P.



Figure 6.3. Close up of hearth layers from the southern half of N3’s western wall. Photo courtesy of Andy Herries.

Layer A10 occurs at 15 – 20 cm under layer A6 but also occurs as deep as 19 cm below datum in the southwest quadrant of N3 and was described as light brown with ashy layers. Layer A11 is described as being under A5 and interacts with the hearth in A3 so it was assumed that it was associate with LB but the field notebook also notes this layer as “ashy 10 – 15cm” so it is unclear if layer A11 is in fact associated with the ashy layer or if that note corresponded to something else.

### *Layer A3*

Layer A3 cuts across squares N2 and N1 (Figure 6.4). In square N2, A3 contains rubble from layer B. This is visible in the eastern wall profile of N2 (Figure 6.4b). In other notes it is described as a gravel horizon (A3c) and a breccia black horizon (A3b). In areas it occurs near the hearth lens. Artifacts were recovered only from layer A3. Figure 5.9 highlights how extensive A3 was across squares. Aligning the western wall provides a clearer image of the extent of A3.

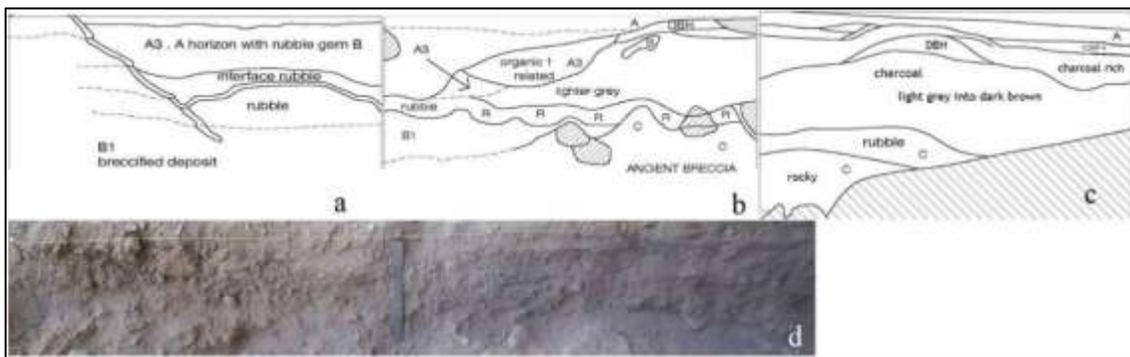


Figure 6.4 a-d. Eastern wall profiles from North to South – squares N3, N2, N1. Photo courtesy of Andy Herries.

### *Layer LB*

It is difficult to trace back the exact layers associated with LB but as far as can be surmised from the notes, LB is made up of layers A5 and layers A10 – A17. This section cuts through squares N3 and N2. In N3's western profile (Figure 5.9a) this section is called "LBH (A5)" while in the second version of N3's western wall profile (Figure 6.1b)

it is split into A5 and DBD (dark brown dust). In the eastern profiles (Figure 6.2b), this area is also referred to as LSA Breccia and referred to as solid breccia LSA in the southern profile (Figure 5.17). A11 occurs in the southeastern quadrant of N2, under A5 and seems to have ashy interlaces from the hearth in A3. It is noted that it is similar to A6. Field notes describe A12 as being under A5 and consisting of a dark charcoal rich layer at 20cm below datum but this information was then scratched. Field notes also describe this layer as being a lens into A10 and under A5. It is described as lighter brown in color and possibly a continuation of A5. A5 is also represented in Figure 6.1a as being within LBH.

A13 is also described as a lens into A11 and A10, around a large rock. It is a darker brown layer and possibly a hearth. Layer A15 is found in square N3 (Figure 6.5) and is also the location of the ostrich eggshells that were recovered and dated to 30,689 – 29,129 cal B.P. (OZKO52). A16 is a burnt feature. Field notes described it as a small hearth bound by two rocks with a large piece of bone and flake at 25-30cm. The feature is 24cm by 23cm. There was a cracked rock next to it which could have been fire cracked or mud cracked.

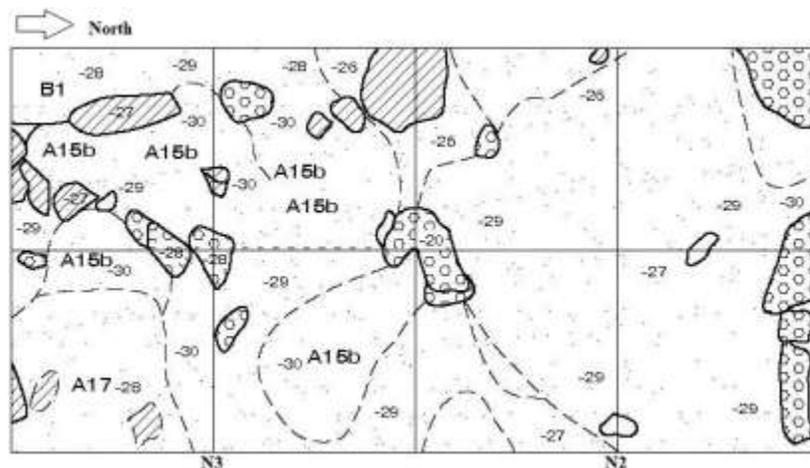


Figure 6.5. Square N3 and N2 showing various A layers.

No artifacts were analyzed from layer LB since it was present in square N3 and artifacts from N3 were lost. Portions of area LB are referred to as LSA Breccia and layer B1 in some excavation notes. Notes from Dr. Herries mentions he believed B1/LSAB/LSA Breccia were decalcified breccia or a mixed horizon with old and new material. References such as B1, LSAB and LSA Breccia occur within the area referred to as LB in the side schematic.

### *Layer B*

Layer B is the breccia that appears underneath layer A3 in square N2 and dominates square N1 on the northern part of the site (Figure 6.6 b-c). Clarity regarding the breccia and the decalcified breccia mentioned in the LB section is still needed. Field notes reference three B layers. B1 which is a solidified sediment, brown and sandy which appears at 30 – 32 cm below datum. B2 which is a sandy sediment which occurs at 32 – 35 cm below datum and B3 which is a white, calcium like sediment. Based on Figure 6.6, it also seems that layer A18 is associated with layer B. In regard to recovered artifacts however, there were only two designations recorded on the artifact bags, B1 and B. Since all these artifacts were from square C1 and the layer that is prominent in C1 is layer B, all these artifacts were relabeled as B in order to facilitate analysis. There were some artifacts recovered from B layers in the N squares but they were not analyzed together with the artifacts from the C squares since it appears these layers were mixed with

younger layers above based on dates. Ostrich egg shell from layer B1 in square N1 was dated to 54 – 498 cal BP (K561).

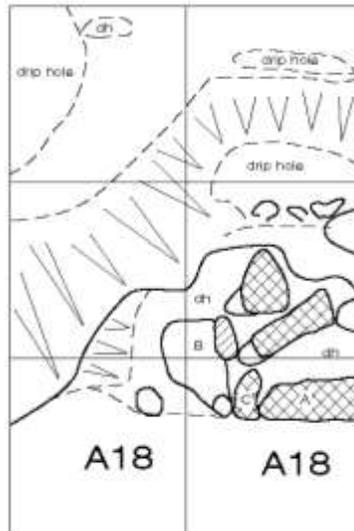


Figure 6.6. Northern half of square N1 and square C1. (Scale: 1m-x-1.5m, top is north)

### *Layer C*

Layer C is also referred to as layer AB (Figure 6.2b) and Ancient Breccia (Figure 5.17). It is the solid floor at the base of the rock shelter. Notes from Dr. Herries indicate that C might represent parts of the solid breccia talus which appears to have been decalcified in some areas by the tufa. This layer is not the same as square C1 and C2, however they may be related.

### **Dating**

Accelerated Mass Spectrometry  $^{14}\text{C}$  dating of the tufa disclosed three major growth episodes between 44,000 years ago and 4,300 years ago at Malony's Kloof (Table

6.1). The first happened before the Last Glacial Maximum between 44ka to 33ka (Clark et al. 2009). The second episode was between 16ka and 4ka. The third was more recent, about 1900 – 2000 years ago (Doran 2010; Herries et al. 2007).

The ELSA layers date to a time between the first and second tufa episode. Dates were derived from ostrich eggshells (OES) found in layer B1 of square C1 and layer A15 in square N3. The combined OES dates provide a range of 30,689 – 21,250 cal BP (Table 6.1) which falls within the ELSA time frame of 46,000-20,000 cal BP (Bousman and Brink 2018). The late glacial tufa cemented stratigraphic layer C before Layer A was deposited, thus cementing the ELSA layers. The youngest occupation dates to 2,181 – 1,876 cal BP during the final tufa episode. These tufa growth periods lend weight to the idea that the environment during these periods was much more humid (Butzer et al. 1978; Doran 2010).

Table 6.1. Malony’s Kloof dates and calibration two sigma spans.

Laboratory No.	Square	Layer	Conventional $^{14}\text{C}$ Age	DCF corrected $^{14}\text{C}$ age *	2 Sigma Cal BP	
					From	To
K561	N1	B1	620 ± 49	269	54	498
OZK056	N3	A6	2,050 ± 60		1,815	2,127
OZK058	N3	A9	2,115 ± 45		1,905	2,193
K044U	Tufa		4,489 ± 60	3,863	3,603	4,859
K045U	Tufa		9,903 ± 85	9,277	8,805	9,749
K047U	Tufa		13,094 ± 136	12,468	11,948	12,988
OZK050	C1	B1	21,670 ± 210		21,250	22,090
OZ052	N3	A15	25,740 ± 300		29,129	30,689

\*Dead Carbon Fraction correction for Tufa =  $7.5 \pm 2.5\%$ , equivalent to  $626 \pm 215$  years (Herries et al. 2008)

\*\*Calibrated using SHCal13 curve (Hogg et al. 2013) on OxCal 4.3.111 (Ramsey 2018)

## **Fauna**

Several of the layers at Malony's Kloof contained faunal remains indicating a clear change in subsistence patterns. Fauna was analyzed in July 2007 by Dr. James Brink from the National Museum, Bloemfontein. Below are the details of that analysis. The organization of the following sections is the way Dr. Brink organized the information. For the sake of uniformity, that organization has been maintained.

### *Layer A and Surface*

Layer A is the first and youngest layer of the excavation and is made up of soft sediment immediately below the surface. Within the Layer A and Surface, 20 individual specimens of various species were identified. Of these specimens, 8 came from invertebrates (5 coming from large land snails, 3 coming from small land snails). The remaining 12 were from vertebrates. One specimen came from an indeterminate small birds and an indeterminate tortoise, respectively. Two specimens belonged to an indeterminate small reptile. Two specimens were from a springhare and plains zebra, respectively and four specimens belonged to an indeterminate bovid (Table 6.2).

Table 6.2. Faunal Count from Stratigraphic Layer A and Surface.

Class	Order	Species	Common Name	NISP/MNI
Gastropoda	Indeterminate	Indeterminate	Land snail: large*	-/5
Gastropoda	Indeterminate	Indeterminate	Land snail: small*	-/3
Aves	Indeterminate	Indeterminate	Indeterminate small bird	1/1
Reptilia	Indeterminate	Indeterminate	Indeterminate tortoise	1/1
Reptilia	Indeterminate	Indeterminate	Indeterminate small reptile	1/2
Mammalia	Rodentia	<i>Pedetes capensis</i>	Springhare	1/2
Mammalia	Perissodactyla	<i>Equus sp.</i>	Possibly plains zebra	1/2
Mammalia	Artiodactyla	Indeterminate	Indeterminate medium-small bovid	1/4

\*MNI unavailable due to fragmentation

### Layer A3

Layer A3 cuts across squares N1 and N2 and is found underneath Layer A. In some areas, A3 contains rubble from layer B, in other it is described as a gravel horizon (A3c) and a breccia black horizon (A3b). In areas it occurs near the hearth lens. The highest amount of faunal specimens was recovered from layer A3. Ten of these specimens were invertebrates (2 large land snails and 8 small land snails). The rest of the assemblage in this layer was represented by indeterminate small fish (1), indeterminate tortoise (3), indeterminate frog (1), aardvark (1), large hare (1), small hare (2), rock hyrax (4), steenbok (1), klipspringer (1), a large-medium indeterminate bovid, a small-medium indeterminate bovid and several specimens from a small indeterminate bovid (8) (Table 6.3).

Table 6.3. Faunal Count from Stratigraphic Layer A3.

Class	Order	Species	Common Name	NISP/MNI
Gastropoda	Indeterminate	Indeterminate	Land snail: large*	-/2
Gastropoda	Indeterminate	Indeterminate	Land snail: small*	-/8
Pisces	Indeterminate	Indeterminate	Indeterminate small fish	1/1
Reptilia	Indeterminate	Indeterminate	Indeterminate tortoise	1/3
Amphibia	Indeterminate	Indeterminate	Indeterminate frog	1/1
Mammalia	Tubulidentata	<i>Orycteropus afer</i>	Aardvark	1/1
Mammalia	Lagomorpha	<i>Leporidae sp.</i>	Indeterminate large hare	1/1
Mammalia	Lagomorpha	<i>Leporidae sp.</i>	Indeterminate small hare	1/2
Mammalia	Hyracoidea	<i>Procavia capensis</i>	Rock hyrax (colloquial: dassie)	2/4
Mammalia	Artiodactyla	<i>Raphicerus campestris</i>	Steenbok	1/1
Mammalia	Artiodactyla	<i>Oreotragus oreotragus</i>	Klipspringer	1/1
Mammalia	Artiodactyla	Indeterminate	Indeterminate large-medium bovid	1/1
Mammalia	Artiodactyla	Indeterminate	Indeterminate medium-small bovid	1/1
Mammalia	Artiodactyla	Indeterminate	Indeterminate small bovid	1/8

\*MNI unavailable due to fragmentation

#### Layers A2 / A4-A13

Layers A2 and A4 – A13 occurred in the southernmost part of the site. They are mainly in Square N3 but extend to the southern part of Square N2. This section is isolated into its own paragraph because that is how the data was analyzed. However, an argument can be made for combining this section with A3 since all A Layers seem to be young, intermixed sediments. The second most prolific set of layers in terms of faunal recoveries, are Layers A2 / A4 – A13. There were 13 invertebrate specimens (land snails again). Most of the vertebrate specimens were mammals with the exception of one tortoise. The rest of the assemblage was made up of hyena (1), rock hyrax (4),

springbok (1), klipspringer (1), an indeterminate small-medium bovid (7) and a small indeterminate bovid (2) (Table 6.4).

Table 6.4. Faunal Count from Stratigraphic Layer A2 / A4-A14.

Class	Order	Species	Common Name	NISP/MNI
Gastropoda	Indeterminate	Indeterminate	Land snail: large*	-/5
Gastropoda	Indeterminate	Indeterminate	Land snail: small*	-/8
Reptilia	Indeterminate	Indeterminate	Indeterminate tortoise	1/1
Mammalia	Carnivora	<i>Hyaenidae sp.</i>	Indeterminate hyaena	1/1
Mammalia	Hyracoidea	<i>Procavia capensis</i>	Rock hyrax (colloquial: dassie)	1/4
Mammalia	Artiodactyla	<i>Antidorcas marsupialis</i>	Springbok	1/1
Mammalia	Artiodactyla	<i>Oreotragus oreotragus</i>	Klipspringer	1/1
Mammalia	Artiodactyla	Indeterminate	Indeterminate medium-small bovid	1/7
Mammalia	Artiodactyla	Indeterminate	Indeterminate small bovid	1/2

\*MNI unavailable due to fragmentation

#### *Layers A14-A18*

Layers A14 – A17 occurred in the southernmost part of the site while A18 occurs in the northern end near the breccia. Layer A15 occurs in square N3 but has an older date than many of the other A layers since this deposit is associated with the ELSA. Like the A layers mentioned above, this section is organized in this paragraph because that is how the data was analyzed.

This section had very few specimens. There was 1 indeterminate tortoise, 1 indeterminate large-medium bovid and an indeterminate small bovid (Table 6.5).

Table 6.5. Faunal Count from Stratigraphic Layer A14 – A18.

Class	Order	Species	Common Name	NISP/MNI
Reptilia	Indeterminate	Indeterminate	Indeterminate tortoise	1/1
Mammalia	Artiodactyla	Indeterminate	Indeterminate large-medium bovid	1/1
Mammalia	Artiodactyla	Indeterminate	Indeterminate small bovid	1/1

\*MNI unavailable due to fragmentation

### *Layer B*

Layer B occurs in square N2 and N1. B is the breccia that appears on the northern part of the site and persists until the bottom of the layer. Layer B has 1 invertebrate specimen (land snail) as well 5 vertebrates, all which were mammals. The fauna represented are hartebeest (1), springbok (1), steenbok (1) and a large-medium indeterminate bovid (1) (Table 6.6).

Table 6.6. Faunal Count from Stratigraphic Layer B.

Class	Order	Species	Common Name	NISP/MNI
Gastropoda	Indeterminate	Indeterminate	Land snail: large*	-/1
Mammalia	Artiodactyla	<i>Alcelaphus buselaphus</i>	Hartebeest	1/1
Mammalia	Artiodactyla	<i>Antidorcas marsupialis</i>	Springbok	1/1
Mammalia	Artiodactyla	<i>Raphicerus campestris</i>	Steenbok	1/2
Mammalia	Artiodactyla	Indeterminate	Indeterminate large-medium bovid	1/1

\*MNI unavailable due to fragmentation

### *Square C1*

Stratigraphic layer C is the solid floor at the base of the rockshelter. This portion might be part of the breccia talus that was calcified by the tufa.

C1 only contained 6 specimens total, 1 invertebrate (large land snail) and 5 vertebrates which were also all mammals. The animals represented were plains zebra (1), warthog (1), extinct giant wildebeest (1), hartebeest (1) and impala (1). A noticeable increase in the size of the fauna can be noted in this section which dates to the ELSA (Table 6.7).

Table 6.7. Faunal Count from Stratigraphic Square C1.

Class	Order	Species	Common Name	NISP/MNI
Gastropoda	Indeterminate	Indeterminate	Land snail: large*	-/1
Mammalia	Perissodactyla	<i>Equus quagga</i>	Plains zebra	1/1
Mammalia	Artiodactyla	<i>Phacochoerus sp.</i>	Warthog	1/1
Mammalia	Artiodactyla	<i>Megalotragus priscus</i>	Giant wildebeest <sup>+</sup>	1/1
Mammalia	Artiodactyla	<i>Alcelaphus buselaphus</i>	Hartebeest	1/1
Mammalia	Artiodactyla	<i>Aepyceros melampus</i>	Impala	1/1

\*MNI unavailable due to fragmentation

+ M. priscus is a giant form of wildebeest that became extinct in southern Africa at the end of the Late Pleistocene/early Holocene.

#### Square C2

The area C2 is the material that seems to be the eroded floor of layer C, the solid floor at the base of the rock shelter. It located to the north of the rock shelter and it consists of several sections that are lettered A – P in a 1m x 1m area. Square C2 was the least prolific of the sections. It contained only one specimen of a large-medium indeterminate bovid (Table 6.8).

Table 6.8. Faunal Count from Stratigraphic Square C2.

Class	Order	Species	Common Name	NISP/MNI
Mammalia	Artiodactyla	Indeterminate	Indeterminate large-medium bovid	1/1

The faunal assemblage at Malony’s Kloof reinforces the idea that the cave inhabited by humans rather than other carnivores as indicated by its carnivore to ungulate ratio (Klein 1975). Had the cave belonged to carnivores, there would be a higher proportion of carnivore remains since carnivores eat other carnivores but humans eat more ungulates (Klein 1975).

Malony’s Kloof shows a change in subsistence patterns across time. The fauna recovered from the various levels, decreases in size over time, perhaps indicating a shift from planned strategies like hunting to more opportunistic strategies like traps. Supporting this idea is the presence of dassies in A3, a young deposit. Dassies are easily snared and were a common staple in LSA diets (Brain 1983). Large herd and grazing animals would have thrived easily in the late Pleistocene environment around Malony’s Kloof. All of the fauna were prey. No carnivores were found.

Springhares were also a common meal (Brain 1983), however they were not very common at Malony’s Kloof. There is no indication that Malony’s Kloof was a kill site. Invertebrates were extremely common at the site. They are especially represented in the younger layers and surface. Younger deposits consisted of more tortoises which is common in LSA deposits and also indicates a decrease in high ranked prey since they are relying on slow moving prey that is easy to capture (Chase et al. 2018; Steele and Klein 2013; Stiner et al. 2000). The high amounts of indeterminate bovid may also indicate a

shifting reliance toward livestock to their diet (Dusseldorp 2016) since livestock was introduced into South Africa around 2100 BP (Pleurdeau et al. 2012; Robbins et al. 2005).

The conclusion made from the fauna are limited since the data provided are only counts. Had there been additional information such as which body parts were found, other assumptions can be brought forth. For instance, if it was found that only feet bones remained, then it can be surmised that the animal was processed for its pelt (Brain 1983; Klein 1975). The types of body parts found can also hint at the distance hunter-gatherers were traveling with these carcasses. The higher proportion of small and medium-small ungulates may indicate that they were bringing back small or juvenile specimens since they are more portable (Brain 1983; Klein 1975).

## **Summary**

There are three major stratigraphic events at Malony's Kloof. The ELSA stone deposits represented in squares C1 and C2 and perhaps layer C. ELSA layers may transgress through the N squares as well but due to decalcification of the breccia, layers have been mixed with the younger deposits above. Square C1 and C2 were likely connected at some point and made up the base of the rockshelter but as time went on, the talus collapsed.

The second major stratigraphic event was the development of the tufa which encased the ELSA deposits. During this time there was no evidence of cultural activity. As water seeped through the tufa that overflowed over the rockshelter, erosion allowed

access to the rockshelter and a younger occupation flourished. The third major stratigraphic event was the young intermixed deposits that consist of the smaller fauna.

## VII. EXCAVATION RESULTS

This chapter will discuss results from the 2005 excavation at Malony's Kloof. This chapter will outline the results of each square individually. Findings from each square will also be outlined and will include information such as amount of raw material, group (tools/cores/debitage), artifact type (general), artifact type (detailed), completeness and cortex. This intent of organizing information this way is to highlight any patterns within the assemblage.

The site was divided into 5 squares. Four of those squares (N3, N2, N1 and C1) were inside the rockshelter while square C2 was at the bottom of the talus. As mentioned in Chapter 5, the box with artifacts from square N3 was lost so they are not included in these results.

Results are organized by square rather than layer because layer information is obscure in some areas. Dividing the information by squares is more reliable than by layers since it is clear that N squares represent soft sediments which have been mixed while C squares represent older breccia dated to the ELSA. It is evident from Table 7.1 that most of the artifacts were recovered from square C2. Square C1 had the lowest counts. C1 and C2 are consolidated in the lithic analysis since they are both part of the cave talus.

Table 7.1. Artifact Counts by Square.

Square	Count	Percentage
C1 (upper talus)	157	8%
C2 (lower talus)	1169	57%
N1	390	19%
N2	320	16%
Grand Total	2036	100%

### Square N2

Square N2 is located to the north of N3 and to the south of N1. The major stratigraphic layers represented within N2 are A3 and B. Square N2 contained a total of 320 artifacts, 288 of those came from layer A3 while 32 came from layer B.

#### *Raw Material*

Although layer A3 was made up of mostly chert (51% of the square) and quartz (26% of the square), it did have artifacts from every other type of raw material. Layer B only contained some chert (5% of the square), hornfels (2% of the square), quartz (3% of the square) and siltstone (0.3% of the square). Artifact count information is elaborated in Figure 7.1.

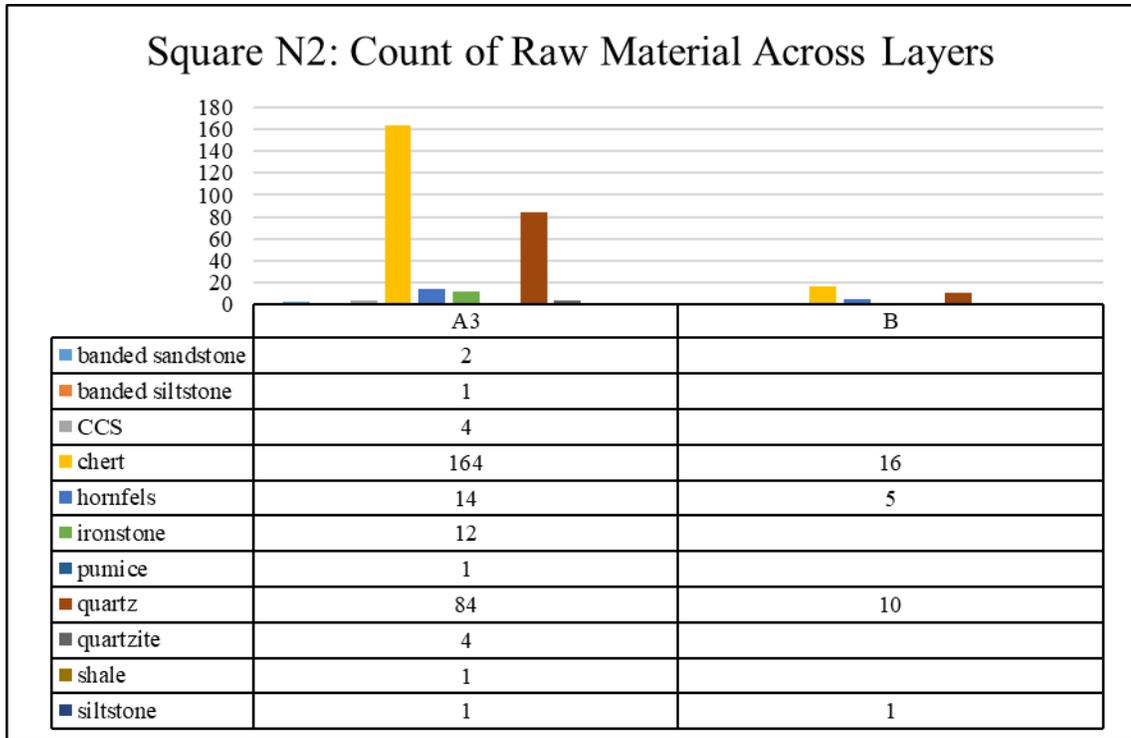


Figure 7.1. Count of Raw Material Across Layers in Square N2.

*Group (Tools/Cores/Debitage)*

Both layers A3 and B contained mostly debitage but the majority was found in layer A3 (79% of square). Layer B only contained 27 debitage pieces (8% of square). This square in general did not contain many cores or tools. Layer A contained 10 cores (3% of square) and 25 tools (8% off square). Layer B contained 3 cores (1% of square) and 2 tools (1% of square). Count information is outlined in Figure 7.2.

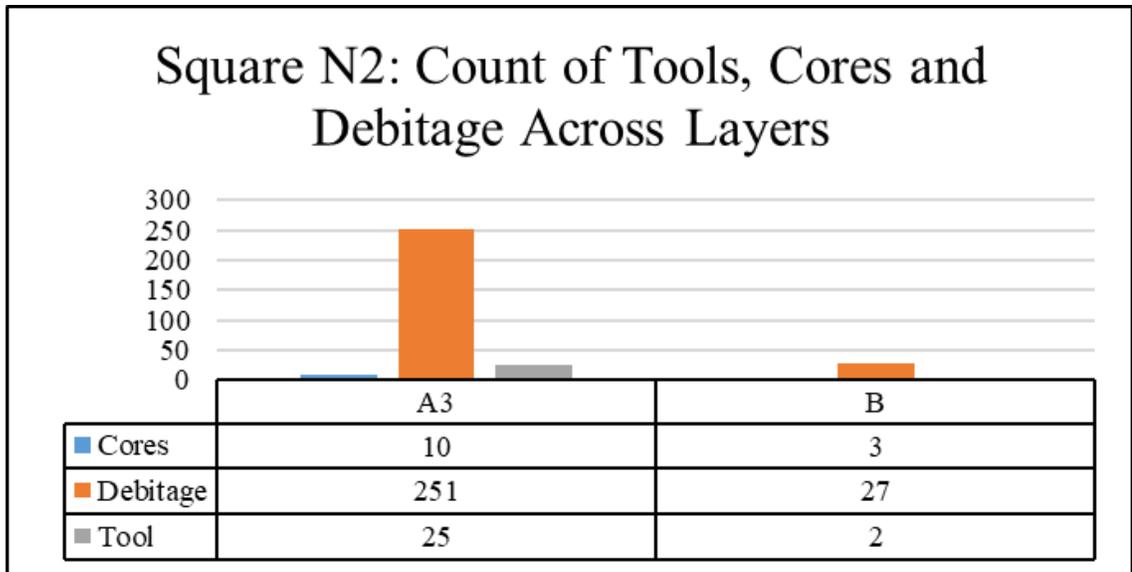


Figure 7.2. Count of Tools, Cores and Debitage Across Layers in Square N2.

#### *Artifact Type (General)*

Flakes were the most prominent artifact type in square N2, with most of them occurring in layer A3 (78% of square). Flakes made up 8% of the square in layer B. Debitage made up 4% of the square in layer A3 and 1% of the square in layer B. Cores represented 3% of the square in layer A3 and 1% in layer B. Four percent of the square in layer A3 and 0.30% in layer B were made up bladelets. Layer A3 contained the one and only blade in this square (0.30% of square). Artifact counts are detailed in Figure 7.3.

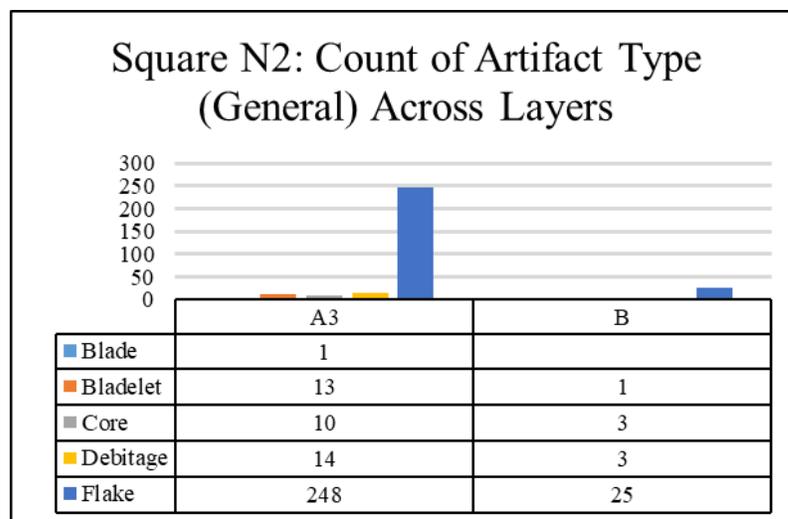


Figure 7.3. Count of Artifact Type (General) Across Layers in Square N2.

#### *Artifact Type (Detail)*

Edge modified blade fragments only found in layer A3 and only made up 0.3% of the square. Bladelets were also only found in layer A3 and were only 2% of the layer. Bladelet fragments were found in both layers but also in low amounts, 2% in A3 and 0.3% in B. Chunk and Shatter in layer A3 made up 4% of the square and 0.9% in layer B. General cores were only found in layer B and made up 0.6% of the square. Bipolar cores and bipolar core fragments were only found in layer A3 and made up 0.3% of the square respectively. Core fragments were only found in layer A3 and only made up 0.6% of the square. Multidirectional cores were found in both layers and made up 1% of the square in layer A3 and 0.3% in layer B. Scaled piece cores (outils écaillés) were only found in layer A3 and made up 0.3% of the square. Unidirectional cores were only found in layer A3 and made up 0.3% of the square. Bipolar flakes were only found in A3 and made up 0.9% of the layer. Edge modified flake fragments were also only found in A3 and made

up 2.8% of the square. Edge modified flakes made up 0.6% of the square in layer A3 and 0.3% in B. Flakes and flake fragments were much more prominent in layer A3 than in B. Flakes made up 33% of the square in A3 and only 3% in B while flake fragments made up 41% of the square in layer A3 and only 4.7%. For additional details on counts see Figure 7.4.

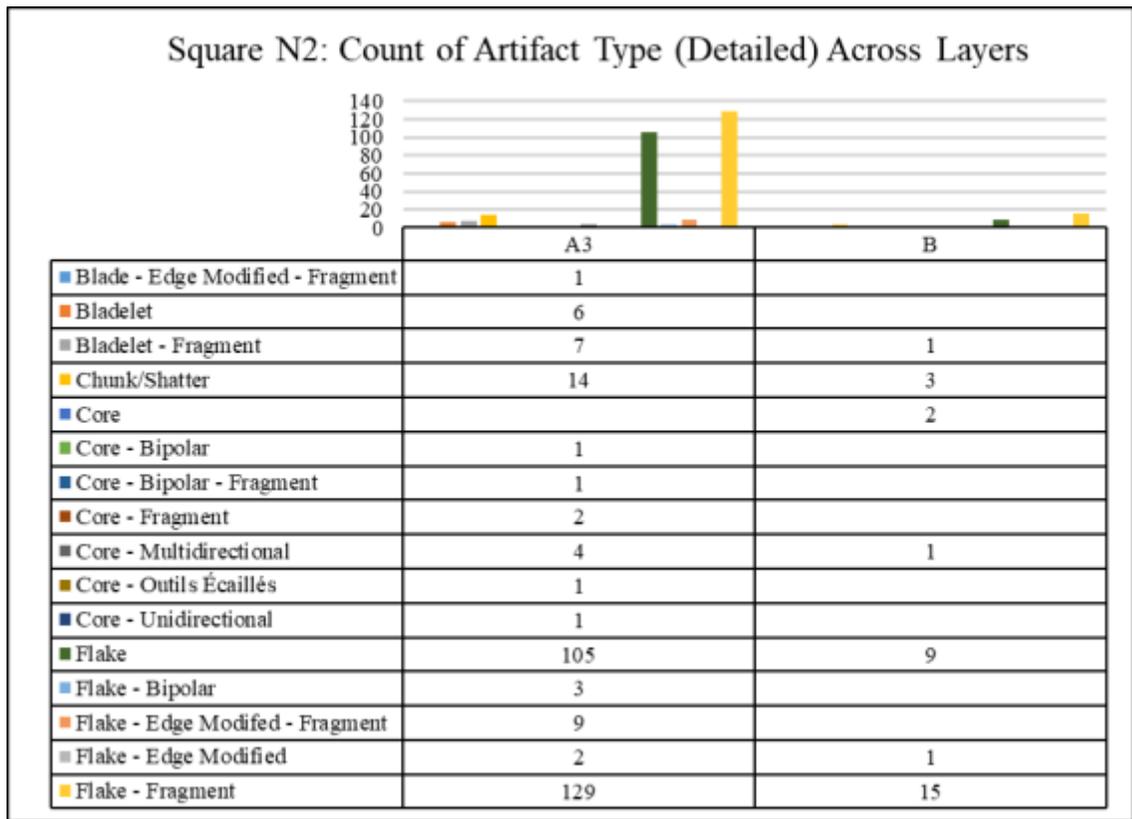


Figure 7.4. Count of Artifact Type (Detailed) Across Layers in Square N2.

### *Completeness*

Complete artifacts made up 38% of the square in layer A3 and only 4% in layer B. Fragments made up 52% of layer A3 and 6% of layer B. For counts see Figure 7.5. Overall there were more incomplete artifacts but this difference was small.

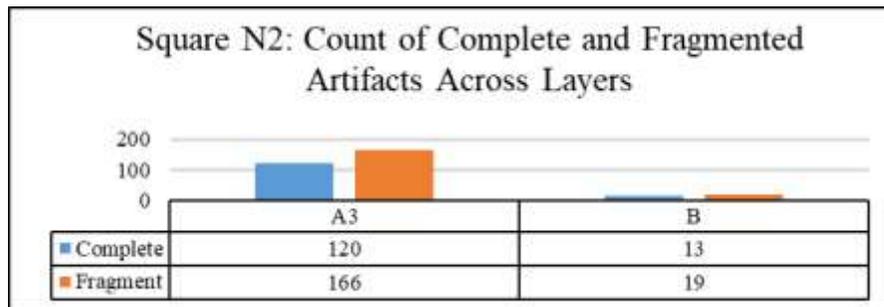


Figure 7.5. Count of Complete and Fragmented Artifacts Across Layers in Square N2.

### *Platform*

The most common platform in square N2 was the single platform as it made up 32% of the square in layer A3 but only 3% in layer B. The second most prevalent platform was multifaceted. They made up 29% of the square in layer A3 and 3% in layer B. Incomplete platforms, which included collapsed, crushed, reduced and broken platforms, were the third most common. They represented 19% of the square in layer A3 and 2% in layer B. Cortex, dihedral and tetrahedral platforms were only found in layer A3. Cortex platforms made up 7% of the square while dihedral represented 3% and tetrahedral represented 1% of the square. Count information is outlined in Figure 7.6.

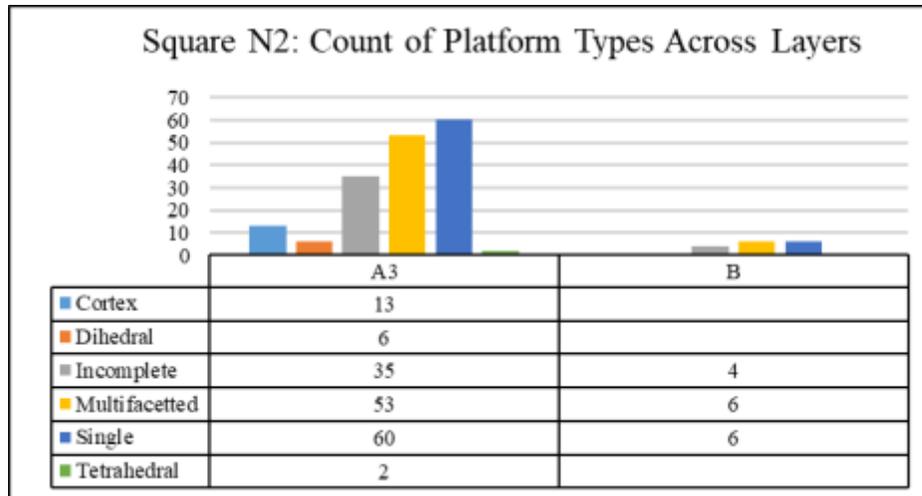


Figure 7.6. Count of Platform Types Across Layers in Square N2.

### *Cortex*

Most of the artifacts in square N2 had little to no cortex. Layer A3 had the highest amount of artifacts with no cortex as they compose 72% of the square. In layer B, this category represented 7% of the square. Artifacts with 1 – 25% cortex made up 9% of the artifacts in layer A3 and 1% in layer B. Those with 26 – 50% cortex made up 2% of the square in layer A3 and 0.3% in layer B. Artifacts with 51 – 75% cortex made up 2% of the square in layer A3 and 0.6% in layer B. Artifacts with 75 – 99% cortex represented 1% of the square in layer A3 and 0.3% in layer B. Artifacts in square N2 that had 100% dorsal cortex only made up 5% of the square in layer A3 and 0.6% in B. For details regarding counts see Figure 7.7.

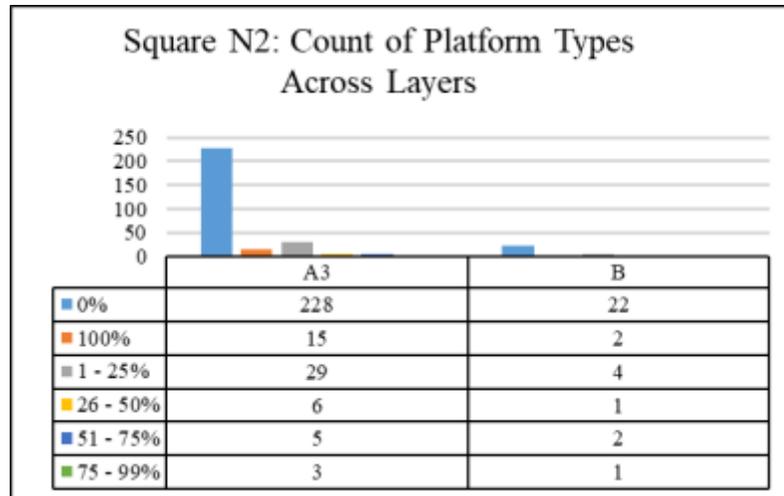


Figure 7.7. Count of Cortex Type Across Layers in Square N2.

### Square N1

Square N1 is located to the north of N2 and to the south of C1. Layers A3 and B were present in square N1, however, artifacts were only recovered from layer B. Square N1 had 390 total artifacts.

#### *Raw Material*

The assemblage in square N1 is made up of mainly quartz (57 % of the square) followed by chert (23 % of the square). Hornfels made up 9% of the square and shale made up 6% of the square. Ironstone made up 2% of the square. Granite and quartzite made up 1% of the square respectively. Banded ironstone and siltstone made up only 0.26% of the square while CCS, pumice, sicified siltstone only made up 0.5% of the square respectively. Details about counts can be found in Figure 7.8.

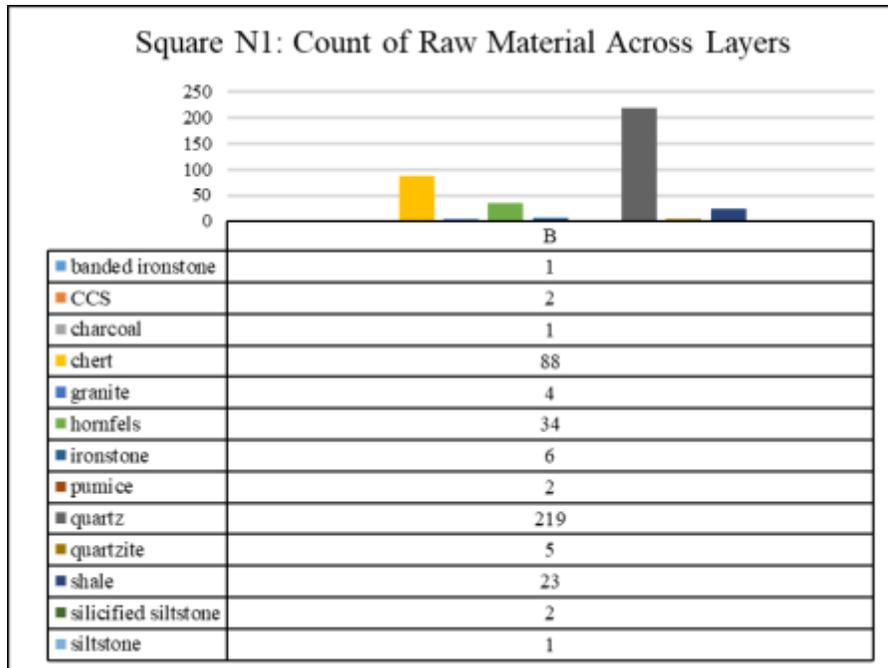


Figure 7.8. Count of Raw Material Across Layers in Square N1.

*Group (Tools/Cores/Debitage)*

Layer B was made up of mostly debitage (78% of square) with fewer cores (15% of square) and even fewer tools (7%). Artifact counts are outlined in Figure 7.9.

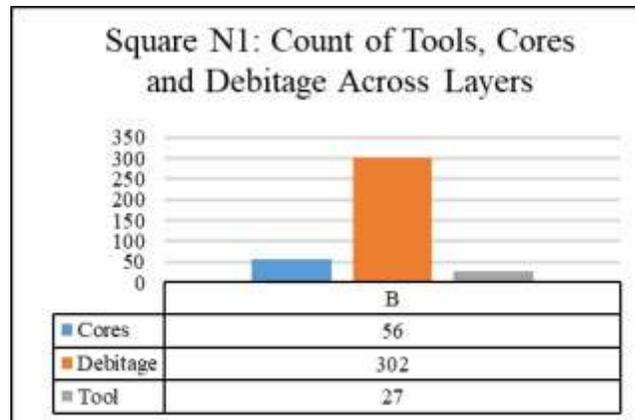


Figure 7.9. Count of Tools, Cores and Debitage Across Layers in Square N1.

### *Artifact Type (General)*

The most common artifact type were flakes. Flakes made up 50% of the square. The second most common artifact type were debitage making up 32% of the square. Cores made up 15% of the square. Bladelets were not common in square N2 as they only made up 2% of the square. The single burin spall and scraper both made up less than 1% respectively. For count details see Figure 7.10.

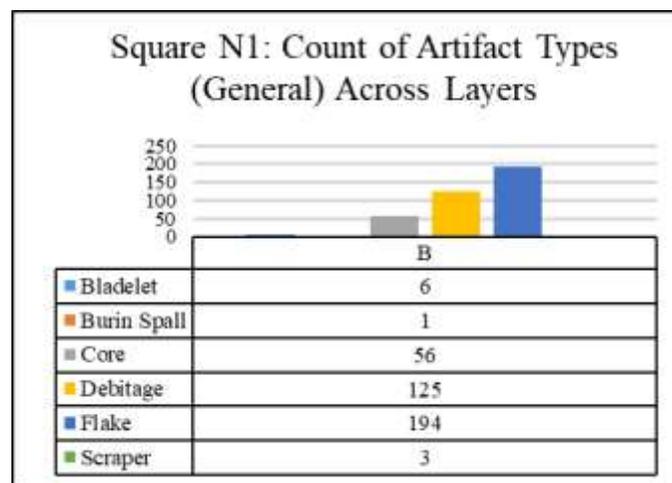


Figure 7.10. Count of Artifact Type (General) Across Layers in Square N1.

### *Artifact Type (Details)*

The most common artifact type was flake fragments. Flake fragments made up 39% of the fragments. The next most common artifact was chunk and shatter since they made up 32% of the square. General cores made up 4% of the square and general core

fragments made up 5% of the square. Flakes made up 7% of the square while edge modified flake fragments made up 4% of the square. Bipolar cores and and bipolar core fragments both made up 2% of the square respectively. Bladelets made up 1% of the square. Bladelet fragments, burin spalls, bladelet cores, multidirectional cores and fragments, scaled pieces (*outils écaillés*) cores, bipolar flakes, edge modified flakes, and scrapers all made up less than 1% of the square respectively. Counts are detailed in Figure 7.11.

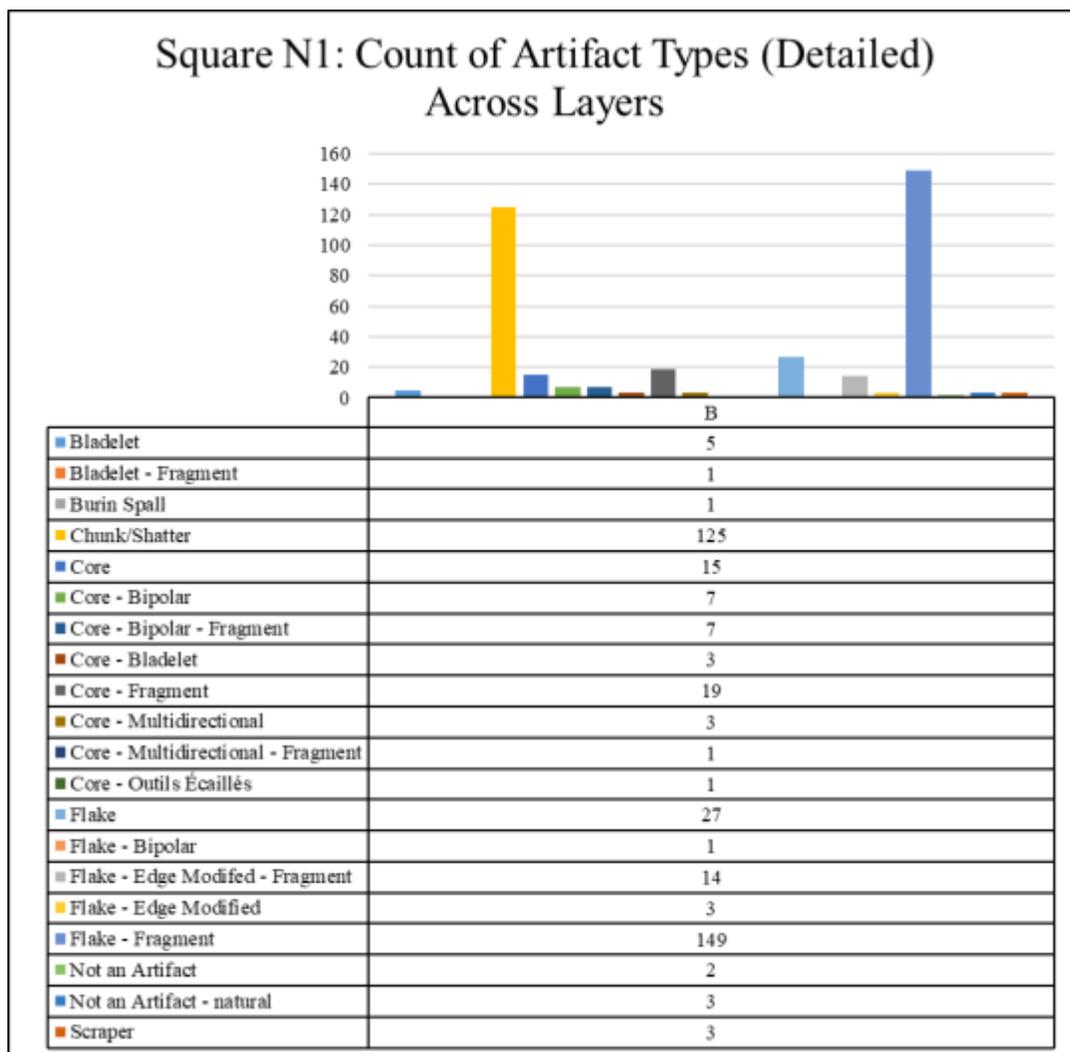


Figure 7.11. Count of Artifact Type (Detailed) Across Layers in Square N1.

### *Completeness*

Artifacts in square N1 were mostly fragments. Complete artifacts made up 17% of the square while fragments made up 83% of the square. Counts can be found in Figure 7.12.

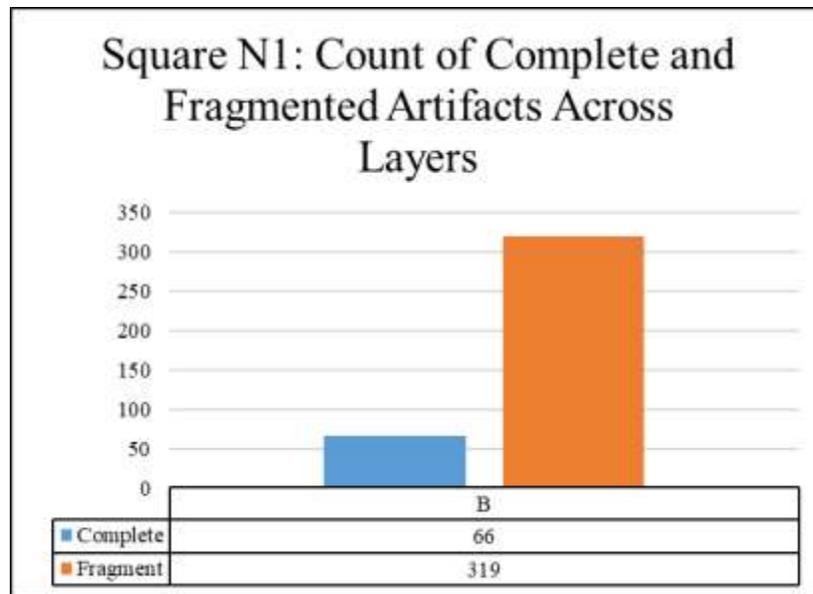


Figure 7.12. Count of Complete and Fragmented Artifacts Across Layers in Square N1.

### *Platform*

The most common platform in square N1 was the single platform. Single platforms made up 40% of the square. The second most common was incomplete platforms which made up 28% of the square. The third most common were multifaceted platforms and they made up 19% of the square. Cortex platforms only made up 9% of the

square while dihedral platforms made up 5% of the square. Count are outlined in Figure 7.13.

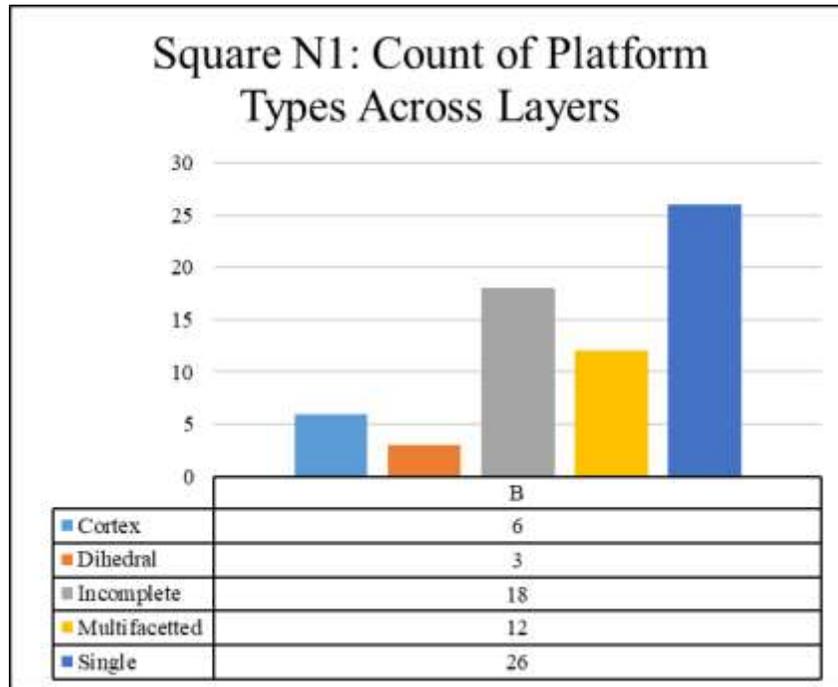


Figure 7.13. Count of Platform Types Across Layers in Square N1.

*Cortex*

Most of the artifacts in square N1 had no cortex. Artifacts with no cortex present made up 95% of the square. Artifacts with 1 – 25% cortex made up 2% of the square. Artifacts with 26 – 50%, 51 – 75%, 75 – 99% and 100% cortex all made up less than 1% of the square respectively. Counts are detailed in Figure 7.14.

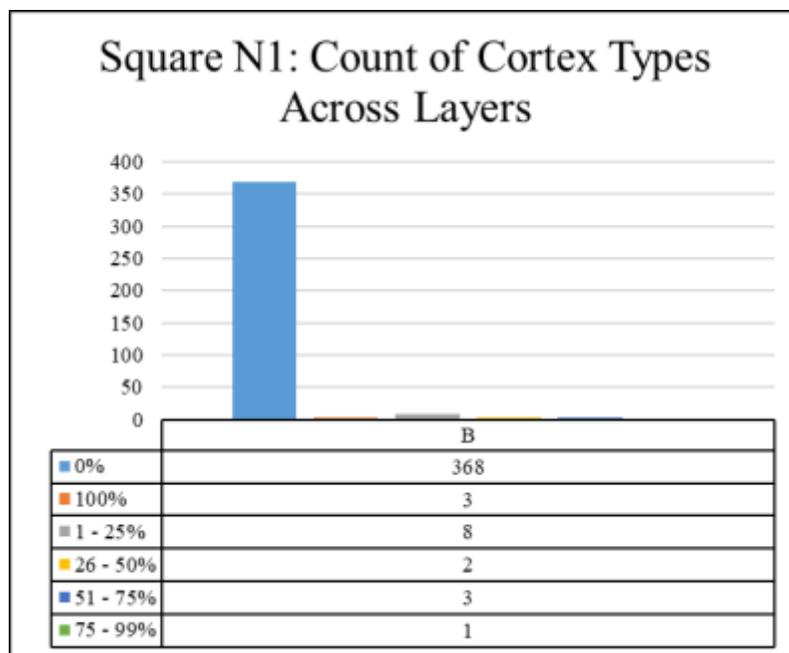


Figure 7.14. Count of Cortex Type Across Layers in Square N1.

### Square C1

Square C1 is located to the north of N2 and makes up the cave talus. It is the northernmost square in the rock shelter. Three layers are represented in square C1, Assumed Surface, Layer B and Layer C1/CB.

#### *Raw Material*

Most of the artifacts found on the surface of square C1 were made out of chert (11.5 % of the square) followed by quartz (5.1% of the square). In layer B of square C1 however, quartz dominated the layer 32.5 % of the square), followed by chert (20.4% of the square). Layer C1/CB was austere in comparison but still had more quartz (5.7% of

the square) than CCS, chert and ironstone which were all found in the layer but made up less than 2% respectively. Count details are outlined in Figure 7.15.

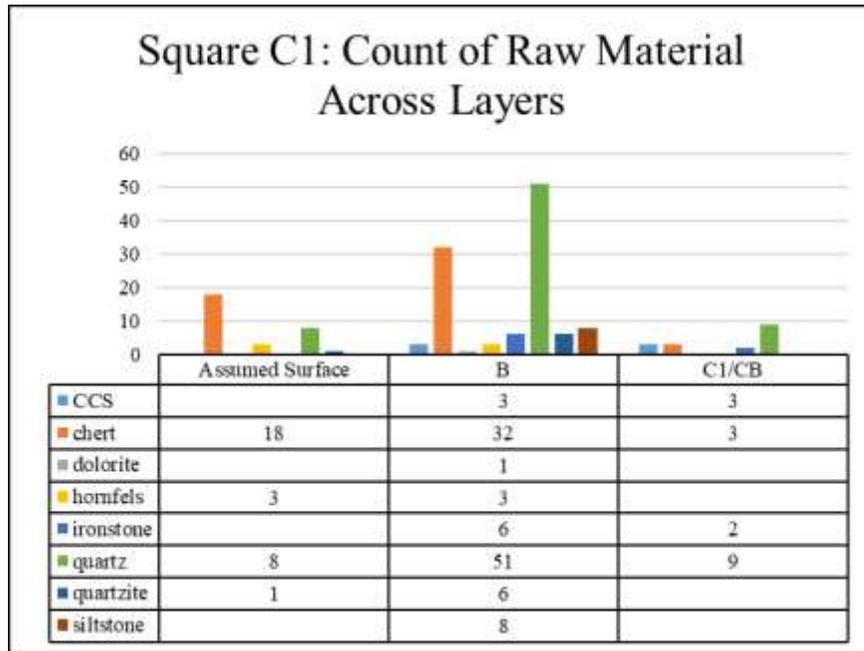


Figure 7.15. Count of Raw Material Across Layers in Square C1.

*Group (Tools/Cores/Debitage)*

Debitage (in the form of flakes) was the most prevalent group type in square C1. Debitage made up 13% of the square in the Assumed Surface layer, 63% in the B layer and 9% in the C1/B layer. Cores made up 4% of the square in the Assumed Surface layer and 2% of the square in layer B. There were no cores in C1/B. Tools made up 2% of the Assumed Surface layer, 6% of the B layer and 1% of the C1/B layer. Counts are outlined in Figure 7.16.

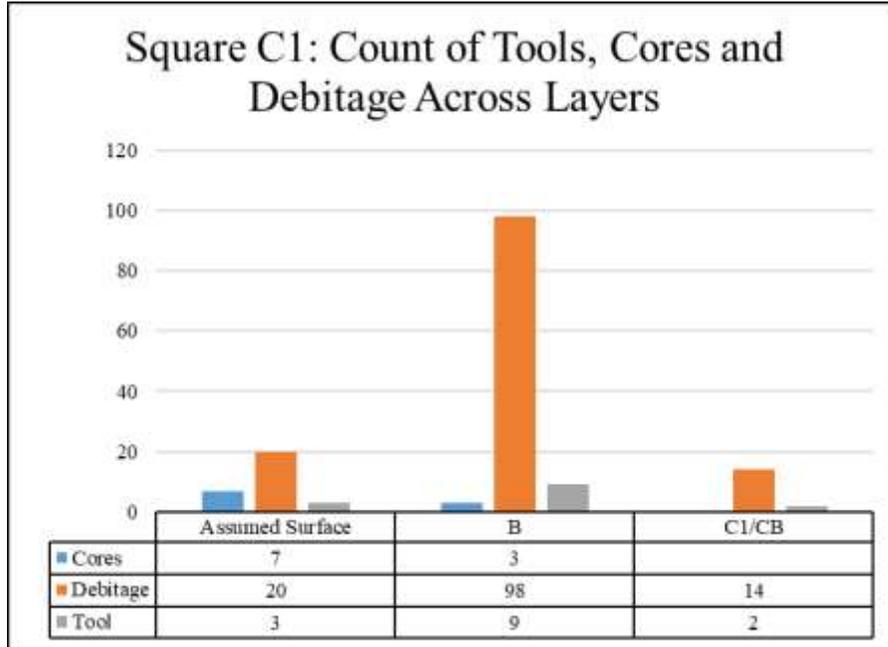


Figure 7.16. Count of Tools, Cores and Debitage Across Layers in Square C1.

*Artifact Type (General)*

The Assumed Surface layer had no blades, miscellaneousdebitage, or notches. It had 4% of the square’s cores and 13% of the square’s flakes. Bladelets and scrapers made up less than 1% of the square respectively. The B layer had no bladelet or miscellaneousdebitage. Blade and cores made up 2% of the square respectively while scrapers made up 1% of the square. Notches made up 0.6% of the square. Flakes made up 13% of the square. Layer C1/CB only had bladelets,debitage, scrapers and flakes. All except flakes made up less than 1% of the square respectively. Flakes in this layer made up 8% of the square. Counts are detailed in Figure 7.17.

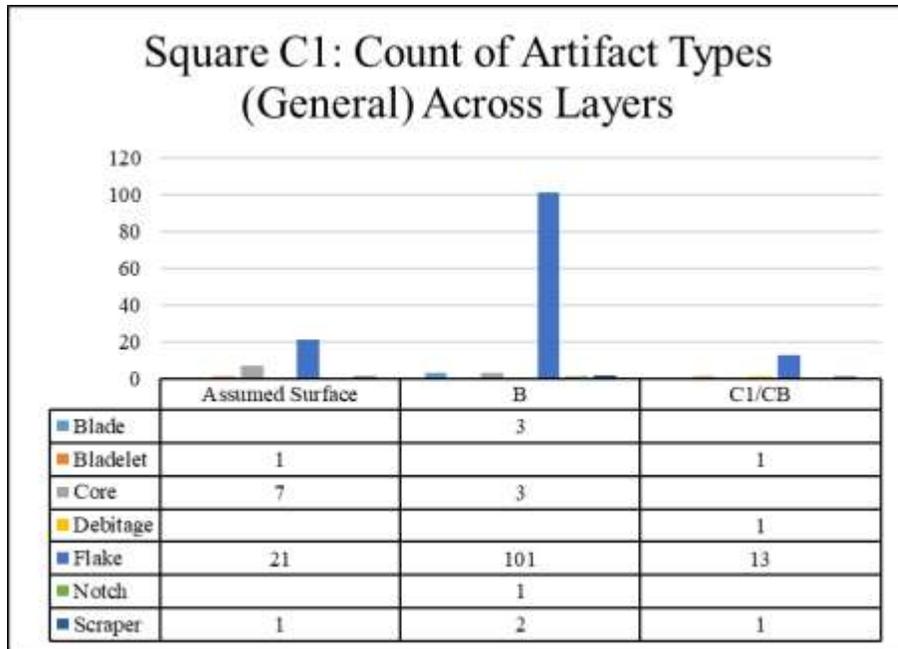


Figure 7.17. Count of Artifact Type (General) Across Layers in Square C1.

*Artifact Type (Detail)*

The most common artifact types were flakes and flake fragments. Flakes made up 6% of the square in Assumed Surface, 15% of the square in layer B and 4% of the square in layer C1/CB. Flake fragments made up 7% of the square in Assumed Surface, 48% of the square in layer B and 4% of the square in layer C1/CB. Blade fragments were only found in layer B and made up 1% of the square. Bladelets, bidirectional cores, and discoid cores were only found in the Assumed Surface layer and made up 0.6% of the square. Edge modified bladelets were only found in layer C1/CB and made up 0.6% of the square. Chunks and shatter were only found in layer C1/CB and made up 0.6% of the square. General cores were only found in the Assumed Surface layer and made up 3% of the square. Edge modified blades, Bipolar cores, bipolar core fragments and notches were

only found in the B layer and made up 0.6% of the square respectively. Core fragments were found in Assumed Surface and layer B and made up 0.6% of the square in each layer. Scrapers made up 06% of the square in Assumed Surface, 1% of the square in layer B and 0.6% of the square in layer C1/CB. Artifact count information is in Figure 7.18.

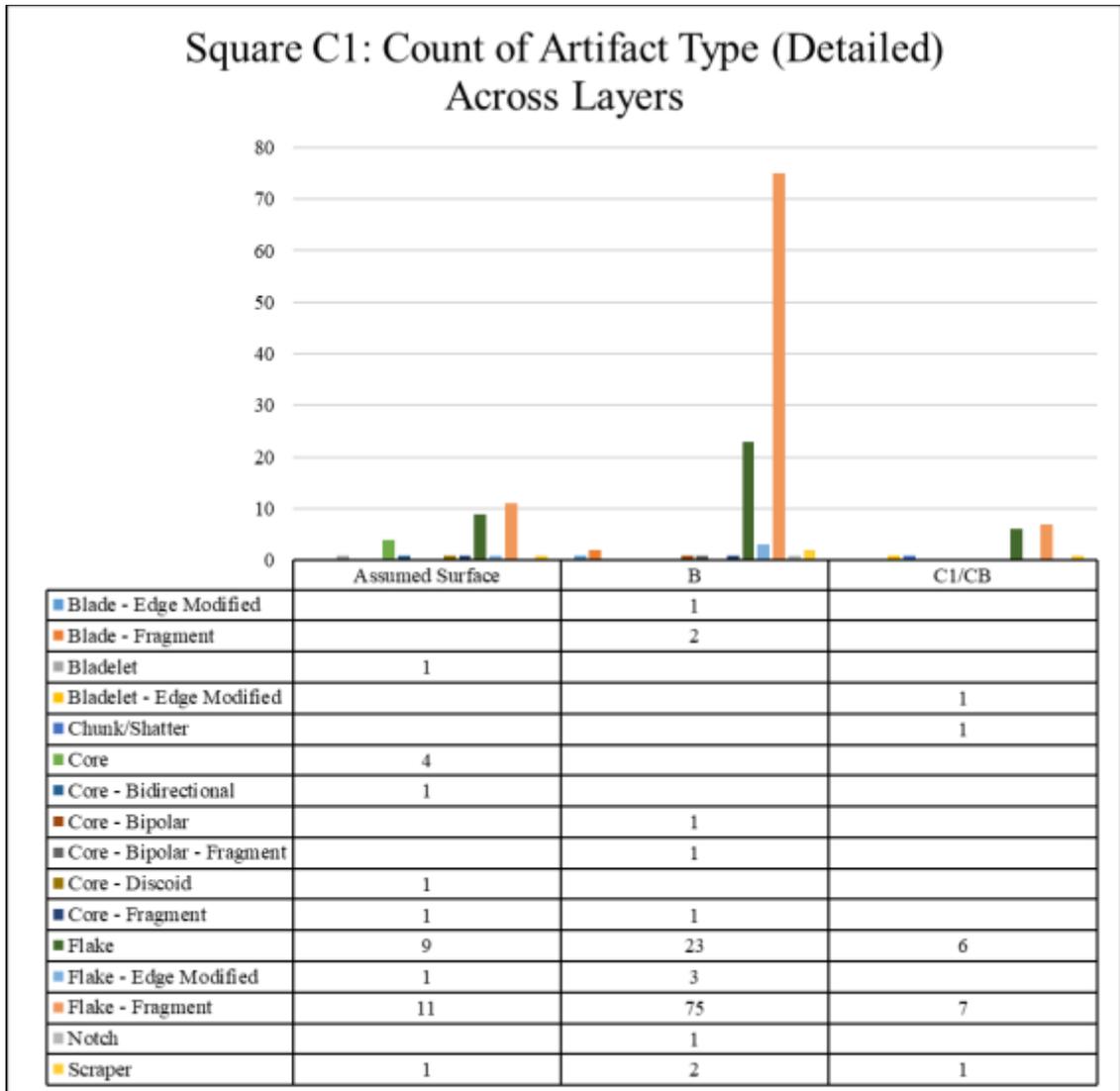


Figure 7.18. Count of Artifact Type (Detailed) Across Layers in Square C1.

## Completeness

Much like the previous squares, square C1 had many more fragments than complete artifacts. The Assumed Surface layer had 12% of the square's complete artifacts and 8% of the fragmented artifacts. The B layer had 17% of the square's complete artifacts and 53% of the fragmented artifacts. The C1/CB layer had 5% of the square's complete artifacts and 5% of the fragmented artifacts. Further information on artifact counts is outlined in Figure 7.19.

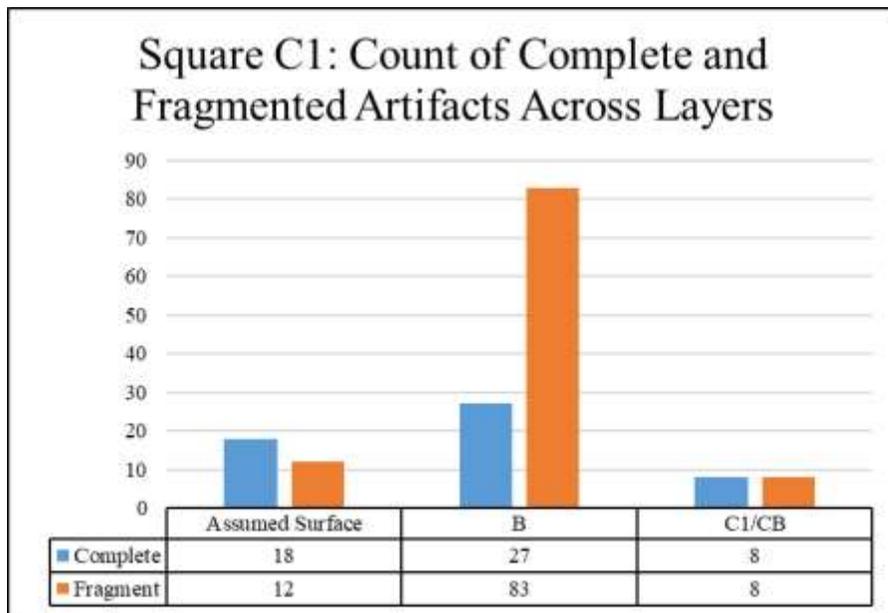


Figure 7.19. Count of Complete and Fragmented Artifacts Across Layers in Square C1.

## Platform

The most common platform in square C1 was single platform with the majority of them in layer B. Single platforms made up 10% of the square in the Assumed Surface

layer, 29% of the square in layer B and 7% of the square in layer C1/CB. The second most common incomplete platforms. Incomplete platforms made up 11% of the square in the Assumed Surface layer, 13% of the square in layer B and 6% of the square in layer C1/CB. Found less frequently were multifaceted, dihedral and cortex platforms. Multifaceted platforms made up 7% of the square in the Assumed Surface layer and 4% of the square in layer B. Cortex platforms were only found in layer B and made up 6% of the square. Dihedral platforms made up 2% of the square in the Assumed Surface layer, 4% of the square in layer B and 2% of the square in layer C1/CB. For count details see Figure 7.20.

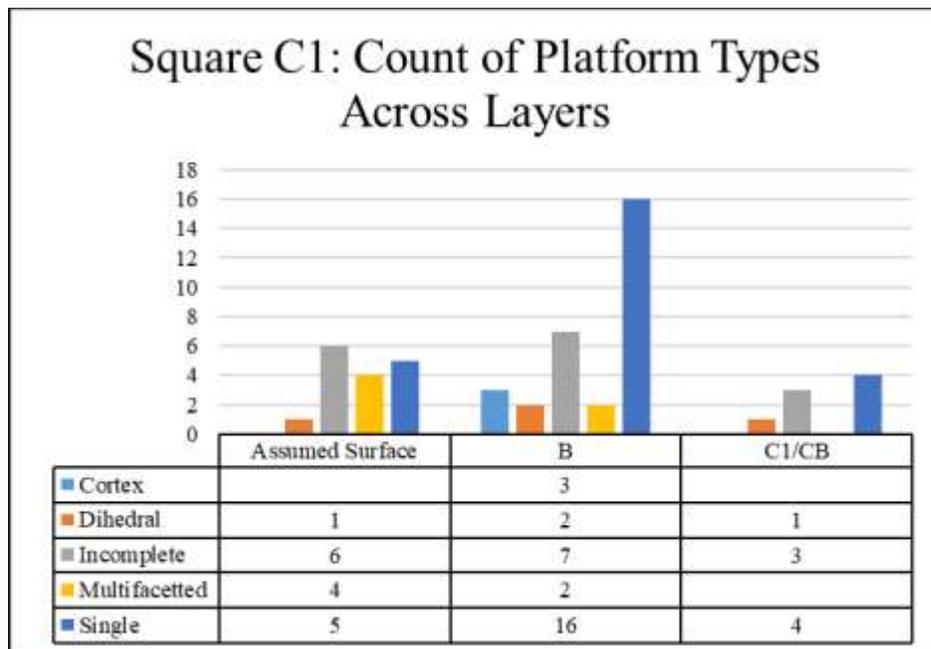


Figure 7.20. Count of Platform Types Across Layers in Square C1.

*Cortex*

Most of the artifacts in square C1 had little to no cortex. Layer B had the highest amount of artifacts with no cortex as they composed 65% of the square. In the Assumed Surface layer, this category represented 16 % of the square and 9% of the square in layer C1/CB. Artifacts with 1 – 25% cortex made up 3% of the artifacts in layer B. Those with 26 – 50% cortex made up 0.6% of the square in the Assumed Surface layer and 1% in layer B. Artifacts with 51 – 75% cortex made up 0.6% of the square in layer C1/CB. Artifacts with 75 – 99% cortex represented 2% of the square in the Assumed Surface layer and 0.6% in layer B and layer C1/CB respectively. Artifacts in square N2 that had 100% dorsal cortex only made up 06% of the square in the Assumed Surface layer and layer B respectively. For details regarding counts see Figure 7.21.

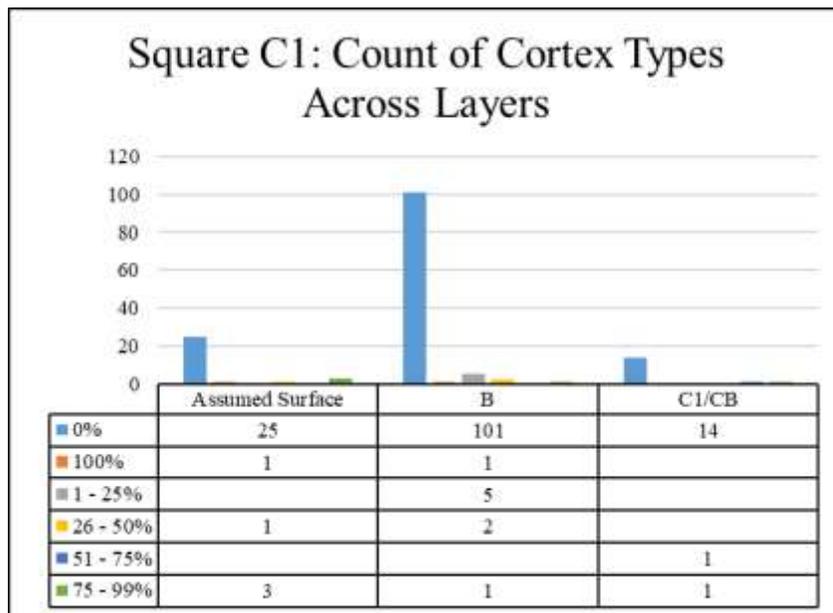


Figure 7.21. Count of Cortex Type Across Layers in Square C1.

## Square C2

Square C2 is located at the bottom of the cave talus. Rather than layers, C2 artifacts were encased in breccia so the square was separated into blocks lettered A – L, although not all blocks produced artifacts. Only blocks A, C, D, H and J had artifacts as well as L2. According to the artifact bags and excavation notes there is no record of a block L1. Additionally, there were some artifacts that were in bags labeled “Surface” and “General” which were consolidated into “Assumed Surface.”

### *Raw Material*

Square C2 was by far the most prolific square in terms of density. It was predicted during laboratory analysis that its representation of raw materials would vary widely as well. Although there were several pieces of various materials, chert was by far the most abundant.

Assumed Surface was mostly chert (13% of the square), with few pieces made of hornfels (2% of the square), ironstone (1% of the square), petrified wood (0.09% of the square), quartz (0.51% of the square), quartzite (0.43% of the square), siltstone (0.26% of the square). Block A, being the densest section of the site, had a wide variety of materials but chert still made up the majority (38% of the square). CCS was 4% of the square, hornfels was 5%, ironstone was 3%, quartz 2%, siltstone 2% and the rest of the material (dolerite, pumice, quartz, and quartzite) were all less than 1% respectively. Block C was made up of chert (3% of square) and ironstone (2% of square) while CCS, hornfels,

quartz, quartzite and siltstone all made up less than 1% respectively. Block D was made up of chert, hornfels, ironstone and quartzite but the all made up less than 1% of the square respectively. Block H was made up of mostly chert (4%) while CCS, hornfels, ironstone, petrified wood, quartz and siltstone all made up less than 1% of the square respectively. Block J was also mainly made of up chert (5% of the square) but hornfels, ironstone, quartzite and siltstone made up less than 1% respectively. The L2 block was also mainly chert (4% of the square) and CCS, hornfels, ironstone, quartz, quartzite and siltstone all made up less than 1 % respectively. Count details are outlined in Figure 7.22.

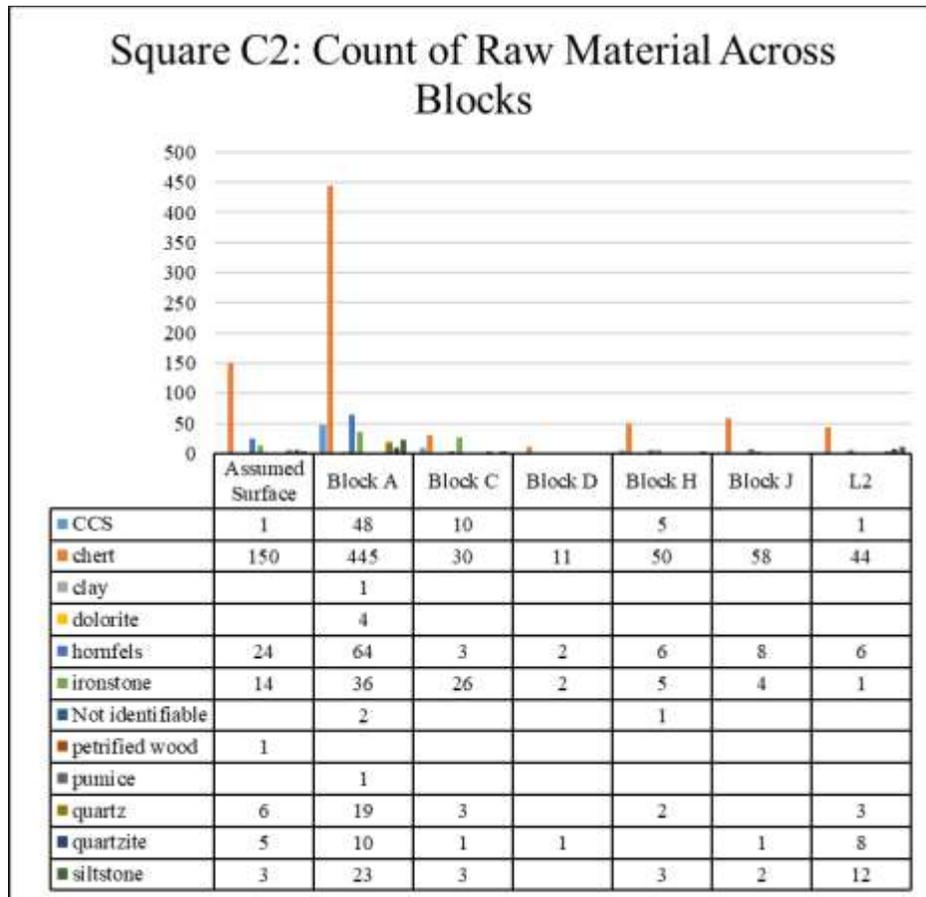


Figure 7.22. Count of Raw Material Across Layers in Square C2.

*Group (Tools/Cores/Debitage)*

The most common group type in square C2 was debitage and it was found mainly in Block A. Block A was made up of 3% cores, 50% debitage, and 3% tools. The Assumed surface layer consisted of 2% cores, 13% debitage and 3% tools. Block C contained 0.3% of the square's cores, 6% of the debitage and 0.6% of the tools. Block D consisted of 0.1% of the square's cores, 0.8% of the debitage and 0.4% of the tools. Block H contained 0.4% cores, 5% debitage and 0.4% tools. Block J was made of 1% of the square's cores, 5% of its debitage and 0.4% of its tools. Block L2 consisted of 1% of the square's cores, 3% of its debitage and 2% of its tools. Additional count information is in Figure 7.23.

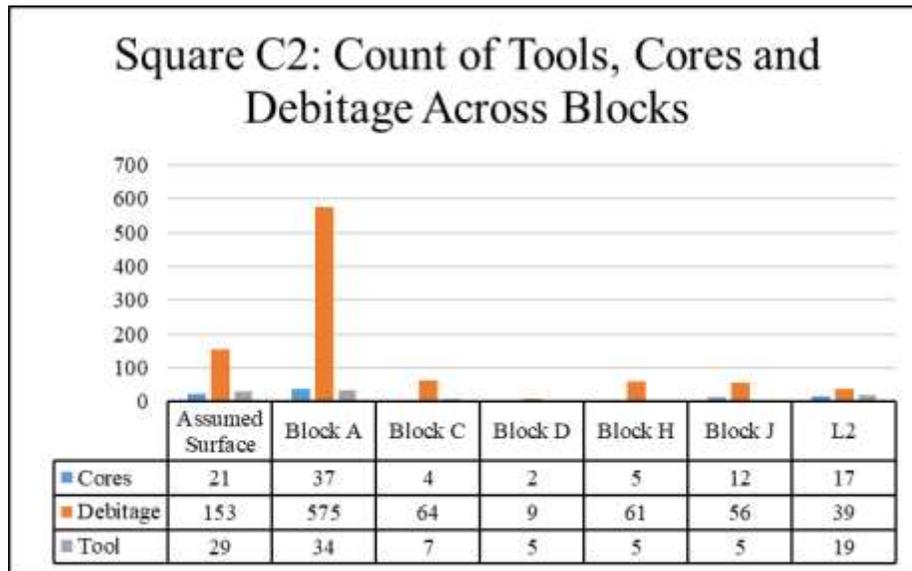


Figure 7.23. Count of Tools, Cores and Debitage Across Layers in Square C2.

*Artifact Type (General)*

Adzes were only found in the Assumed Surface Layer and Block D and both made up 0.9% of the square respectively. Bipolar pieces were only found on the surface and made up 2% of the square. Blades were only found on the surface and in Block A and made up 0.9% of each block respectively. Bladelets were found in Block A, C and L2 and each made up less than 1% of the block respectively. Cores were found in every block. They made up 2% of the surface finds, 3% of Block A, 0.4% of Block C, 0.2% of Block D, 0.4% of Block H, 1% of Block J and 1% of Block L2. Debitage was found in every block as well but made up less than 1% of the square in each block respectively. Endscrapers were only found on the surface and made up 0.2% of the square. Flakes were found in every block. They made up 15% of the surface finds, 50% of Block A, 5% of Block C, 1% of Block D, 6% of Block H, 5% of Block J and 4% of Block L2. Notches were found on the surface, in Block A and Block C and each made up less than 1% of the block respectively. Scrapers were found on the surface and in Blocks A, C, D and L2 but made up less than 1% of the square in each block. More details about counts can be found in Figure 7.24.

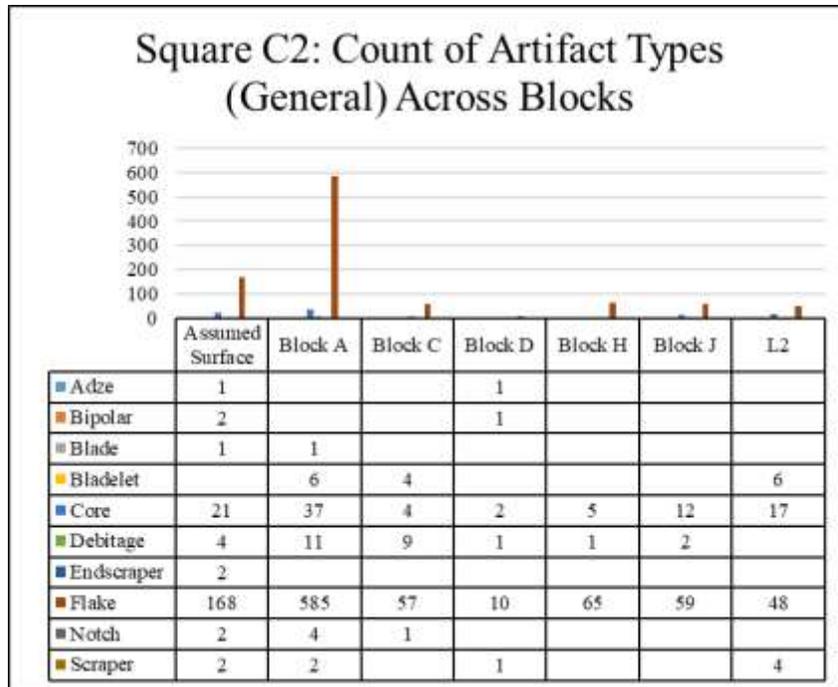


Figure 7.24. Count of Artifact Type (General) Across Layers in Square C2.

*Artifact Type (Detail)*

Artifact type variety was high in square C2; however, many were represented in low amounts. Except for a few exceptions which will be mentioned, all artifact types made up 1% or less of the square in each layer they were present. Core fragments in Block A made up 2% of the square. Flakes made up 6% of the surface, 14% of Block A, 2% of Block L2 and 1% or less of the square in Block C, Block D, Block H, and Block H. Edge modified flakes made up 2% of the surface finds and Block A respectively. They made up less than 1% of the square in every block thereafter. Flake fragments made up 7% of the square in the Assumed Surface layer, 35% in Block A, 3% in Block C, 0.3% in Block D, 4% in Block H, 4% in Block J and 1% in Block L2. Count details can be found in Figure 7.25.

### Square C2: Count of Artifact Types (Detailed) Across Blocks

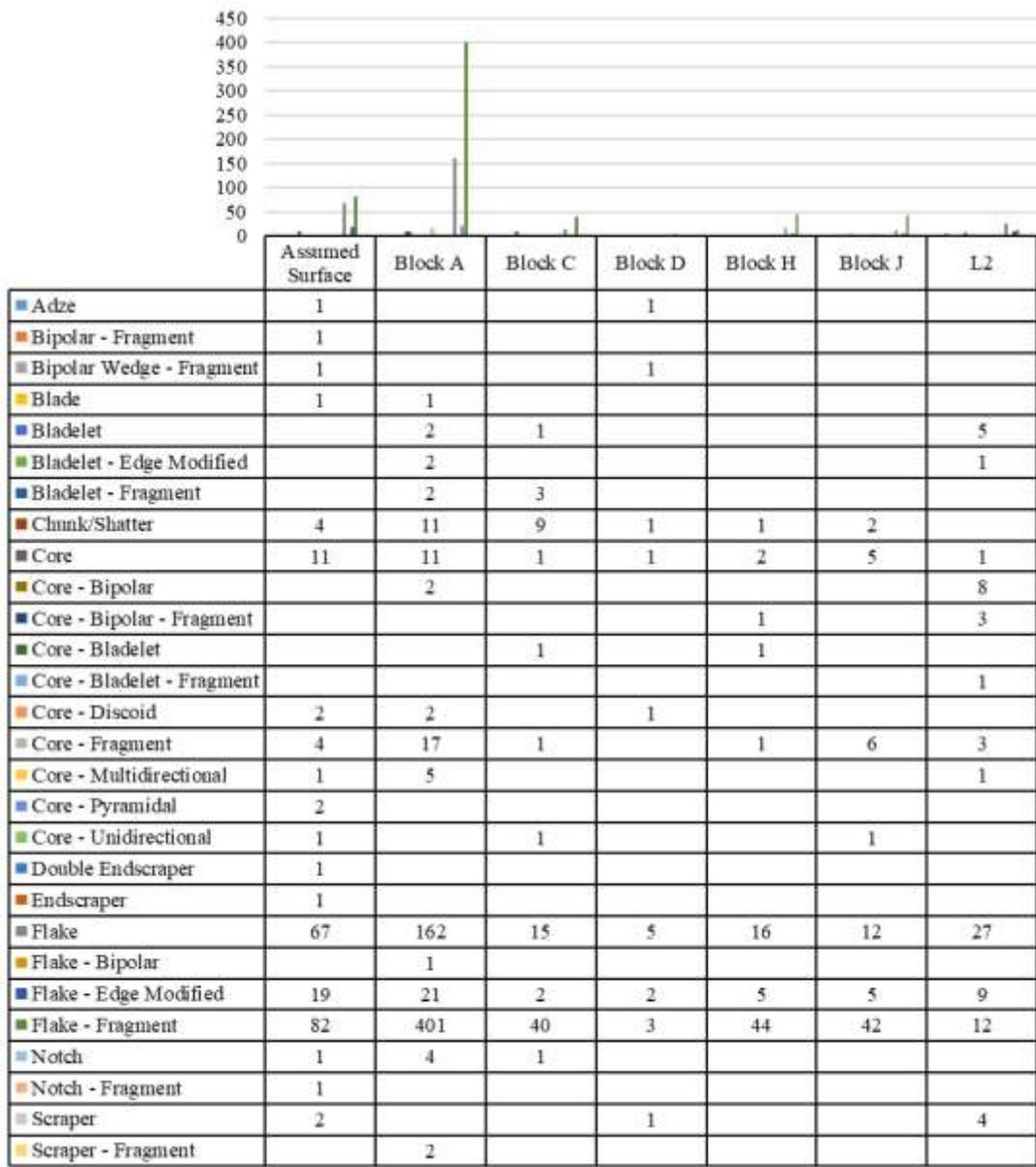


Figure 7.25. Count of Artifact Type (Detailed) Across Layers in Square C2.

## Completeness

Many of the artifacts in C2 were fragmented. The majority of the fragmented artifacts came from Block A since it made up 40% of the square. The assumed surface layer was responsible for 8% of the square while Block C was responsible for 5%, Block D had 0.5%, Block H had 4%, Block H and J had 4% each and L2 had 2% of the square. Complete artifacts more abundant in Block A, making up 16% of the layer. They made up 10% of the layer in the Assumed Surface layer, 4% of L2 and 2% in Block C, Block H and Block J respectively. They also made up 0.8% of Block D. Further details about artifact counts can be found in Figure 7.26.

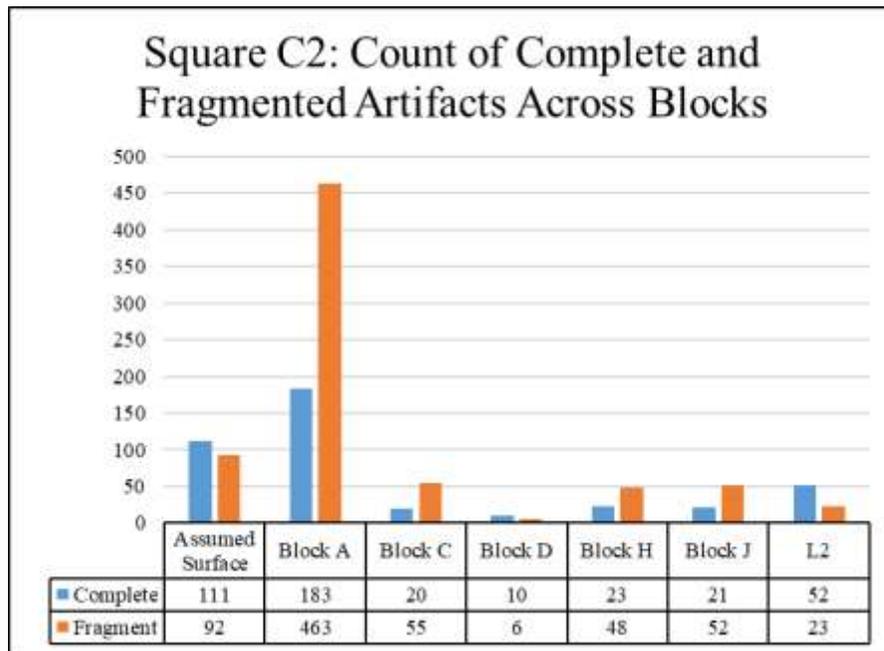


Figure 7.26. Count of Complete and Fragmented Artifacts Across Layers in Square C2.

## Platform

Cortex platforms were mostly found within surface finds, making up 3% of the square. They made up 7% of the square in Block A and less than 1% in every block thereafter.

Incomplete cortex and single cortex platform was only found on the surface and made up less than 1% of the square respectively. Dihedral platforms made up 4% of the square in Block A but only 2% in surface finds and 04% in Block C. Incomplete platforms made up 8% of the square in Block A and 5% in surface finds but only 2% Block C and Block H respectively. They made up 1% of the square in Block D. Additional count information is in Figure 7.27.

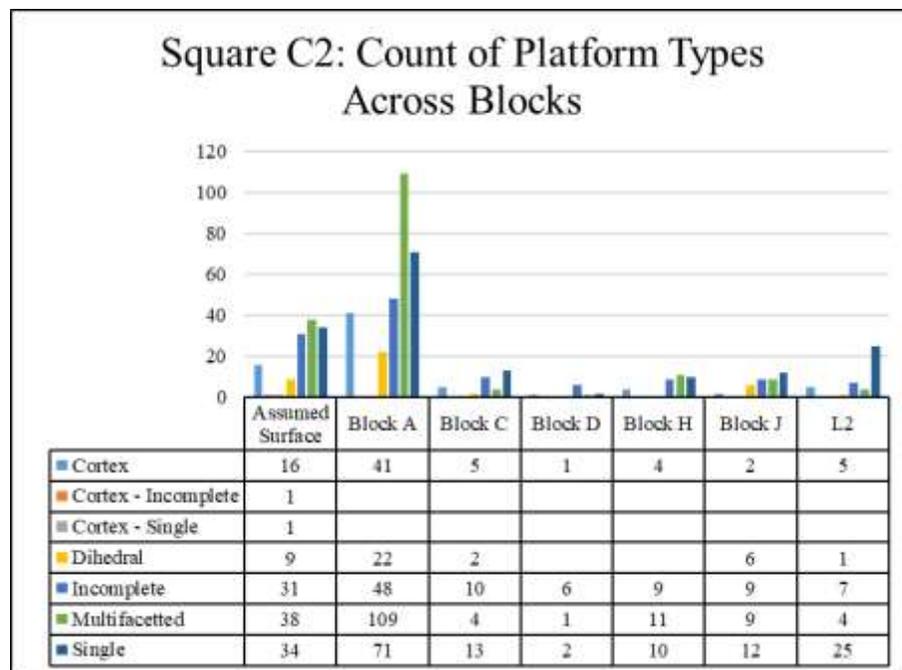


Figure 7.27. Count of Complete and Fragmented Artifacts Across Layers in Square C2.

*Cortex*

Most of the artifacts in square C2 had little to no cortex. Block A had the highest amount of artifacts with no cortex as they composed 40% of the square. In the Assumed Surface layer, this category represented 11% of the square. In Block C, it represented 5% of the square, in Block H and L2 it represented 4% and in Block J it represented 3% of the square. Artifacts with 1 – 25% cortex made up 7% in Block A, 3% of the artifacts in the Assumed Surface layer and 2% in Block J. They made up less than 1% of the square in the rest of the blocks. Those with 26 – 50% cortex made up 3% of the square in Block A and 1% or less in the rest of the blocks. Artifacts with 51 – 75% cortex made up 2% of the square in Block A and 1% or less in the rest of the blocks. Artifacts with 75 – 99% cortex represented less than 1% of the square in all blocks. Artifacts in square C1 that had 100% dorsal cortex only made up 2% of Block A less than 1% in Block J and the Assumed Surface layer. For details regarding counts see Figure 7.28.

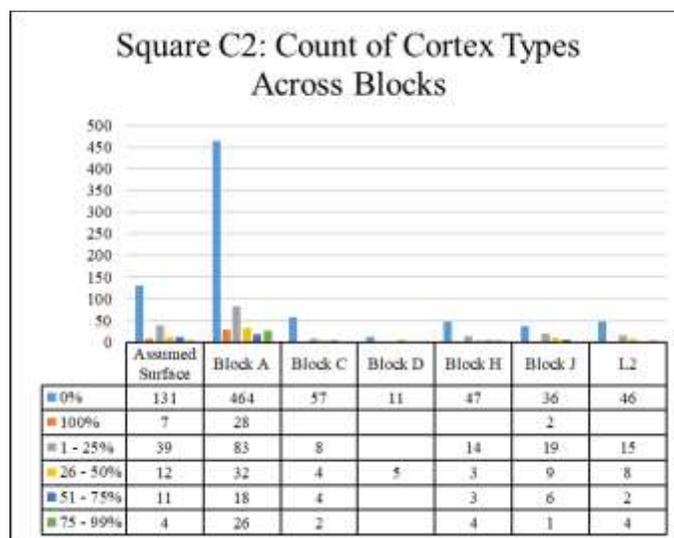


Figure 7.28. Count of Cortex Type Across Layers in Square C2.

## Dimensions

The average length of all of the complete artifacts within Malony's Kloof is 21.06 mm while the breadth is 17.52 mm and the thickness is 15.10 mm (Table 7.2). The assemblage in general was quite small.

Table 7.2. Artifact Dimensions.

	Length	Breadth	Thickness
Average	21.0523	17.516	5.62362
Variance	78.5142	60.5477	15.0977
Standard Deviation	8.86082	7.78124	3.88558

## Summary

The results of the 2005 excavation of Malony's Kloof has elucidated various patterns. Square C2 had the highest count of artifacts. The most common raw material used throughout the squares is chert with the exception of square N1 which also had a decent presence of quartz. The most common artifact was debitage, specifically flakes and flake fragments. Square N2 was unique in the sense that it also held many blades. Single platforms were prevalent throughout the entire site. However, multifaceted platforms and single platforms were equally prevalent in square C2. All squares had artifacts with little to no cortex. The following chapter will explore these patterns in further detail and will argue that C1 and C2 are two sections of the same area which is related to the Early Later Stone Age.

## VI. LITHIC ANALYSIS

Excavations at Malony’s Kloof recovered 2092 artifacts. However, of this initial count, 36 artifacts were removed from the analysis due to missing provenience information. Furthermore, artifacts that were only labeled “sweepings” with no other square or layer information were also removed (n =2) as well as artifacts labeled “Hillside opposite MKA” (n =18) since provenience was unclear and it was difficult to establish how these artifacts related to the site.

### Statistical Analysis

All t-test and Cohen’s D values were calculated using an online calculator (Stangroom 2018). Significant level was set to .05 and the hypothesis was set to two-tailed. A Cohen’s D value of 0.20 or less is considered a small effect, 0.21 - 0.50 is considered a medium effect and 0.51 - 0.80 was considered a medium-large effect and anything above a 0.80 was considered a high effect.

Chi-squares were calculated using excel unless they were 2X2 tables. Two by two tables were inputted into an online calculator as well (Stangroom 2018). Chi-square values were inputted into the online calculator to test for significance. Chi-squares were calculated using the equation:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where  $c$  is the degrees of freedom calculated by multiplying the number of columns minus 1 by the number of rows minus 1 [ $df = (N_{Columns}-1) \times (N_{Rows}-1)$ ].  $O$  is the observed values derived from pivot tables and  $E$  is the expected values derived by multiplying the row total by the column total and dividing it by the grand total ( $n$ ). Sub  $i$  represents the “ $i$ th” position in the pivot table.

Cramer’s  $V$  values were calculated in excel using the equation:

$$V = \sqrt{\chi^2/n(k-1)}$$

Where  $\chi^2$  is the chi-square value,  $n$  is the sample size and  $k$  is the number of rows or columns (whichever is smaller). The value varies between 0 (weak association) to 1 (strong association). Correlation between 2 X 2 tables is assessed using the Phi ( $\Phi$ ) calculation:

$$\Phi = \sqrt{\chi^2/n}$$

### **Comparisons Between C Squares and N Squares**

Before delving into the results of the analysis, a few notes about methods must be made. The analysis (unless otherwise noted) combined squares C1 and C2 into one category (C Squares) since these two squares make up the talus and are associated with ELSA dates. Squares N1 and N2 are combined into one category (N squares) and serve as a comparison since the dates are much younger. The two areas associated with surface collections are not analyzed since context was lost. Additionally, layers are not used as a condition because of the B layer problem. Details of this dilemma are discussed in the methods chapter but to summarize here, it is recalled that layer B was used to describe

decalcified breccia (as in the B1 and B2 layers in Square N1 and N2) and was sometimes used to describe the breccia (as in the B in square N1 and C1). In some field notes, B is described as being within mixed horizons so it is difficult to determine whether it was in fact part of the breccia associated with the ELSA (Table 8.1).

Table 8.1. Layer Descriptions and Associated Layers.

	C1	C2	N1	N2	Grand Total
<b>Breccia</b>					
B			36		36
<b>Decalcified Breccia/Mixed Horizon</b>					
B			354	32	386
<b>Rock Shelter Soft Sediment</b>					
A3				288	288
<b>Talus</b>					
Assumed Surface	30	174			204
B	110				110
Block A		653			653
Block C		76			76
Block D		16			16
Block H		72			72
Block J		73			73
C1/CB	17				17
General		30			30
L2		75			75
<b>Grand Total</b>	<b>157</b>	<b>1169</b>	<b>390</b>	<b>320</b>	<b>2036</b>

Confidence that C1 and C2 are related is supported by the fact that there is no statistical difference between artifact sizes. The average artifact length in square C1 is 20.57 mm and 22.78 mm in square C2. This difference is not statistically significant at  $p < 0.05$  ( $t = -1.74$ ;  $df = 471$ ;  $p = 0.082754$ ). The effect between these two samples is small. They vary by about a quarter of a standard deviation (*Cohen's D* = 0.26). The average artifact breadth in square C1 is 17.38 mm and 19.1 mm in square C2. This

difference is not statistically significant at  $p < 0.05$  ( $t = -1.54$ ;  $df = 471$ ;  $p = 0.124956$ ). The effect between these two samples is small. They vary by about a quarter of a standard deviation (*Cohen's D* = 0.22). The average artifact thickness in square C1 is 5.41 mm and 6.2 mm in square C2. This difference is not statistically significant at  $p < 0.05$  ( $t = -1.37$ ;  $df = 470$ ;  $p = 0.169281$ ). The effect between these two samples is medium. They vary by about a half of a standard deviation (*Cohen's D* = 0.48).

There are some statistical differences between artifact sizes in N1 and N2, however the decision to continue to combine the squares was made since they serve mainly as a form of comparison against the ELSA assemblage. The average artifact length in square N1 is 16.49 mm whereas the average length in N2 was 17.87 mm. This difference is not statistically significant at  $p < 0.05$  ( $t = -1.14$ ;  $df = 197$ ;  $p = 0.255349$ ). The effect between these two samples is small. They vary by less than a quarter of a standard deviation (*Cohen's D* = 0.17). The average artifact breadth in square N1 is 12.77 mm whereas the average length in N2 was 14.88 mm. This difference is statistically significant at  $p < 0.05$  ( $t = -2.01$ ;  $df = 197$ ;  $p = 0.045379$ ). The effect between these two samples is small. They vary by a little more than a quarter of a standard deviation (*Cohen's D* = 0.31). The average artifact thickness in square N1 is 5.27 mm and 3.95 mm in square N2. This difference is statistically significant at  $p < 0.05$  ( $t = 2.48$ ;  $df = 197$ ;  $p = 0.013939$ ). The effect between these two samples is small. They vary by a little more than a quarter of a standard deviation (*Cohen's D* = 0.37). Lengths between the two squares do not vary but breadth and thickness do. Artifacts in square N1 are slightly narrower and thicker than artifacts in square N2. It should also be highlighted that the effects of these differences are small.

## Early Later Stone Age Industry

If the assemblage at Malony's Kloof is to qualify for consideration within the ELSA criteria, the artifacts must include evidence of bipolar flaking, increased use of quartz, lack of formal tools, and little to no prepared cores nor multifaceted platforms. There must also be evidence of blades and bladelets (Beaumont 1978, 1981; Kaplan 1990; Low and Mackay 2016; Mitchell 1988; Orton 2006; Orton et al. 2011; Plug 1981; Wadley 1987). The following paragraphs will test whether these features exist and whether they are statistically significant.

Although the presence of microliths is not necessary in order to determine whether an assemblage belongs to the ELSA, it is meaningful when it is coupled with bipolar flaking. Bipolar reduction techniques are important because they are often used in the production of small tools, especially those made of quartz (Callahan 1987; Pargeter and de la Peña 2017; Pargeter and Eren 2017). Placing artifacts over an anvil provides stability when working with small cores (Hiscock 2015; Pargeter and Eren 2017).

### *Raw Material*

The distribution of raw material across the C squares and N squares is statistically significant at  $p < 0.05$  ( $\chi^2 = 0.499.19$ ;  $df = 15$ ;  $p < 0.00001$ ) with a medium association (*Cramer's V* = 0.50). There is a mildly significant relationship between raw material types at the site. A closer examination of the adjusted residuals (Table 8.2) reveals that chert in the C squares and quartz in the N squares are observed significantly more than

expected. This can be interpreted as a higher use of chert in ELSA layers and a transition into a higher use of quartz in younger layers.

Table 8.2. Adjusted Residuals for Raw Material Across Squares.

	C1/C2	N1/N2
Banded Ironstone	-1.37	1.37
Banded Sandstone	-1.93	1.93
Banded Siltstone	-1.37	1.37
CCS	5.08	-5.08
Chert	11.08	-11.08
Dolerite	1.64	-1.64
Granite	-2.74	2.74
Hornfels	1.16	-1.16
Ironstone	4.40	-4.40
Petrified Wood	0.73	-0.73
Pumice	-1.69	1.69
Quartz	-19.51	19.51
Quartzite	1.84	-1.84
Shale	-6.74	6.74
Silicified Siltstone	-1.93	1.93
Siltstone	4.75	-4.75

### *Artifact Size*

The average length of complete artifacts in the C squares 22.53 mm. The average length of artifacts in the N squares is 17.41 mm. This difference is statistically significant at  $p < 0.05$  ( $t = 7.09$ ;  $df = 670$ ;  $p < 0.00001$ ). The effect between these two samples is medium. They vary by little more than half of a standard deviation (*Cohen's D* = 0.61). The average breadth of complete artifacts in the C squares 18.91 mm. The average length of artifacts in the N squares is 14.18 mm. This difference is statistically significant at  $p < 0.05$  ( $t = 7.46$ ;  $df = 670$ ;  $p < 0.00001$ ). The effect between these two samples is medium.

They vary by little more than half of a standard deviation (*Cohen's D* = 0.64). The average breadth of complete artifacts in the C squares 6.11 mm. The average length of artifacts in the N squares is 4.39 mm. This difference is statistically significant at  $p < 0.05$  ( $t = 5.35$ ;  $df = 670$ ;  $p < 0.00001$ ). The effect between these two samples is medium. They vary by little less than half of a standard deviation (*Cohen's D* = 0.46). The artifacts seem to get smaller after the ELSA with the biggest difference being in length. Based on size criteria summarized in Table 2.4, artifacts from Malony's Kloof are considered microliths.

### *Completeness*

The distribution of complete and incomplete artifacts across the C squares and N squares is not statistically significant at  $p < 0.05$  ( $\chi^2 = 0.29$ ;  $df = 1$ ;  $p = 0.59$ ) with a low association ( $\Phi = 0.01$ ). There is not a significant relationship between complete and incomplete artifacts at the site as can be seen by the adjusted residuals (Table 8.3). Both the C and N squares have more incomplete artifacts than complete.

Table 8.3. Count and Adjusted Residuals for Complete and Incomplete Artifacts Across Squares.

	C1 / C2		N1 / N2	
	Count	Adjusted Residual	Count	Adjusted Residual
Complete	473	0.54	199	-0.54
Fragment	813	-0.54	362	0.54
Grand Total	1286		561	

## *Flake Tools*

The average length of complete flake tools in the C squares is 25.57 mm and 26.59 mm in the N squares. This difference is not statistically significant at  $p < 0.05$  ( $t = -0.40$ ;  $df = 107$ ;  $p = 0.69$ ). The effect between these two samples is low. They vary by less than a tenth of a standard deviation (*Cohen's D* = 0.10). The average breadth of complete flake tools in the C squares was 19.67 mm and 14.04 in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 2.86$ ;  $df = 107$ ;  $p = .005$ ). The effect between these two samples is medium-high. They vary by more than three quarters of a standard deviation (*Cohen's D* = 0.76). The average flake tool thickness was 6.34 mm in the C squares and 4.65 in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 2.36$ ;  $df = 107$ ;  $p = .02$ ). The effect between these two samples is medium-high. They vary by more than half a standard deviation (*Cohen's D* = 0.63). The complete flake tools maintain their size length wise, but they are narrower and thinner in the younger assemblages.

The distribution of flake tools across the C squares and N squares is statistically significant. This is true whether the chi square is calculated using general artifact types or detailed artifact types. Testing general artifact types across units produces a significant result at  $p < 0.05$  ( $\chi^2 = 18.86$ ;  $df = 8$ ;  $p = 0.016$ ) with a low association (*Cramer's V* = 0.33). Interestingly, notches are the only artifacts that seem to have a raw p-value of less 0.05 and is observed significantly more than expected in the C squares (Table 8.4).

Table 8.4. Adjusted Residuals for Flake Tools (General) Across Squares.

	C1/C2	N1/N2
Adze	0.96	-0.96
Bipolar	1.18	-1.18
Blade	0.79	-0.79
Bladelet	-3.20	3.20
Burin Spall	-1.48	1.48
Endscraper	0.96	-0.96
Flake	0.38	-0.38
Notch	1.96	-1.96
Scraper	1.14	-1.14

Testing detailed artifact types across units produces a significant result at  $p < 0.05$  ( $\chi^2 = 66.44$ ;  $df = 17$ ;  $p < 0.00001$ ) with a medium association (*Cramer's V* = 0.62). Edge modified flakes were observed significantly more than expected however there was a difference between complete artifacts and fragments. Complete edge modified flakes were observed more than expected in the C layers whereas fragmented edge modified flakes were found more in the N layers (Table 8.5). It is difficult to assess whether this difference is due to technological changes across time or the fact that many of the layers in N were mixed and potentially disturbed. Bladelets were also observed more in than expected in the N squares.

Table 8.5. Adjusted Residuals for Flake Tools (Details) Across Squares.

	C1 C2	N1 N2
Adze	0.96	-0.96
Bipolar - Fragment	0.68	-0.68
Bipolar Wedge - Fragment	0.96	-0.96
Blade	0.96	-0.96
Blade - Edge Modified	0.68	-0.68
Blade - Edge Modified - Fragment	-1.48	1.48
Blade - Fragment	0.96	-0.96

	C1	C2	N1	N2
Bladelet	-2.42		2.42	
Bladelet - Edge Modified	1.37		-1.37	
Bladelet - Fragment	-2.77		2.77	
Burin Spall	-1.48		1.48	
Double Endscraper	0.96		-0.96	
Endscraper	0.96		-0.96	
Flake - Edge Modified - Fragment	-7.62		7.62	
Flake - Edge Modified	5.62		-5.62	
Notch	1.83		-1.83	
Notch - Fragment	0.68		-0.68	
Scraper	0.84		-0.84	
Scraper - Fragment	0.96		-0.96	

### *Cores*

The average cores length of complete cores in the C squares (Figure 8.1) is 24.18 mm and 15 mm in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 5.42$ ;  $df = 79$ ;  $p < 0.00001$ ). The effect between these two samples is high. They vary by more than 1 standard deviation (*Cohen's D* = 1.30). The average core breadth was 18.63 mm in the C squares and 11.1 in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 4.78$ ;  $df = 79$ ;  $p < 0.00001$ ). The effect between these two samples is high. They vary by more than 1 standard deviation (*Cohen's D* = 1.20). The average core breadth was 10.56 mm in the C squares and 7.03 in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 2.99$ ;  $df = 78$ ;  $p < 0.00001$ ). The effect between these two samples is medium-high. They vary by more than half a standard deviation (*Cohen's D* = 0.73). The cores seem to get smaller after the ELSA with the biggest difference being in length.



Figure 8.1. Artifact MKA-035: Core from C2 (Block A).

Despite the clear change in size, the distribution of core types across the C squares and N squares (Figure 8.2) is statistically not significant whether it is tested against general core types or detailed core types. General core types across squares are not significant at  $p < 0.05$  ( $\chi^2 = 13.81$ ;  $df = 8$ ;  $p = 0.09$ ) with a low association (*Cramer's V* = 0.28). Detailed core types across squares are not significant at  $p < 0.05$  ( $\chi^2 = 16.16$ ;  $df = 12$ ;  $p = 0.18$ ) with a low association (*Cramer's V* = 0.30).

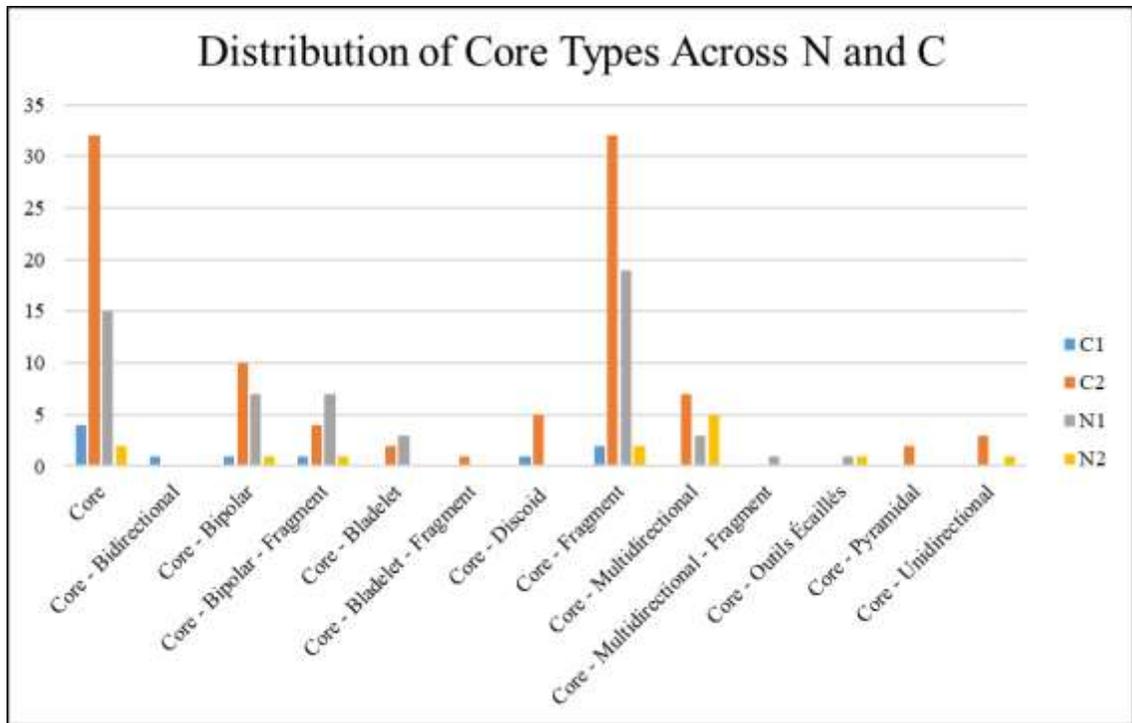


Figure 8.2. Distribution of core types across C squares and N squares.

Cores with no other identifying adjective were analyzed on their own to test whether there were any differences between squares. The average length of general cores was 24.64 mm in the C squares and 17.06 in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 5.34$ ;  $df = 57$ ;  $p = 0.0008$ ). The effect between these two samples is high. They vary by more one standard deviation (*Cohen's D* = 1.03). The average breadth of general cores breadth was 20.4 mm in the C squares and 12.66 in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 3.98$ ;  $df = 57$ ;  $p = 0.0002$ ). The effect between these two samples is high. They vary by more one standard deviation (*Cohen's D* = 1.22). The average breadth of general cores breadth was 11.05 mm in the C squares and 8.23 in the N squares. This difference is not statistically significant at  $p < 0.05$  ( $t = 1.82$ ;  $df = 57$ ;  $p = 0.07$ ). The effect between these two samples

is medium. They vary by more about half of a standard deviation (*Cohen's D* = 0.54).

There is no size difference between length and breadth of general cores when analyzed on their own, but there was a difference between the thickness of cores. The cores still seemed to get smaller over time but they did not necessarily get any thinner.

### *Blades and Bladelets*

For this section, blades and bladelets were combined. There are 2 bladelets and 12 blades in the C squares (n = 14) and 9 blades in the N squares. The average length of blades/bladelets in the C squares is 27.24 mm and 22.17 mm in the N squares. This difference is not statistically significant at  $p < 0.05$  ( $t = 1.25$ ;  $df = 21$ ;  $p = 0.23$ ). The effect between these two samples is medium. They vary by about half of a standard deviation (*Cohen's D* = 0.53). The average breadth of blades/bladelets in the C squares is 13.2 mm and 8.9 mm in the N squares. This difference is statistically significant at  $p < 0.05$  ( $t = 2.46$ ;  $df = 21$ ;  $p = 0.02$ ). The effect between these two samples is high. They vary by more than one standard deviation (*Cohen's D* = 1.09). The average thickness of blades/bladelets in the C squares is 4.32 mm and 2.99 mm in the N squares. This difference is not statistically significant at  $p < 0.05$  ( $t = 1.93$ ;  $df = 21$ ;  $p = 0.07$ ). The effect between these two samples is high. They vary by less than one standard deviation (*Cohen's D* = 0.85). Blade and bladelets sizes stayed relatively similar through time, although they did become narrower in younger deposits. Square did not have an effect on blades and bladelets. The distribution was not statistically significant at  $p < 0.05$  ( $\chi^2 = 2.69$ ;  $df = 1$ ;  $p = 0.10$ ) with a low association (*Cramer's V* = 0.25). Raw material did not

have an effect on blade presence. The collected blades and bladelets were made out of CCS, chert, hornfels, ironstone, quartz and siltstone and the distribution was not statistically significant at  $p < 0.05$  ( $\chi^2 = 10.25$ ;  $df = 5$ ;  $p = 0.07$ ) with a medium association (*Cramer's V* = 0.48).

### *Cortex*

The distribution of cortex across the C squares and N squares is statistically significant at  $p < 0.05$  ( $\chi^2 = 80.43$ ;  $df = 5$ ;  $p < 0.00001$ ) with a low association (*Cramer's V* = 0.20). Upon review of Table 8.6, it is evident that artifacts without a cortex were observed significantly more than expected in the N squares. Since there are raw material outcrops nearby, it is plausible to assume that blanks were created at the local outcrops and transported to the site for further detailing. All other cortex amounts with the exception of 100% cortex, were significant in the C squares which may indicate various levels of tool manufacturing.

Table 8.6. Adjusted Residuals for Cortex Percentage Across Squares.

	C1/C2	N1/N2
0%	-8.37	8.37
100%	-0.02	0.02
1 - 25%	5.21	-5.21
26 - 50%	4.63	-4.63
51 - 75%	2.48	-2.48
75 - 99%	3.67	-3.67

### *Modified/Unmodified*

The distribution of modified and unmodified artifacts across the C squares and N squares is statistically significant at  $p < 0.05$  ( $\chi^2 = 4.83$ ;  $df = 1$ ;  $p = 0.03$ ) with a low association ( $\Phi = 0.20$ ). The trend at both C squares and N squares is that there are more unmodified artifacts than modified. This could be due the high amount of debitage found at the site in general.

### *Platform*

The distribution of different platform types across the C squares and N squares is statistically significant at  $p < 0.05$  ( $\chi^2 = 15.12$ ;  $df = 7$ ;  $p = 0.03$ ) with a low association (*Cramer's V* = 0.13). Adjusted residuals (Table 8.7) indicate that cortex and dihedral platforms are significantly found more in the C units whereas single platforms are occurring more in the N units. This lends to the idea that blades and bladelets are more prominent in the younger layers since single platforms come from unidirectional cores and are indicative of blade production (Andrefsky 2005).

Table 8.7. Adjusted Residuals for Platform Types Across Squares.

	C1 /C2	N1/N2
Cortex	1.96	-1.96
Cortex - Incomplete	0.63	-0.63
Cortex – Single	0.63	-0.63
Dihedral	1.89	-1.89

	C1 /C2	N1/N2
Incomplete - Collapsed/Crushed/Reduced/Broken	-0.43	0.43
Multifaceted	0.10	-0.10
Single	-1.85	1.85
Tetrahedral	-2.25	2.25

*Group (Tool/Core/Debitage)*

There is no correlation between tools, cores anddebitage as a group and squares. This association is not statistically significant at  $p < 0.05$  ( $\chi^2 = 2.24$ ;  $df = 1$ ;  $p = 0.33$ ) and has a weak association (*Cramer's V* = 0.03). Artifacts that were labeled Not an Artifact (n = 8) were removed from this chi-square calculation.

Testing for correlations betweendebitage types and square is significant. This association is statistically significant at  $p < 0.05$  ( $\chi^2 = 201.25$ ;  $df = 3$ ;  $p < 0.00001$ ) and has a low association (*Cramer's V* = 0.35). Inspecting the adjusted residuals (Table 8.8) shows that the N units have a high amount of shatter whereas the C units is dominated by flake fragments and followed by flakes.

Table 8.8. Adjusted Residuals for Debitage Types Across Squares.

	C1/C2	N1/N2
Chunk/Shatter	-13.983	13.983
Flake	2.99395	-2.9939
Flake - Bipolar	-1.6977	1.69769
Flake - Fragment	6.07767	-6.0777

One of the known criteria of ELSA assemblages is bipolar production which creates high amounts of shatter and the increased use of quartz. There is a chance that the shatter may be flake fragments but due to quartz' amorphous nature, its tendency to

produce diffused bulbs and its lack of compression rings, it would be difficult to distinguish between quartz shatter and quartz flake fragments (Callahan 1987; Driscoll 2011). To test whether quartz is responsible for the high amount of shatter, there would need to be a correlation between quartz and shatter. The correlations between raw material and debitage is statistically significant at  $p < 0.05$  ( $\chi^2 = 404.15$ ;  $df = 14$ ;  $p < 0.00001$ ) and has a medium association (*Cramer's V* = 0.49). A review of the adjusted residuals (Table 8.9) shows that quartz is in fact a prominent material at the site but not in the ELSA layers within the C squares, rather in the later occupations. Chert, however, is highly represented in the C squares and thus associated with the ELSA.

Table 8.9. Adjusted Residuals for Debitage Raw Material Across Squares.

	C1/C2	N1/N2
Banded Ironstone	-1.37	1.37
Banded Sandstone	-1.94	1.94
Banded Siltstone	-1.37	1.37
CCS	4.72	-4.72
Chert	10.11	-10.11
Dolerite	1.63	-1.63
Granite	-2.75	2.75
Hornfels	1.21	-1.21
Ironstone	3.92	-3.92
Petrified Wood	0.73	-0.73
Quartz	-17.28	17.28
Quartzite	1.53	-1.53
Shale	-6.78	6.78
Silicified Siltstone	-1.37	1.37
Siltstone	4.12	-4.12

The prominent presence of quartz is clearly represented in the debitage from the N squares but, more specifically, it is also represented amongst the site's shatter. The

correlations between raw material and shatter is statistically significant at  $p < 0.05$  ( $\chi^2 = 70.11$ ;  $df = 8$ ;  $p < 0.00001$ ) and has a medium association (*Cramer's V* = 0.64). As can be seen in Table 8.10, the adjusted residual for quartz is 4.69. Chert, ironstone and petrified wood were more significant sources of shatter in the C squares.

Table 8.10. Adjusted Residuals for Shatter Raw Material Across Squares.

	C1/C2	N1/N2
CCS	-0.64	0.64
Chert	5.95	-5.95
Granite	-0.78	0.78
Hornfels	0.36	-0.36
Ironstone	4.46	-4.46
Petrified Wood	2.24	-2.24
Quartz	-4.69	4.69
Quartzite	-0.45	0.45
Shale	-2.37	2.37

*Subclass (Formal/Informal)*

The distribution of formal and expedient tools across the C squares and N squares is statistically significant at  $p < 0.05$  ( $\chi^2 = 6.64$ ;  $df = 1$ ;  $p = 0.01$ ) with a low association (*Cramer's V* = 0.19). There is by far more tools in general in the C squares than in the N squares. Both formal and information tools are found mostly in the N squares. The trend with both squares is that there are more informal tools. Even within the N squares, there are 51 informal tools and only 3 formal tools (Table 8.11). This pattern matches the ELSA pattern of having little to no formal tools within an assemblage.

Table 8.11. Count and Adjusted Residuals for Formal and Informal Artifacts Across Squares.

	C1/C2		N1/N2	
	Count	Adjusted Residual	Count	Adjusted Residual
Formal	25	2.58	3	-2.58
Informal	93	-2.58	51	2.58
Grand Total	118		54	

### Summary

Statistical analysis of the assemblage at Malony’s Kloof helped elucidate patterns within the site as well as determine whether the assemblage reflected ELSA technology. This effort was not without its challenges, however despite its limitations there are some patterns that have emerged. Within this analysis, squares C1 and C2 because they are part of the cave talus and are associated with ELSA dates of 25,562– 30,715 cal BP. Squares N1 and N2 were combined as a form of comparison. They are much younger they reflect an occupation that utilized the cave after the development of the large tufa fans. The layers within the N squares date to 2,181 – 1,876 cal BP.

The artifacts at Malony’s Kloof get much shorter after the ELSA. The site contained more incomplete artifacts than complete, across both squares. Between the C squares and the younger N squares, the complete flake tools (which included blades and bladelets) stay the same size but they get narrower and thinner as time goes on. Cores also decreased in size over time. After analyzing cortex, it is clear that many of the artifacts at Malony’s Kloof were in the final stages of production. There were also

significantly more unmodified artifacts than modified. This pattern remained true across squares.

In order for the assemblage at Malony's Kloof, more specifically the C squares, to meet the ELSA criteria it must contain evidence of bipolar flaking, the increased use of quartz, lack of formal tools, little to no prepared cores or multifaceted platforms, blades and bladelets. Interestingly, some of these features were found in the N squares. Large amounts of and specifically quartz shatter was found in N squares whereas the C squares contained more flakes and flake fragments made out of chert. There was a correlation between square and informal tools, however not a clear one. The adjusted residuals did not seem to prefer any particular square but based on artifact counts, there were more informal tools in the C squares indicating expediency. As was expected, there were not many multifaceted platforms which are an indication of prepared core technologies like those found in the Middle Stone Age. The C squares had a significant amount cortex and dihedral platforms whereas the N squares had more single faceted platforms. Single platforms are an indication of bladelet production. Evidence of bladelet production in the N units is further reinforced by the fact that it contained more bladelets that should be expected by chance.

## VII. DISCUSSION AND CONCLUSION

The lithic analysis of the assemblage of Malony's Kloof focuses around two goals. The first is to establish whether artifacts found in Rockshelter A qualify as an ELSA assemblage. This was done by narrowing down a working definition of the ELSA industry and comparing it to the patterns found across the assemblage. The second goal is to discuss the challenges associated with working on a legacy project.

The decision to combine C squares for the analysis was made because C1 and C2 are two sections of the same talus. There are two possible hypotheses that explain why C2 is separated spatially from C1. The first explanation is that C1 and C2 were once connected as the floor of the rockshelter. As the roof eroded away, the floor of the rockshelter collapsed and eroded down. As the roof receded, the ancient tufa that made up the northern part of the rockshelter roof dropped large boulders over the assemblage. The implication of this explanation is that artifacts in C2 are a decent representation of the occupation associated with the ELSA date from square C1.

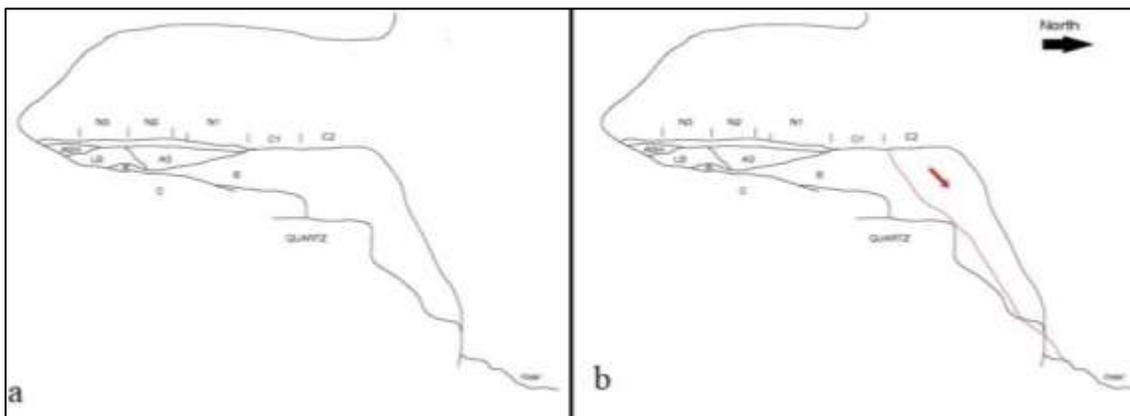


Figure 9.1. Scenario in which C2 represents a collapsed rockshelter floor.

The second explanation is that portions of C1 eroded away and C2 represents an accumulation of artifacts that have collected at the bottom of the talus. The implication of this explanation means that artifacts in C2 are potentially intermixed with other portions of the site.

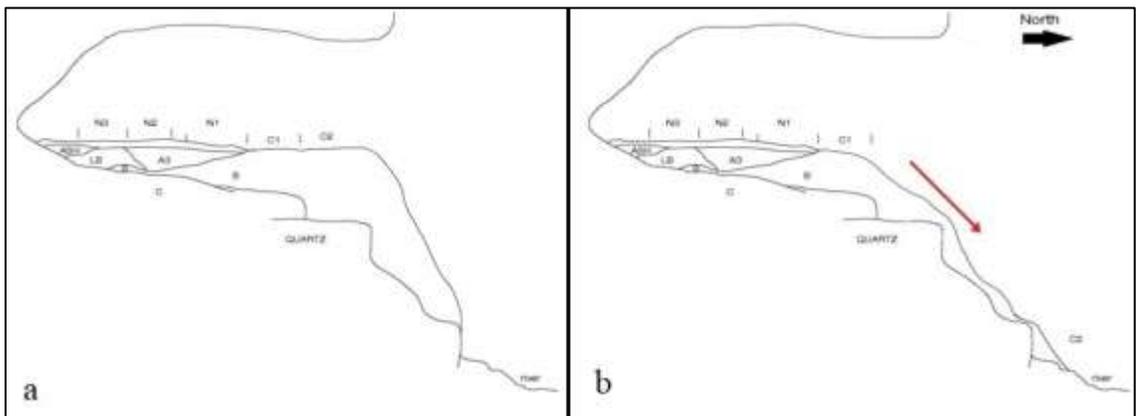


Figure 9.2. Scenario in which C2 represents accumulation of eroded material.

In order for Malony's Kloof to meet the ELSA criteria, the artifacts need to have evidence of bipolar flaking, a significant use of quartz, lack of formal tools, and little to no prepared cores nor multifaceted platforms. Evidence of blades and bladelets is also important (Beaumont 1978, 1981; Kaplan 1990; Low and Mackay 2016; Mitchell 1988; Orton 2006; Orton et al. 2011; Plug 1981; Wadley 1987).

Evidence of bipolar production such as flakes with impact on opposing ends were not prominent, however the high amounts of shatter and the small artifact size indicate that bipolar production was used at Malony's Kloof especially in the younger, intermixed deposits of the N squares. The use of bipolar flaking also suggests technological

miniaturization since bipolar reduction facilitates the production of smaller tool kits because it is possible to extract flakes from small cores (Callahan 1987; Pargeter 2016). Another indication of bipolar production is the fact that cores decreased in size over time (Barham 1987; Deacon 1982, 1984a). The next detail that supports the idea of bipolar technology, is the prevalence of incomplete platforms which result from bipolar damage (Low and Mackay 2016; Pargeter 2016). Another indication of bipolar production is the use of quartz (Barham 1987; Driscoll 2011; Flenniken 1981; Pargeter and de la Peña 2017)

In terms of the use of quartz, ELSA deposits (C squares) at Malony's Kloof did not meet this criterion when compared to younger deposits (N squares). ELSA inhabitants at Malony's Kloof were producing tool primarily made out of chert. Quartz was used significantly more in the younger deposits. Both quartz and chert are readily available in this area so it is not clear why inhabitants changed their raw material procurement strategy. Chert is a higher quality material than quartz yet quartz was over represented in the N squares. Significant amounts of formal tools were not found at the site. Both ELSA deposits and the younger soft sediments contained little formal tools. This feature is common across many Later Stone Age assemblages.

The high amount of multifaceted platforms along with evidence of bipolar production and lack of formal tools support the idea that the assemblage at Malony's Kloof is in fact transitional. The features are mostly devoid of MSA descriptors but there is enough platform preparation occurring as per the high amounts of multifaceted platforms. Blades and bladelets were present at the site but their distribution was not statistically significant. The assessment above suggests that Malony's Kloof represents a

technological approach with a leaning toward Robberg features. If layers between the herding occupation and the ELSA existed, this analysis predicts that the assemblage would have fit within the Robberg industry.

The question of whether ELSA is its own industry is still up for debate. It is hoped that the information provided here will be used in conjunction with research that is currently happening at other sites. By adding to the overall body of evidence, the lithic analysis within this thesis will aid in further operationalizing archaeological information in order to make research into the South African stone ages replicable by creating a common language.

Scholarly literature on legacy collection reveal a concern amongst archaeologist to process and curate artifact assemblages from previous excavations (Macfarland and Vokes 2016). Not only to deal with the space issues many museums and research facilities have but also to apply new technology and new research questions to old data. Legacy collections also provide harsh lessons to researchers regarding why it is vital to maintain excavation information organized and curated correctly. The majority of the time invested in completing this manuscript was spent on deciphering field notes, photographs, and proveniences. It is understandable that the area where the excavation was taking place was remote and it might have been planned with little time, however the contents of the field notebook were inadequate. Pages were not dated, information was not initialed by excavators, nomenclature changed as the excavation progressed and there were no notes in explaining nomenclature changes. Wall profiles were mislabeled, not labeled, drawn different or a combination of all these problems. It was expressed by Dr. Herries that some of the pages of the field notebook were lost which compounded the

predicament. Additionally, artifacts from square N3 were lost. Based on photos, N3 seemed to have evidence of a hearth, a wood post and a deep layer (A15) had been dated to within the ELSA time frame. Time spent connecting obscure dots with little assistance made this research effort much larger and convoluted than it otherwise would have been. The lack of response from the original excavation team worsened the frustration this project festered. The information that Malony's Kloof is adding to the South African archaeological narrative is vital and contributes to high level questions about human behavior in the Pleistocene and technological reactions to the surrounding environment. However, the validity of the information is slightly diminished because of the unreliable data collection. In order to improve the data set's potential for future research, it is imperative to curate the information in digital form. GIS information was not available so a geodatabase may not be possible (Plaza 2012; Tennant 2007) but all files, re-labeled photos and traced site diagrams will be converted into a manageable digital database for future researchers to use with greater ease.

**APPENDIX SECTION**

A. ELEVATION MAP ..... 169

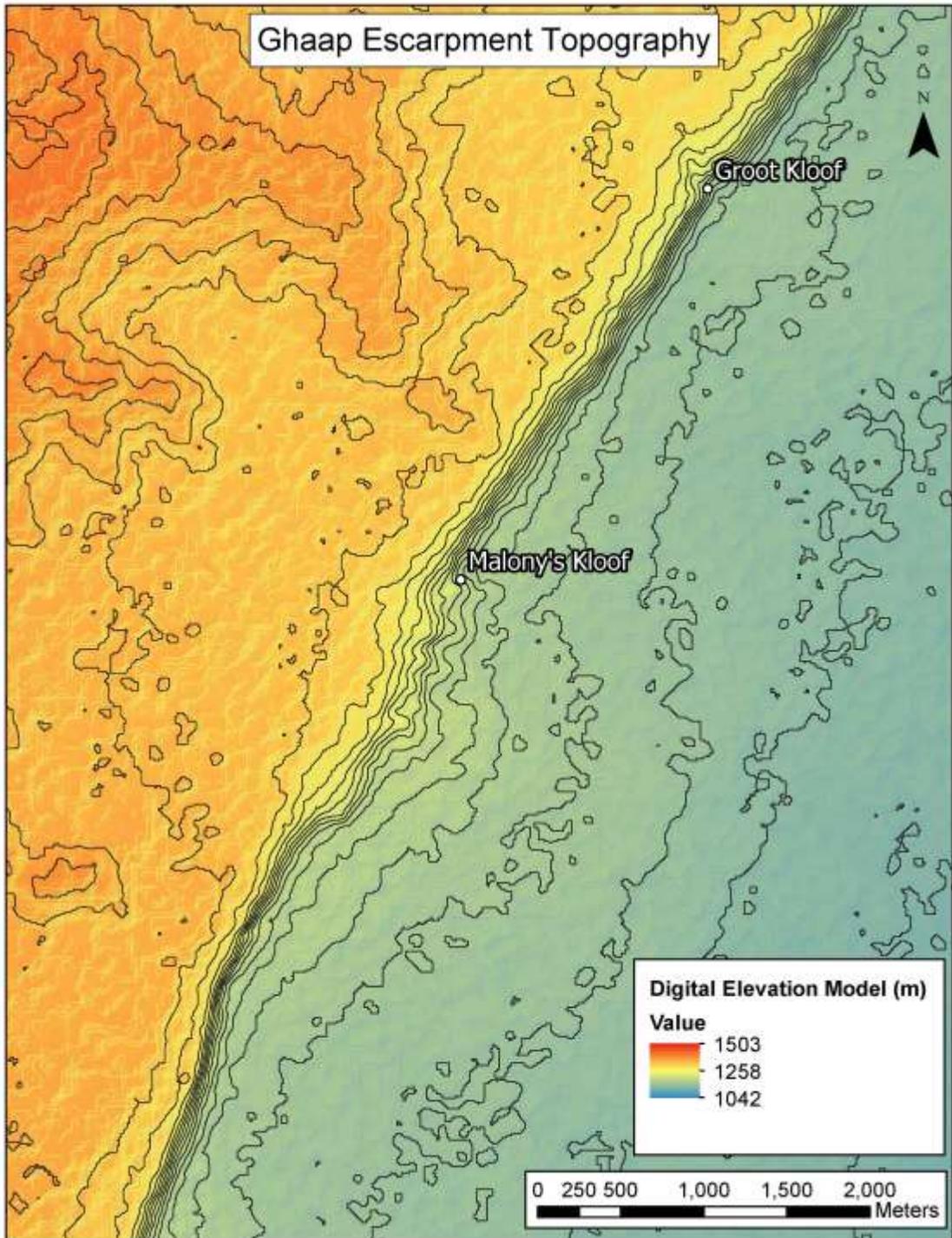
B. MALONY’S KLOOF AREA PHOTOS ..... 171

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**APPENDIX A: ELEVATION MAP**

## Appendix A: Elevation Map



**APPENDIX B: MALONY'S KLOOF AREA PHOTOS**

## Appendix B: Malony's Kloof Area Photos



Figure 1. MKB in relation to MKA. Photo courtesy of Andy Herries.



Figure 2. Gorrokop area with Malony's Kloof Caves. Photo courtesy of Andy Herries.



Figure 3. Malony's Kloof Shelter A. Photo courtesy of Andy Herries.

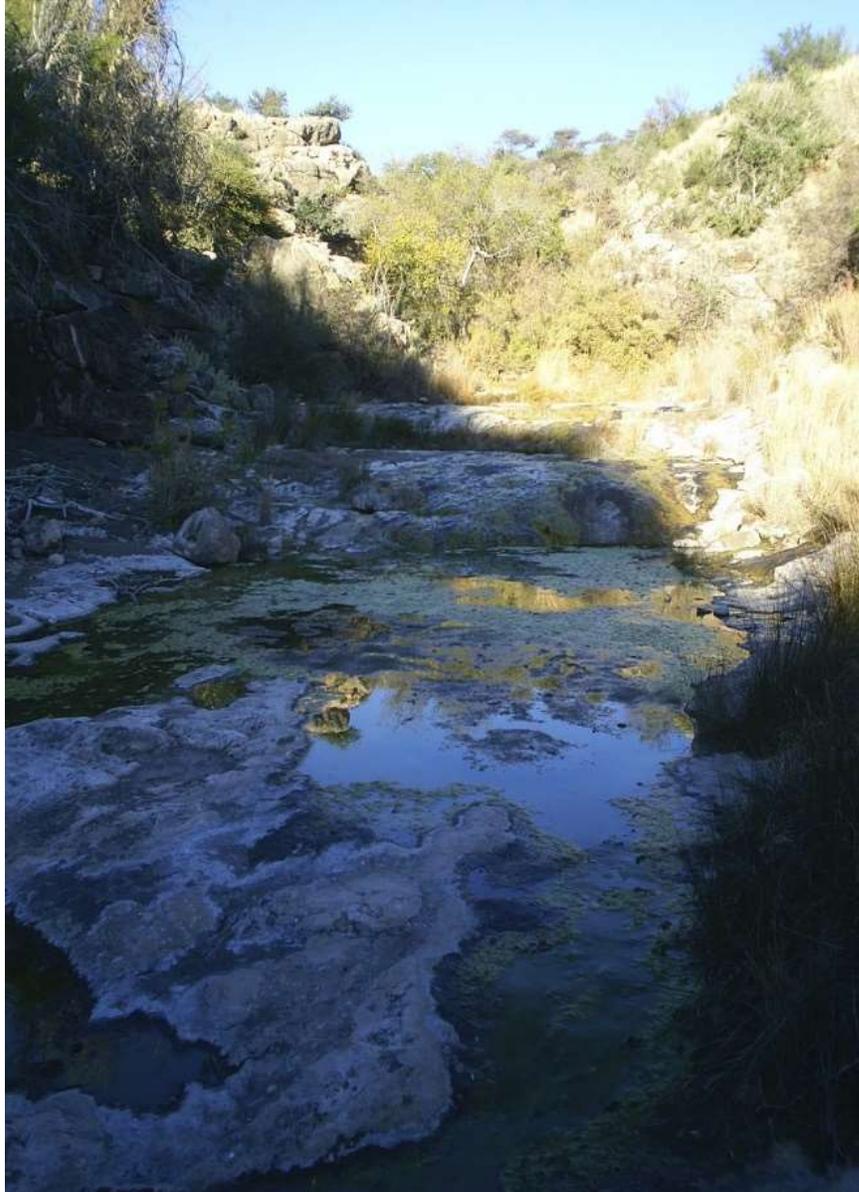


Figure 4. Stream at the bottom of the site. Photo courtesy of Andy Herries



Figure 5. Malony's Kloof C with breccia indicated by "B." Photo courtesy of Andy Herries.



Figure 6. View of Groot Kloof. Photo courtesy of Andy Herries.

**APPENDIX C: UNIT PHOTOS**

## Appendix C: Unit Photos

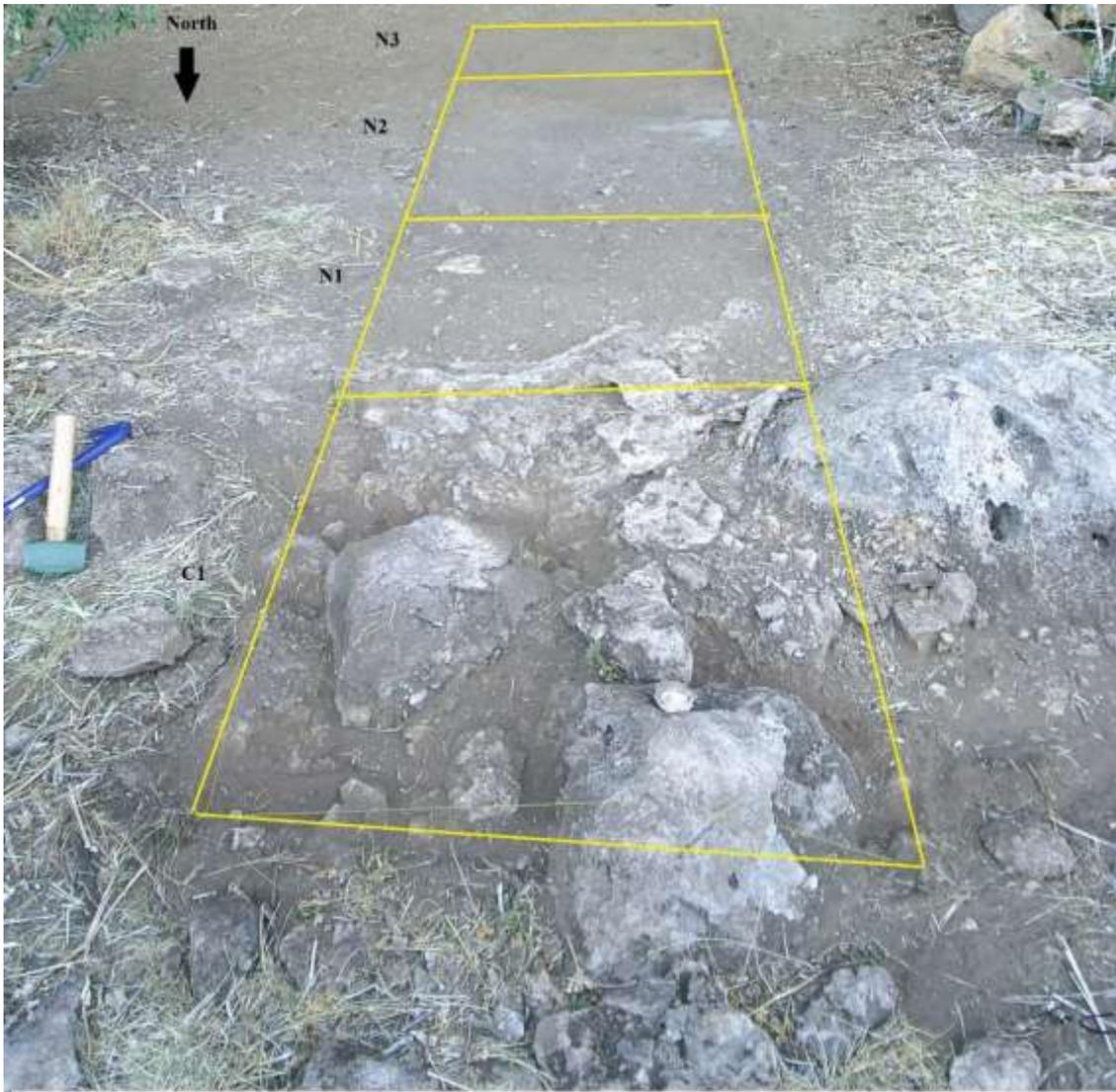


Figure 1. South facing view of squares before excavation with lines to highlight squares.

Photo courtesy of Andy Herries.

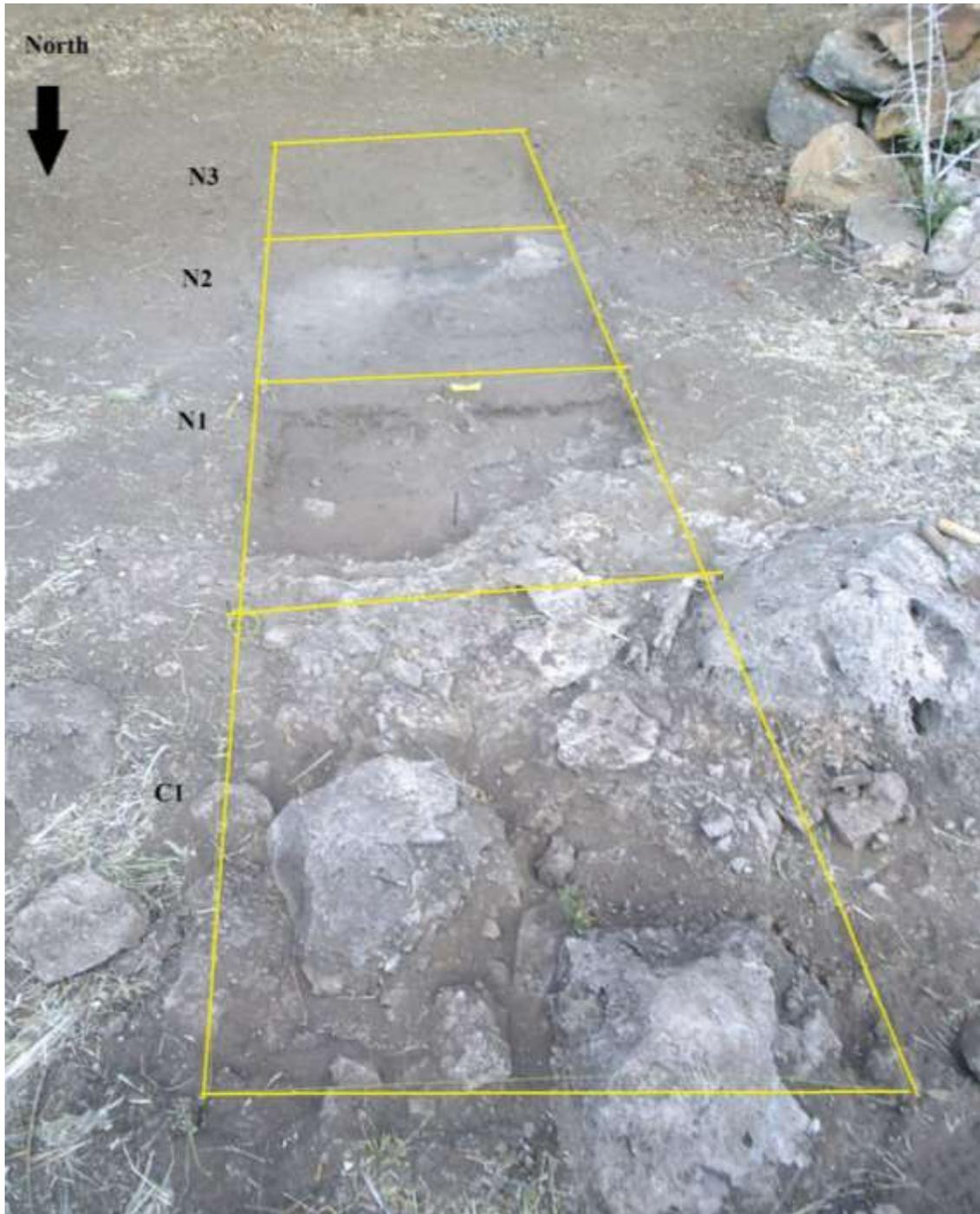


Figure 2. South facing view of squares on 28 June 2005 with lines to highlight squares.

Photo courtesy of Andy Herries.

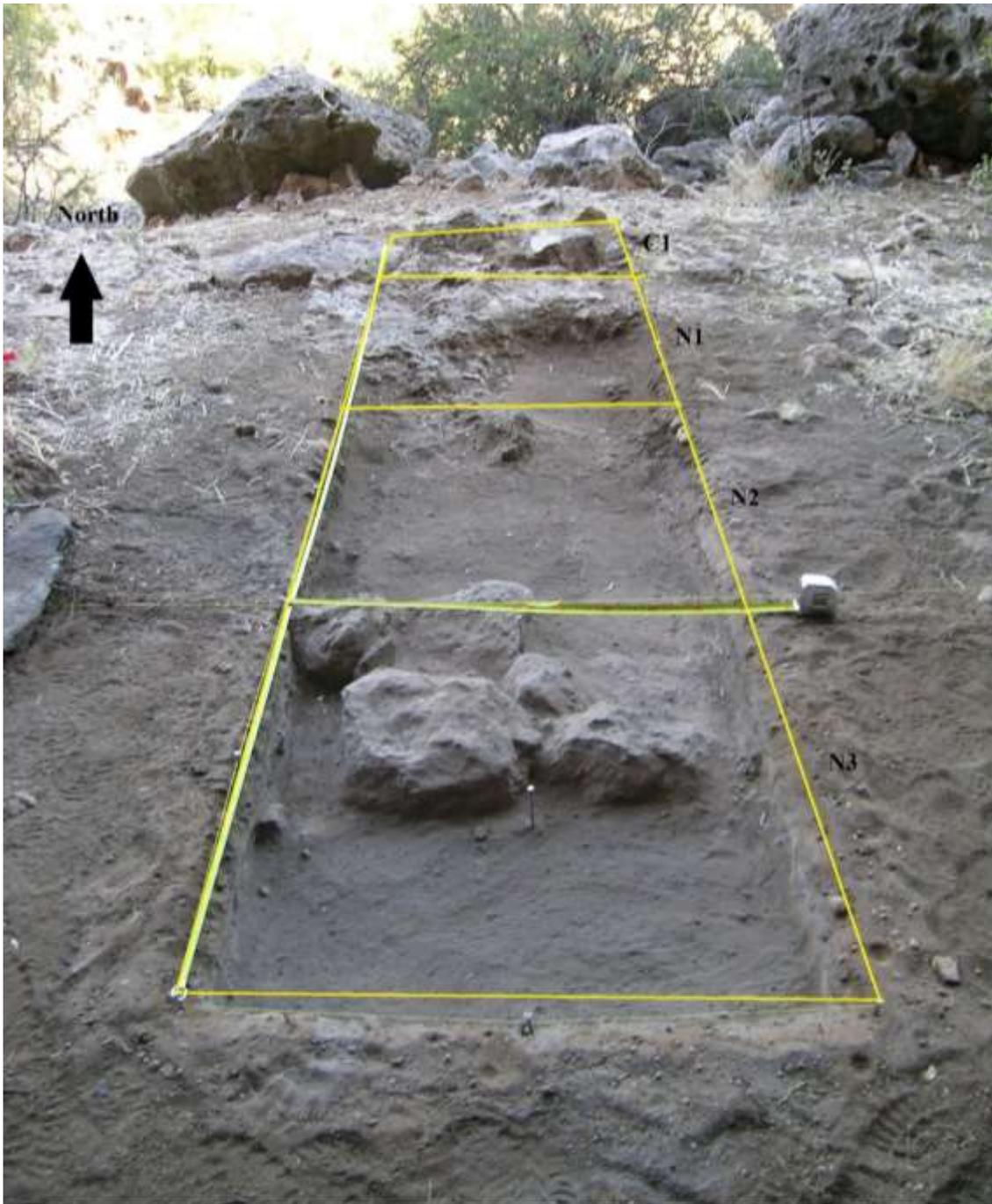


Figure 3. North facing view of squares on 28 June 2005 with lines to highlight squares.

Photo courtesy of Andy Herries.



Figure 4. Southwest facing view of squares on 3 July 2005 with lines to highlight squares. C1 out of view. Photo courtesy of Andy Herries.



Figure 5. South facing view of squares on 11 July 2005 with lines to highlight squares. C1 out of view Photo courtesy of Andy Herries.

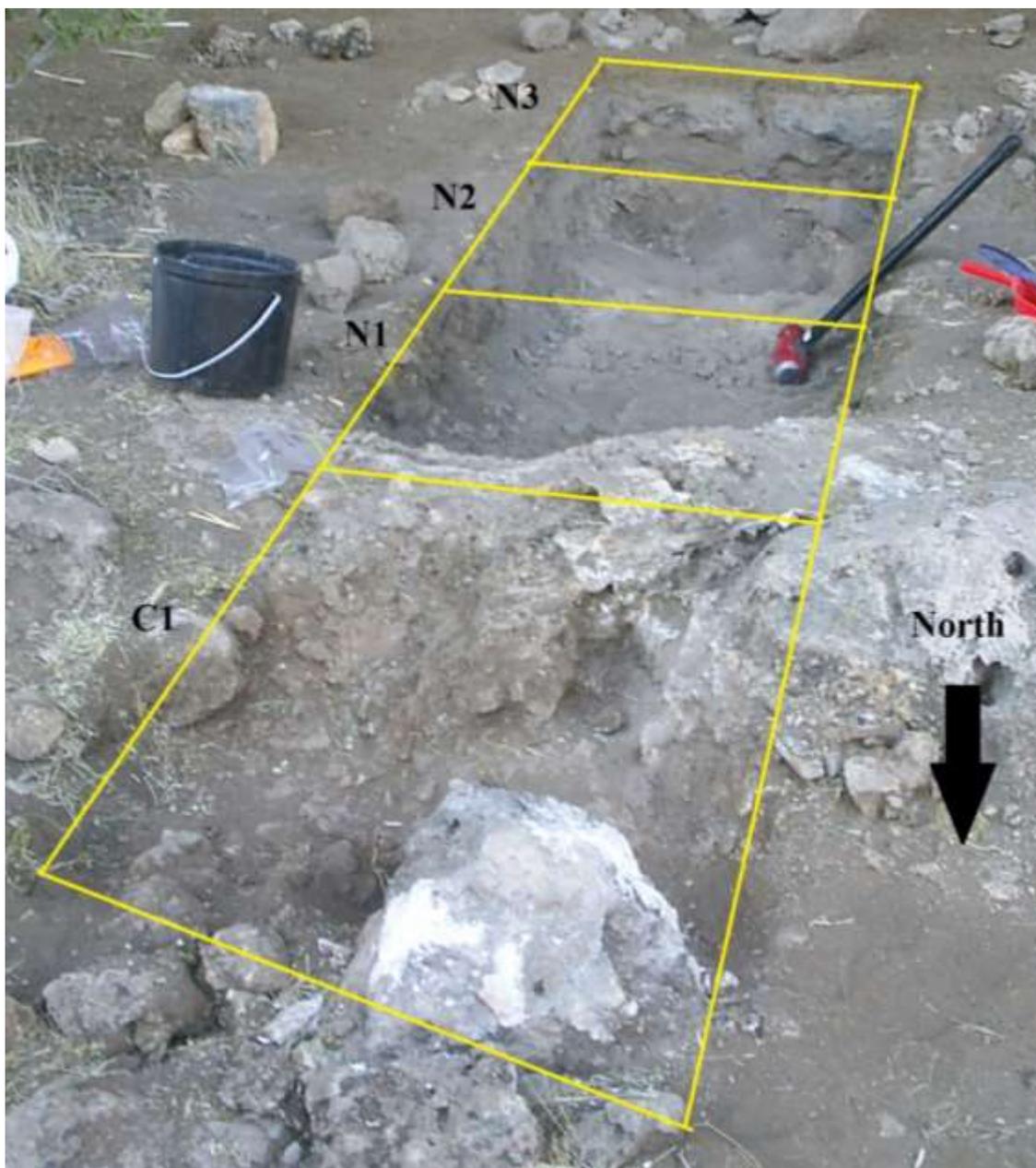


Figure 6. South facing view of squares on 11 July 2005 with lines to highlight squares. C1 in view. Photo courtesy of Andy Herries.



Figure 7. South facing view of squares on 12 July 2005 with lines to highlight squares.

Photo courtesy of Andy Herries.

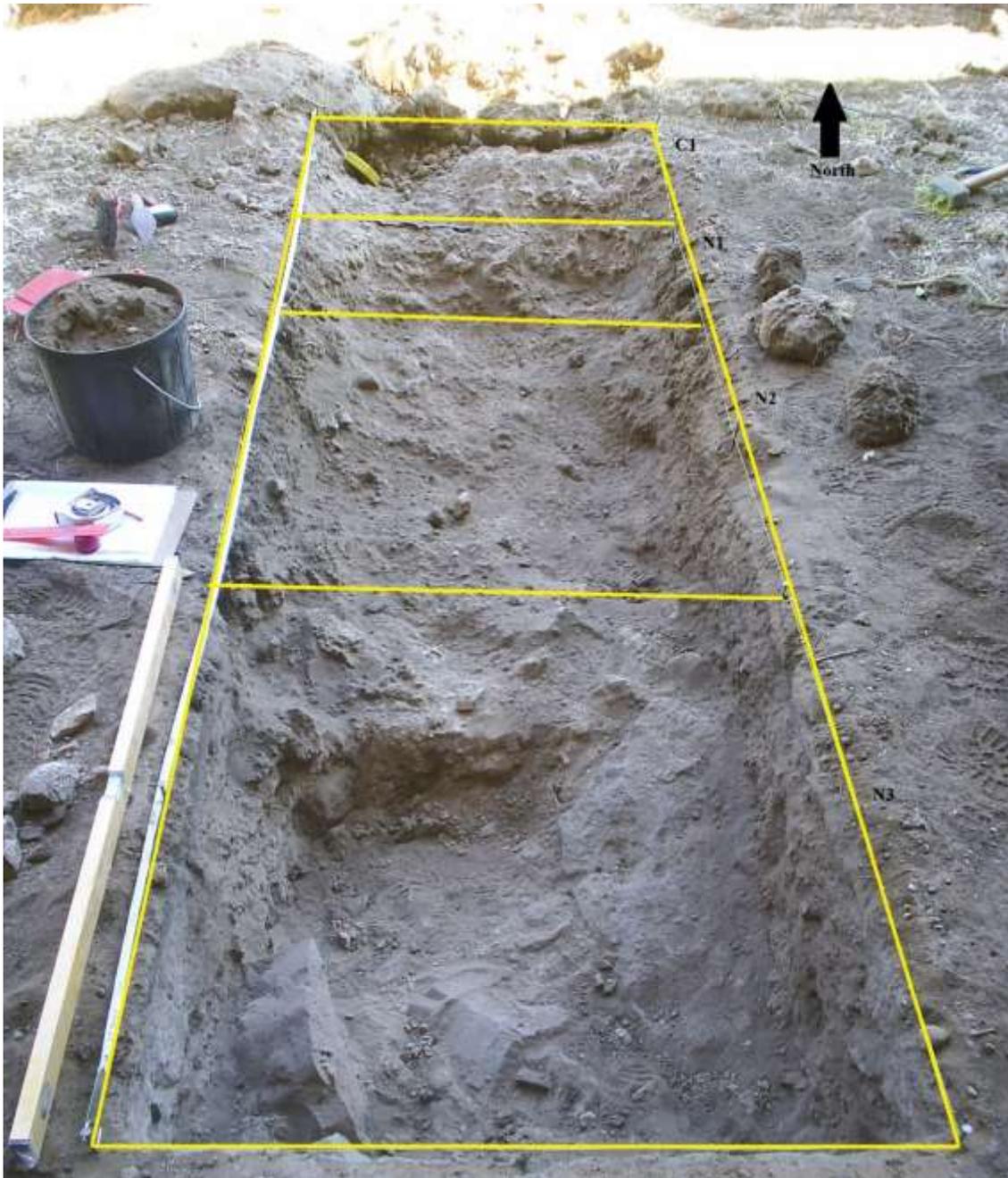


Figure 8. South facing view of squares on 12 July 2005 with lines to highlight squares.

Photo courtesy of Andy Herries.



Figure 9. Squares backfilled. Photo courtesy of Andy Herries.

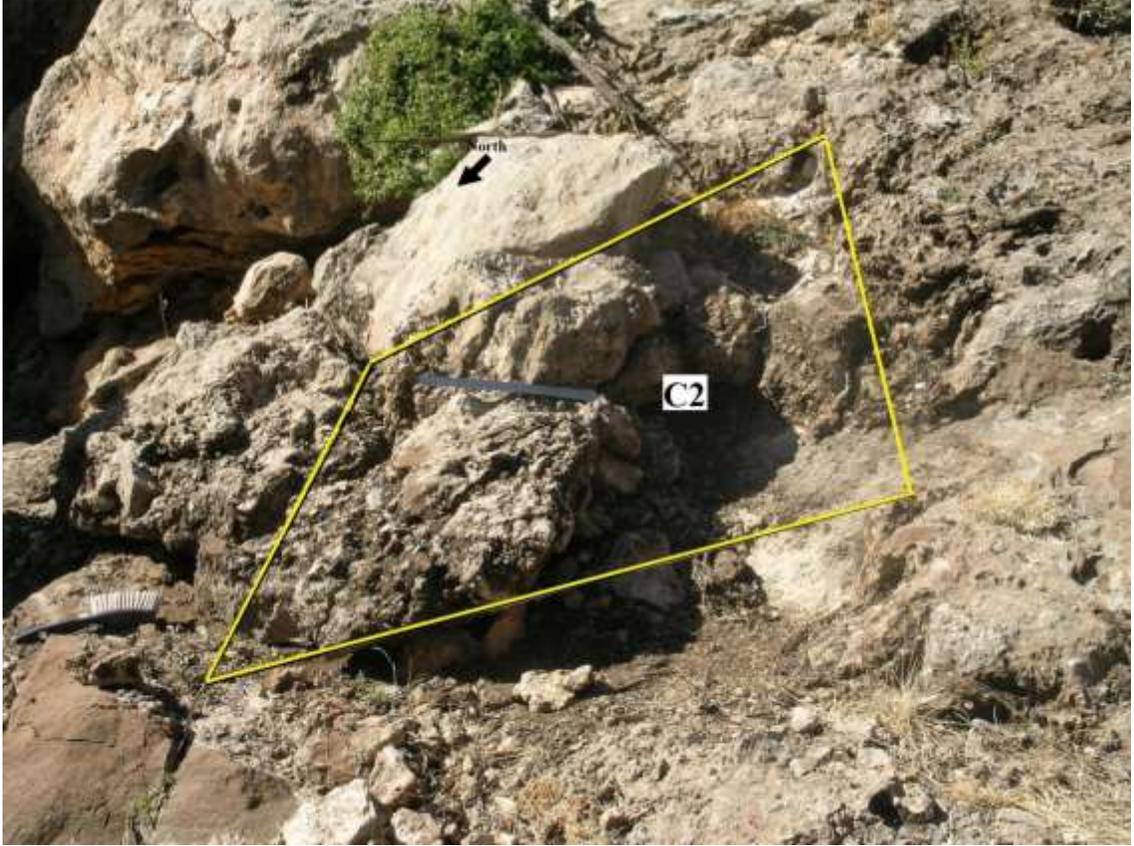


Figure 9. Eastern facing view of Square C2 lines to highlight square. Photo courtesy of Andy Herries.



Figure 10. Southern facing view of Square C2 lines to highlight square. Photo courtesy of Andy Herries.



Figure 10. Northern facing view of Square C2 from top of talus. Lines to highlight square. Photo courtesy of Andy Herries.

## **APPENDIX D: LITHIC TERMINOLOGY**

## **Appendix D: Lithic Terminology\***

**Adze:** An axe-like bifacial tool with a beveled bit or blade edge usually used to work wood or dig up roots.

**Backing:** The grinding or dulling of an artifact edge to prevent the artifact from cutting the hand when held.

**Bipolar Flake:** A detached piece formed as a result of compression forces. Bipolar flakes often show signs of impact on opposing ends and have compression rings moving in two directions toward one another.

**Bipolar Technology:** A technique of resting the objective piece on an anvil and striking it with a hammer to split or remove a detached piece.

**Blade:** A type of detached piece with parallel or subparallel lateral margins. It usually twice as long as it is wide.

**Bladelet:** A flake with a linear dorsal flaking pattern with a maximum length that is greater than twice the maximum width and less than 25 mm in length (Deacon 1984b; Tixier 1963).

**Bladelet Core:** Cores with one and occasionally more platforms from which parallel-sided flakes of bladelet dimensions have been systematically struck. Damage along the striking platform can resemble scraper retouch.

**Burin:** A flake tool with a chisel edge that was produced by the removal of two flakes or spalls at right angles to one another to create a very fine sharp and durable edge.

**Burin Spall:** A narrow, thick flake removed to re-sharpen the bit of a burin. This flake is often continuously curved from proximal to distal end.

**Chalcedony:** A cryptocrystalline silica that is formed with a radiating and fibrous structure.

**Chert:** A compact cryptocrystalline or microcrystalline variety of quartz originating from a sedimentary context.

**Cryptocrystalline (CCS):** Rock of fine-grained aggregate crystals less than 3 mm in diameter.

**Core:** A nucleus or mass of rock of rock that shows signs of detached piece removal. A core is often considered an objective piece that primarily functions as a source for detached pieces.

**Cortex:** Chemical or mechanical weathered surface on rocks.

**Curation:** In stone tools, the amount of use extracted from the potential maximum amount of use available in a spectrum.

**Debitage:** Detached pieces that are discarded during the reduction process.

**Endscraper:** A flake tool with retouch on the distal end. The retouched area has an edge angle that approaches 60° to 90°.

**Expedient tools (informal tools):** Stone tools made with little production effort with only minor design constraints.

**Flake:** A portion of rock removed from an objective piece by percussion or pressure.

**Flake Tool:** A flake that has been subsequently modified by intentional retouch and/or by wear resulting from use.

**Formal Tools:** Stone tools made as a result of extra effort in their production.

**Flat Bladelet Core:** A small core (usually less than 20 mm long) from which bladelets have been struck: The core does not have a flat platform; instead, the bladelets have been removed from a chisel like end. The bipolar technique has often been used.

**Lithic Artifact:** A culturally modified stone tool material found in prehistoric sites.

**Microlith:** Very small blades usually geometric in form used in composite tools. May be created using bipolar production (de la Peña and Wadley 2014).

**Opaline:** An amorphous form of quartz unstable at temperatures and pressures found on the surface of the Earth.

**Pressure Flaking:** The removal of a flake from an objective piece by pressing rather than by percussion.

**Quartz:** A mineral composed of the elements silicon and oxygen that occurs in multiple forms.

**Quartzite:** Generalized term for a sandstone that has been recrystallized or cemented through infiltration and pressure by quartz.

**Sandstone:** A cemented or compacted detrital sediment composed predominantly of quartz grains the size of sand particles.

**Scraper:** A generalized term used to describe a flake tool that has a retouched edge angle of approximately 60° to 90°.

**Shale:** A sedimentary rock formed by the cementation of very fine particles such as mud or silt.

**Shatter:** The unintentional detachment of lithic material from an objective piece in a shape or shapes that were not anticipated.

**Striking Platform:** The surface area on an objective piece receiving the force to detach a piece of material. This surface is often removed with the detached piece so that the detached piece will contain a striking platform at the point of applied force.

**Unidirectional Core:** A core with only one striking platform surface and with flake scars extending in only one direction.

**Usewear:** Modification on lithic artifacts resulting from use as a tool.

\*After Andrefsky 2005 unless otherwise noted.

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